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Sustainability of the *Kawasan Rumah Pangan Lestari* (A Sustainable Food House Area Program) in Pasuruan Regency

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Abstract

The global demand for food is consistently increasing. However, the agricultural land area tends to decline in size. It would pose serious and strenuous issues in the future. The utilization of the house yard area through the *Kawasan Rumah Pangan Lestari Program* (KRPL/Sustainable Food House Area Program) offered a resolution for this issue. The objective of this study was to investigate the sustainability of the KRPL program in Pasuruan Regency from its ecological, social, and economic aspects, and most influential attributes. Interviews sessions arranged with 18 participants who funded by the National and Regional Revenues and Expenditures Budget. The data collected were analyzed using the Multi-Dimensional Scaling (MDS) approach and RAPFISH software. Findings revealed that the KRPL program classified into the moderate category, which indicated it could be executed sustainably in Pasuruan Regency. The economic aspect had the lowest sustainability index compared to the ecological and social aspects. The most influential attributes identified were the utilization of kitchen waste, pest control and irrigation (ecological), cooperation between group members, utilization of village nursery house, interests and benefits for other members (social aspect), cost savings, fulfillment of household consumption, user fees and visits, and product sales processed products (economic). To ensure the sustainability of the program, we need to address some issues and work in several areas: 1) community knowledge, attitudes, and skills improvement; 2) consumptive to productive thinking behavior transition; 3) intensive guidance from the creative and innovative workers, and 4) KRPL promotion.

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INTRODUCTION

More than 570 million agricultural lands in the world are managed by families with a declining scale of business (Lowder et al., 2015). Family farming is a vital subject for sustainable development in rural communities and healthy lifestyles promotion. It broadly applied as a means of organizing agriculture, forestry, fisheries, grazing, and aquaculture production that was managed and driven by families and relied on family labor, women or men (Graeub et al., 2016). Family farming holds an essential role in global food production, especially in Brazil and Malawi (Graeub et al., 2016). In Indonesia, the *Kawasan Rumah Pangan Lestari* (KRPL/Sustainable Food House) area considers as the manifestation of sustainable agriculture that concentrates on small cultivation areas and family farming. However, this issue is developing into a more complicated matter in Indonesia, due to low global land ownership (less than 2 hectares). Hence, its targets are identical: food security, rural development, development of new jobs, natural resource management, cultural heritage perseverance, environment protection, and biodiversity maintenance

Cultivation of plants, livestock, and fish in the house yard, both in the urban or rural areas, delivers beneficial effects for the local community in Indonesia. In Pekanbaru City, KRPL-based farming had contributed 2% to household income. It reduced the budget used for vegetable purchases (Amran et al., 2016). Similar to this finding, vegetables and medicinal plants in the house yard had increased the level of household income in Bandung Regency (Hidayat, 2017), Batu City (Syam et al., 2018), Gianyar Regency (Oka et al., 2016), Kediri City (Annisahaq et al., 2014), Mimika Regency (Patadungan, 2019), Semarang City (Kusumaningsih & Tyas, 2019), Sintang Regency (Rini et al., 2019), Southeast Sulawesi (Tando, 2018), and Yogyakarta (Werdhany & Gunawan, 2012). The effectiveness and profitable effect of the program depended on farmers' knowledge, availability of land, and the duration of cultivation (Sukanata et al., 2015), demographic characteristics of the women and their level of education (Oka et al., 2016), number of family members, and cultivation area (Annisahaq et al., 2014), house yard potential, resource capacity, specific technology and institutions (Purwantini et al., 2012; Surtinah, 2018), environmental maintenance knowledge and attitude (Purwami et al., 2018; Kusnadi, 2019), and supervision from related parties (Kurniawan et al., 2018).

The implementation of KRPL had encountered several hindrances: 1) poor understanding of production technology or plant cultivation techniques, 2) the lack of mentoring and training activities (Tyas, 2019), 3) poor level of knowledge and behavior towards the KRPL program (Sholehah et al., 2016), and 4) limited cultivation area (Kurniawan et al., 2018).

The execution of KRPL programs had started in 2012. Currently, there were 68 KRPLs had distributed across the villages/sub-districts in 24 districts, through the National and Regional Revenues and Expenditures funding. Despite numerous benefits presented by the program, obstacles also occurred during its implementation. The

sustainability of this program needs to be evaluated, especially from its ecological, social, and economic aspects.

Studies related to the implementation of KRPL have been widely conducted in Indonesia. However, most studies applied the descriptive method, calculated the added value, analyzed factors, identified the development techniques, and determined its effectiveness. This study concentrated on the sustainability level of the program by enrolling the multidimensional scaling (MDS) method. In addition, we also conducted a comparison between the National Revenues and Expenditures Budget-based KRPL and Regional Revenues and Expenditures Budget-based KRPL. Sustainability assurance is essential because of the utilization of governmental funds for the program. This study aimed to: 1) describe the KRPL programs in Pasuruan Regency, 2) analyze the sustainability status of the KRPL program in Pasuruan Regency through the aspect of ecological, social, and economic, and 3) determine the most influential attributes in each aspect of the program.

RESEARCH METHODS

The research was conducted in six villages that distributed in six districts in Pasuruan Regency: Watukosek Village in Gempol District, Jatisari Village, Purwodadi Village, and Gunungsari Village in Beji District, Gambir Kuning Village in Kraton District, Ranuklindungan Village in Grati District, and Kawisrejo Village in Rejoso District, Pasuruan Regency on June 3 to July 3, 2020. The data checking and cleaning carried out from July 5 to 16, 2020.

A survey method applied to collect data. The population in this study was the community in six villages that had implemented the KRPL program. Participants were selected purposively. Eighteen individuals from the study locations who funded by the National and Regional Revenues and Expenditures Budget recruited as study participants.

The first objective was addressed by enrolling a qualitative descriptive method. We described the KRPL program and the demographic profiles of participants. The second objective analysis answered by conducting a multi-dimensional scaling (MDS) method with the RAPFISH application (Pitcher, 1999). The sustainability of the program determined by its ecological, social, and economic aspects. Each aspect composed of 10 attributes and assessed through a Likert scale: 1 = very poor, 2 = poor, 3 = moderate, and 4 = good. The criteria for program sustainability set in the index of: a) very poor= 0 – 25%; b) poor: >25 – 50 %; c) sufficient: >50 – 75 %; and d) good: >75 – 100%.

The third objective analyzed by using leverage figures. This analysis enrolled to examine the most influential variable for the program sustainability. Three attributes with the highest leverage value established as the most influential variables.

RESULTS AND DISCUSSION

Kawasan Rumah Pangan Lestari

KRPL program has been implemented in Pasuruan Regency since 2015. The Local Department of Animal Husbandry and Food Security has established 68 KRPLs distributed across 24 districts. The program was funded by three institutions: 1) Ministry of Agriculture through National Revenues and Expenditures Budget, 2) Department of Agriculture and Food Security of East Java Province through Regional Revenues and Expenditures Budget I, and 3) Department of Livestock and Food

Security of Pasuruan Regency through National Revenues and Expenditures Budget II.

KRPL Program aimed to empower the families and communities economically and socially in sustainably meeting food and nutritional needs, achieving food diversification, maintaining the production of the local food crops, conserving the environment, and balancing the ecological system. The KRPL programs had enrolled in each village by *dasawisma* who were part of the Pendidikan Kesejahteraan Keluarga Mobilizing Team (PPK/a program at village level to educate women on various aspects of family welfare) that consisted of 30 to 35 members, in a *Dusun* (a smallest geographical area in a village) or one *Rukun Tetangga* (a non-formal organization that managed a group of people that living in a small scope of area), or members of the Women Farmers Group. The activities included the construction of screen houses (houses/nurseries, demonstration plots) and vegetable, fruit, poultry, and freshwater fish cultivation. Regional Revenues and Expenditures Budget-based KRPL received the aids of a screen house, seeds, and production facilities as well as poultry and fish to run the program. National Revenues and Expenditures Budget-based KRPL received the aid of the fund for the construction of a nursery, demonstration plots, planting yards, and post-harvest handling.

The benefit provided by the implementation of KRPL were: 1) providing the needs of daily vegetable and protein sources independently, 2) providing daily healthy vegetables need without pesticide residues, 3) creating a more beautiful and neat house yard, 4) the needs for several types of vegetables and animal protein could be purchased from other participants with a lower price, and 5) knowledge and skill improvement: a) processing household organic waste into organic fertilizer, b) utilizing non-organic waste (package) as a plant container to reduce the use of poly bags, c) understanding the concept of vertical technology, d) utilization of refugia plants as pest and insect repellents, e) making the vegetable pesticides (neem, garlic, turmeric, ginger, and others) as pest control materials, and f) catfish cultivation with a biofloc system.

KRPL Program Sustainability Status According to Ecological, Social and Economic Aspects

1) Ecological Aspect

Based on the results from the MDS analysis by enrolling *Rapfish* on 10 attributes of the ecological aspect, the sustainability index value of National Revenues and Expenditures Budget (APBN)-based KRPL and Regional Revenues and Expenditures Budget (ABPD)-based KRPL was 75.95 percent (Figure 1) and 72.88 percent (Figure 2), respectively.

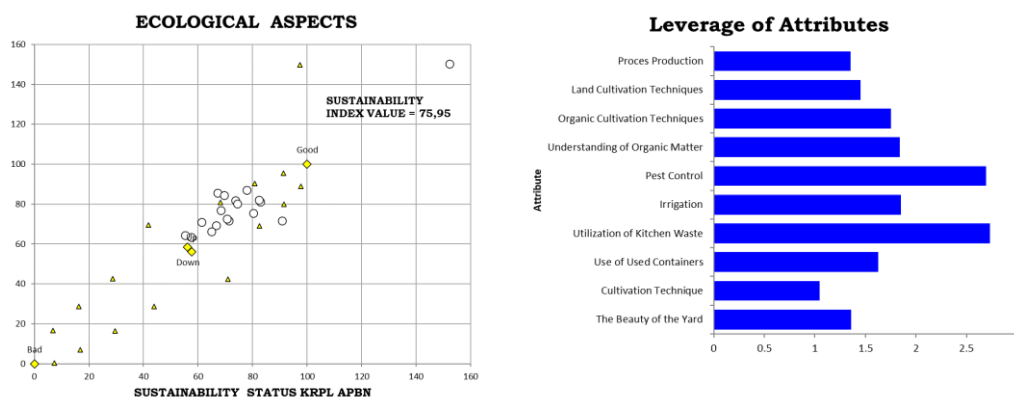


Figure 1. KRPL Sustainability Status by the Ecological Aspect (National Revenues and Expenditures Budget/APBN)

Based on the sustainability criteria, the National Revenues and Expenditures Budget-based KRPL and Regional Revenues and Expenditures Budget-based was positioned in good and sufficient category, respectively. This situation signified the effect of fund given for the program. The aid in the form of fund delivered better impact in comparison with aid of goods. The participant might had poor understanding in using the seed or tools from the aid.

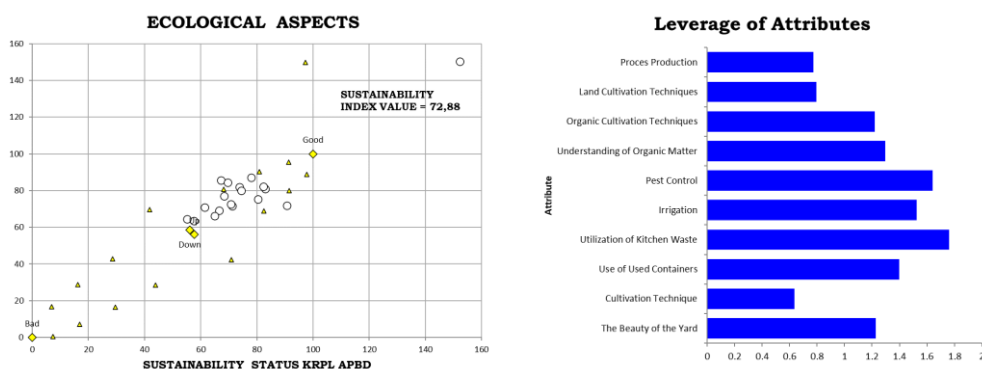


Figure 2. KRPL Sustainability Status by the Ecological Aspect (Regional Revenues and Expenditures Budget/APBD)

2) Social Aspect

The sustainability index value of National Revenues and Expenditures Budget (APBN)-based KRPL and Regional Revenues and Expenditures Budget (ABPD)-based KRPL was 79.74 percent (Figure 3) and 79.26 percent (Figure 4), respectively. Based on the sustainability criteria, the National Revenues and Expenditures Budget-based KRPL and Regional Revenues and Expenditures Budget-based was positioned in good and good category, respectively. Thus, there was no difference in the sustainability between the National Revenues and Expenditures Budget (APBN)-based KRPL and Regional Revenues and Expenditures Budget identified.

The results of the leverage analysis revealed that two attributes affect the sustainability of National Revenues and Expenditures based-KRPL, namely: 1) group member partnership, and 2) utilization of village nursery gardens with the value of

leverage 1.75 and 1.69, respectively. This finding indicated that the improvement in the social aspect required to involve these attributes to produce a significant impact. Assistance from district officials and visitation from the communities had the lowest percentage. Measures were also needed to improve these attributes. IT could be enhanced through the intensification of visitation frequency by district officials to provide motivation and assistance and KRPL promotion.

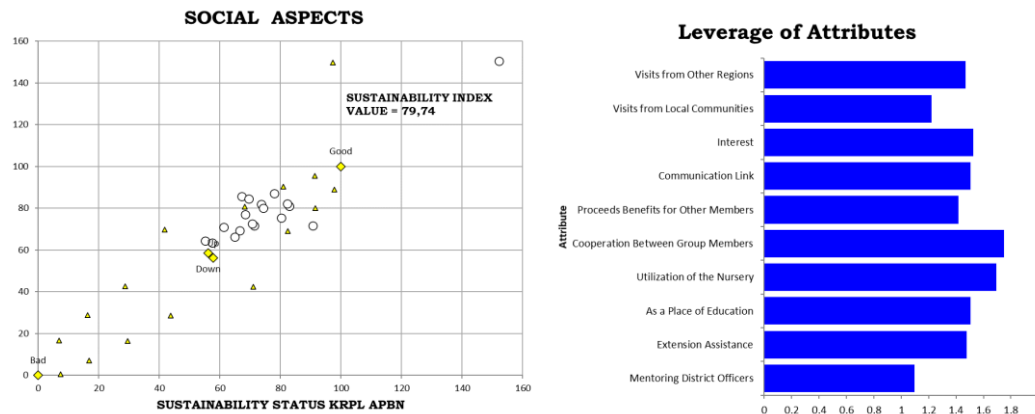


Figure 3. KRPL Sustainability Status by the Social Aspect (National Revenues and Expenditures Budget/APBN)

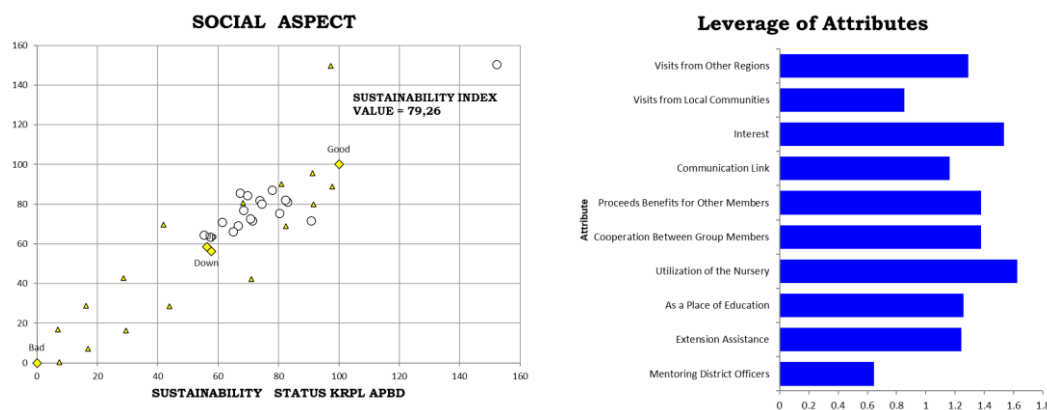


Figure 4. KRPL Sustainability Status by the Social Aspect (Regional Revenues and Expenditures Budget/APBD)

3) Economic Aspect

The sustainability index according to 10 attributes of the economic aspect of National and Regional Revenues and Expenditures Budget-based KRPL was 65.95% (Figure 5) and 69.03% (Figure 6), respectively. Based on the sustainability criteria, the National Revenues and Expenditures Budget-based KRPL and Regional Revenues and Expenditures Budget-based was positioned in moderate and moderate category, respectively.

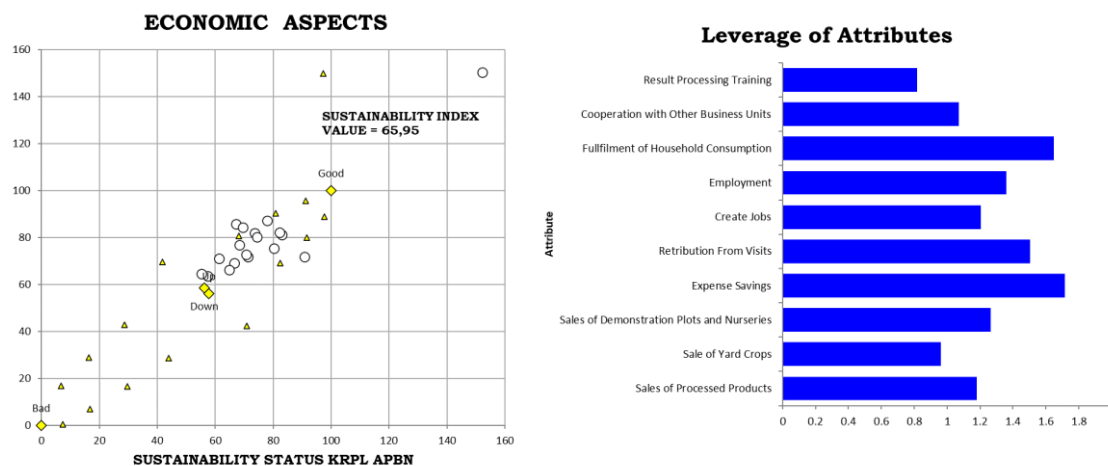


Figure 5. KRPL Sustainability Status by the Economic Aspect (National Revenues and Expenditures Budget/APBN)

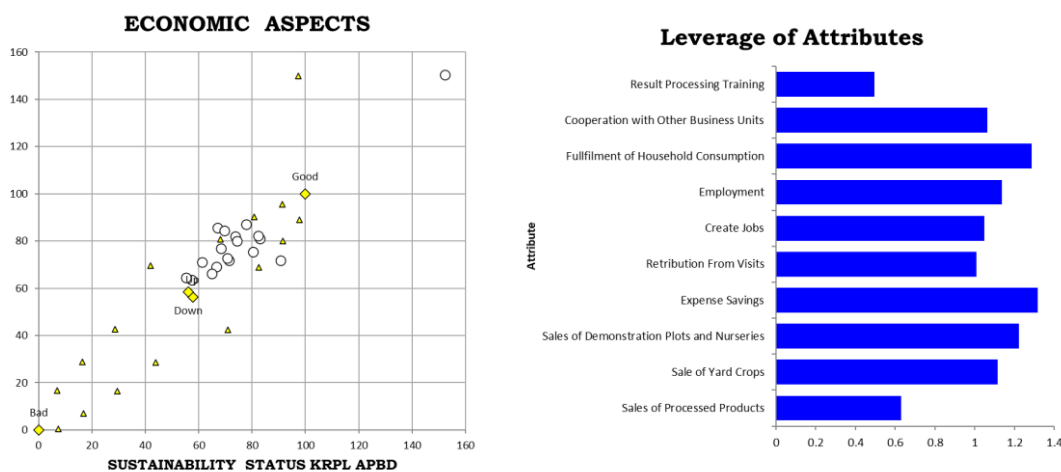


Figure 6. KRPL Sustainability Status by the Economic Aspect (Regional Revenues and Expenditures Budget/APBD)

Based on the findings, the sustainability of the KRPL program in Pasuruan Regency based on its ecological, social and economic aspects had revealed its position in the sufficient category (Table 1). The sustainability index for National and Regional Revenues and Expenditures Budget-based KRP was 73.88% and 73.72%, respectively. Hence, no difference between the National and Regional Revenues and Expenditures Budget-based KRPL identified in this study.

Table 1. KRPL Program Sustainability in Pasuruan Regency

Aspect	National Revenues and Expenditures Budget		Regional Revenues and Expenditures Budget	
	Sustainability index (%)	Status	Sustainability index (%)	Status
Ecology	75.95	Good	72.88	Good
Social	79.74	Good	79.62	Good
Economy	65.95	Moderate	69.3	Moderate
Mean	73.88	Moderate	73.72	Moderate

National Revenues and Expenditures Budget-based KRPL sustainability index (73.88%) was higher than the index of Regional Revenues and Expenditures Budget-

based KRPL (73.72%). National Revenues and Expenditures Budget-based KRPL received This situation probably occurred to different form of aid delivered for the program. National Revenues and Expenditures Budget-based KRPL received aid the the form of money. Hence, the program could manage the fund according to their need. In some points, it improved the motivation to develop the programs. Despite of the distinctive characteristic of aid delivered, the management of the National and Regional Revenues and Expenditures Budget-based KRPL was still identified in sustainable state.

Economic aspect presented the lowest sustainability index. This value indirectly indicated that the main objective of the program in meeting the daily household need. Initially, the programs did not intend to achieve any commercial purpose. The attributes in economic aspect should have improved to ensure the sustainability of the program. Well-functioned ecological and social aspects would serve an improvement in the economic aspect. We expected the improvement of the sustainability index increases up of 70% for National Revenues and Expenditures Budget-based KRPL and 73% for Regional Revenues and Expenditures Budget-based KRPL. Training on product processing and sales would increase the sustainability of the economic aspect and the KRPL program.

This finding was in line with a study done by (Hanipah et al., 2020). They found that economic aspect served the lowest index of agricultural sustainability in Karawang. The underlying cause of issues on the economic, social, and ecological dimension was the high capital required for production, lack of farmer regeneration poor cultivation land size and access to irrigation. The evaluation of the sustainability of energy forestry area in East Lombok Regency by (Narendra et al., 2019), showed in a fairly sustainable status of the area. Hence, it was necessary to prioritize several attributes to improve it's the sustainability of a program. This was in contrast to the lack of continuity of multidimensional pond polycultures with or without mangrove integration (Dolorosa et al, 2016).

The Most Influential Attributes of KRPL Sustainability

The sustainability status of the KRPL program was determined by the value from the leverage analysis. Figure 1-6 reveals three attributes with the highest value from the leverage analysis on the National and Regional Revenues and Expenditures Based-KRPL programs (Table 2).

1) Ecological Aspect

The results of the leverage analysis showed the three most-influential attributes from the ecological aspects: 1) utilization of kitchen waste, 2) pest control, and 3) irrigation. These attributes had high leverages, signified their major contribution to the sustainability status of the program. Cultivation techniques and production processes had the lowest leverage values (Figures 1 and 2). This value indicated improvement in these areas required to enhance the sustainability status of KRPL.

Table 2. The Most Influential Attributes on KRPL Sustainability

No	Aspect	Attribute	Leverage	
			APBN	APBD
1	Ecology	Utilization of kitchen waste	2,73	1,76
		Pest control	2,69	1,64
		Irrigation	1,85	1,53
2	Social	Collaboration/partnership between members	1,75	1,38*
		Utilization of village nursery house	1,69	1,62
		Interest	1,53	1,53
3	Economy	Cost-saving	1,72	1,32
		Meeting the need of daily household consumption	1,65	1,29
		Retribution dan visit	1,50	
		Sales of processed products		1,22

Findings had shown that the utilization of kitchen waste and pest control had a high leverage value. This situation implied KRPL activities implemented the food safety measures, namely: 1) reducing the use of inorganic fertilizers (chemical fertilizers), replacing them with compost made from kitchen waste, and using rice water to provide plant nutrients, and 2) pest eradication by using natural vegetable pesticide.

This finding was in line with a study by (Toader & Roman, 2015) that mentioned the importance of family farming for food security, sustainable rural development, new job chance, natural resource management, cultural heritage preservation, environment protection, and biodiversity maintenance. The low-leverage production process needed to be enhanced because global family farming had a vital role in global food production (Graeub et al., 2016).

2) Social Aspect

The most influential attributes for the program sustainability were: 1) collaboration between members, 2) utilization of village nursery house, and 3) interest. Interestingly, we found a significant difference in these attributes between the National Revenues and Expenditures Budget-based KRPL and the National Revenues and Expenditures Budget-based KRPL (Figures 3 and 4). This difference could be caused by different forms of aid delivered for the KRPL. To well-organized the aid of self-managed cash, good collaboration between the members was required. The village nursery houses would help the member to convey their desires and aspirations as the group members. Facility and infrastructure also would support the sustainability of the program.

Interest in the program was the most vital attribute in KRPL implementation. Furthermore, a good partnership between members is ultimately required to manage the group activities, especially activities in village nursery house and demonstration plots activity. The lack of assistance from district officials and visitation from the surrounding community, which was indicated by the lowest leverage value, had to be improved to ensure program sustainability.

3) Economic Aspect

Three most influential attributes for the sustainability of the National Revenues and Expenditures Budget based-KRPL were: 1) expenditure savings, 2) the fulfillment of household consumption, and 3) user retribution and visits. This result implied the importance of the involvement of these attributes for the sustainability state of the economic aspect. Analysis also revealed that sales of cultivated commodity and training had the lowest index.

In contrast to the Regional Revenues and Expenditures Budget based-KRPL, three most-influential attributes for the sustainability status of the program were: 1) expenditure savings, 2) fulfillment of household consumption, and 3) sales of processed products. This finding revealed that the intention of the KRPL program adoption was to utilize the house yard as the cultivation area of vegetable, fruit, livestock, and fish to meet the needs of diverse, nutritious, balanced, and safe household nutritional requirement. The sales of demonstration plot and village nursery house and training had the lowest percentages. However, the implementation of all attributes in this aspect had to be improved to maintain the sustainability of the program.

According to the economic aspect, the program of KRPL could not produce adequate economic advantages. Hence, no job opportunities provided by the program. The majority of the participant of the programs were “housewives”. Poor labor absorption may occurred due to 1) lack of collaboration within business units, 2) poor harvest production (small- scaled), and 3) cultivation commodity were consumed in a family-scale (subsistence).

In fact, KRPL activities also designed to generate a small and simple economic activity in a family scale. The cultivated agricultural products expected to be distributed as a healthy organic products at affordable prices, processed or freshly harvested products. Unfortunately, this aim could not completely address due to lack of market access and rare utilization of processed products. Therefore, training on harvest processing skill is also required.

This was in line with a finding by Ashari et al. (2012). They found that the major issues encountered during the development of a home-based garden was the poor availability of harvest and post-harvest technology for local food commodities, put as a side activity, subsistence, and not market-oriented. (Yusuf et al., 2019) found that based on economic conditions, the analysis of rice farming in Siak Regency was quite sustainable for Sabak Auh, Sungai Apit and Sungai Mandau and very sustainable for Bunga Raya. This may occur to the different economic sensitivity offered by different regions. Several dimensions of the economic aspect of KRPL in this study also showed different sensitivities (Figures 5 and 6).

Ten economic attributes need to be well-involved to ensure the sustainability of this program. The leverage value of all program elements funded by the Regional Revenues and Expenditures Budget was lower than the National Revenues and Expenditures Budget. This finding conveys a message for the government to reconsider the form of aid delivered for the KRPL program.

To the best of our knowledge, no studies had discussed the sustainability status of KRPL with the recent method. Studies had conducted in Batu City, Bandung, Subang, Mimika, Gianyar, Pacitan, Southeast Sulawesi, Pekanbaru, and other areas in Indonesia only described and analyzed other aspects as previously mentioned. In

Cirebon, a study had conducted to examine factors that influence the house yard use with regression analysis (Sukanata et al., 2015) with the determinant of variable of knowledge, land availability, and availability of free time, but the sustainability. Meanwhile, studied that enrolled MDS had applied to evaluate the sustainability of different programs or activities (rice, fisheries, local agriculture). In Gianyar, the success implementation of KRPL was investigated (Oka et al., 2016) by regression analysis with the dependent variables of household income, family nutritional intake, and the amount of income from the house yard utilization.

According to our review of literature, no study of the similar program also found in foreign countries. In Georgia, for example, (Gelashvili, 2014) studied the role of family farming in sustainable agricultural development and poverty alleviation. He had reviewed three aspects of the program (ecological, social and economic) with different indicators, namely: 1) ecology: natural resources, pollution and biodiversity; 2) social: empowerment, equity, inclusion; and 3) economy: growth, efficiency, stability. These aspects were then analyzed by SWOT. In Romania ((Toader & Roman, 2015) examined the family farming policies, but only described the current conditions during the study. Moreover, no discussion of the sustainability found in their study.

CONCLUSION

The KRPL program in Pasuruan Regency was funded by the National and Regional Revenues and Expenditures Budget. It widely had implemented since 2015 and followed by the formation of other 68 KRPL and self-help KRPL programs distributed across 24 districts. Regional Revenues and Expenditures Budget-based KRPL received the aids of a screen house, seeds, and production facilities as well as poultry and fish to run the program. National Revenues and Expenditures Budget-based KRPL received the aid of the fund for the construction of a nursery, demonstration plots, planting yards, and post-harvest handling. The status of KRPL was sustainable (index 73.80%), with the index of 73.88% for the National Revenues and Expenditures Budget-based KRPL and the index of 73.72% for the Regional Revenues and Expenditures Budget-based KRPL. Findings revealed that the most significant attributes for sustainability status were: 1) ecological: utilization of kitchen waste, pest control, and irrigation (indicators of food safety measures implementation); 2) social: cooperation between group members, utilization of village nursery house, interests, and benefits for other members; and 3) economic: cost-saving, meeting household consumption, retribution and visits, and selling processed products.

RECOMMENDATION

To assure its sustained implementation, several areas of the KRPL program required to be improved: 1) community knowledge, attitudes, and skills improvement to organically cultivating vegetables, poultry, and fish; 2) consumptive to productive thinking behavior transition, recalling the best level of success is generally achieved by a community who oriented productive behavior; 3) intensive guidance from the creative and innovative workers; and 4) KRPL promotion to empower the community, through social media platforms or visitation. Further studies suggested assessing more factors and analyzing each element of the three most influential aspects

contributing to the sustainability status of the program. Hence, factors that need to be maintained or improved could be well-identified and elaborated.

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