INTEGRATION OF PLANT-HUSBANDRY IN USAHATANI TO INCREASE THE CONSUMPTION ABILITY OF FARMERS' HOUSEHOLDS IN INDONESIA

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ABSTRACT

Background and Objective: In line with the efforts to meet national and international food needs so far, it requires innovations in food production, especially for small scale farming. Various countries have their respective policies in an effort to meet these food needs. The objectives of the research were to find the right types of commodities for farmers to produce so that they can increase the financial capacity of their households. **Materials and Methods**: This research studied 400 farmers in West Java Province through the 2012 Beneficiery Impact Assessment (BIA) project. The hypothesis is that the integration of several commodities into one farm production process can maximize farmers' income. **Results**: The increase in farmer income has a positive correlation with the increase in the ability of financial expenditure for consumption needs by farmer households. As many as 56.5% of farmers practice the integration of several commodities in their farming, while 43.5% of farmers do not practised (only rice production). The combination of rice business with poultry achieved the highest income per year (IDR 36,599,813) when compared to rice business alone (IDR 25,283,368) and integration of paddy-sheep commodity (IDR 20,598,195). **Conclussion**: Socialization of these findings needs to be done through extension services and other media to farmers so that they can adopt the farming system appropriately.

Keywords: ability, farming, farm production, increase farmer, paddy-sheep commodity

1. INTRODUCTION

The international community has recognized the challenges that exist today. In particular, the 2030 Agenda is gradual development in achieving food security as a measure to anticipate logistical crises or food crises with various strategies to improve the welfare and nutrition of the world's families and develop agriculture in 2031. Efficient and appropriate technology in agricultural development. The thing that becomes a crisis with the world is hunger, lack of logistics and also lack of food reserves (Golay, 2010). Extreme climate change as well as diminishing food reserves which deplete logistical reserves also exacerbates this crisis, which has an impact on the global food crisis. This can be overcome with the current trend which is getting better (Schnitter & Berry, 2019; Wollenberg et al., 2016).

Integrated crop-livestock production systems can create multiple environmental benefits. The scale of integration depends on the farmer's knowledge, motivation and resources. The hope of farmers adopting an integrated crop-livestock system is to increase the profitability and sustainability of the agricultural environment. The combination of the complexity of the system and the potential for the public interest justifies the creation of new national or international research initiatives to overcome constraints and move North American agriculture towards greater profit and sustainability (Foran et al., 2014; Turner et al., 2003). The agricultural sector is still a fairly important sector with the highest contribution to Indonesia's gross domestic product (13.41%), the second largest after the manufacturing sector (21.31%) (Khairiyakh et al., 2016; Mardiana et al., 2021). This achievement places the farmer

household as a strategic player in Indonesia's economic development.

Efforts to increase farmer household income are continuously carried out through the implementation of national development programs. The series of implementation of the development program is aimed at increasing the independence of farmer households in Indonesia. One of these efforts was the implementation of the Farmer Empowerment through Agriculture Technology and Information (FEATI) program in 2010, which was funded by the Worldbank, targeting farmer households in Indonesia. In line with the increase in the independence of farmer households participating in the program, it is necessary to have a more in-depth study of which commodities are potential and significant to develop more effective and efficient farming.

Farming in Indonesia, especially those on a small scale and constituting the largest share, is generally carried out with one or several commodities in one production process. Therefore, development efforts require the identification of potential commodities in the farms that it runs.

The parameter that can be measured on the level of farmer welfare is the ability of consumption expenditure by the farmer household. The farmer household consumption expenditure can be grouped based on the commodity produced and averaged for comparison between commodity groups. Thus, it can be seen which commodities have the most potential to be developed so as to create more effective and efficient farming.

This study is based on data collected in 2012 and is still feasible to describe the current conditions related to farming carried out by farmer households in Indonesia. The problem that exists in farming in Indonesia is also a problem for farming in other countries, especially developing countries. Thus, this study is expected to be a contribution to consideration in efforts to improve the welfare of farmer households, especially in Indonesia and developing countries in general.

2. THEORETICAL FRAMEWORK

Empowerment is defined as a person's ability to make effective choices, as the capacity to transform choices into desired actions and outcomes. This is influenced by each individual. The indicator that can be used to measure

personal capacity is the talent they have. This personal ownership in this case, in the form of psychological, informational, or organizational forms, it can also be in the form of material, social forms, financial forms, and/or the human side (Alsop & Heinsohn, 2005). The results of study showed that the increase in creative performance is in line with the increase in respondent independence. Reported a higher level of independence by utilizing individual creativity in a team through the existence of shared knowledge about who knows what ("knowledge of who knows what"/ KWKW) and diversity of functional backgrounds. It is generally assumed that a high degree of independence has both positive and negative consequences for performance, depending on the specific setting (Richter et al., 2012). Research conducted found that there was no interaction effect between learning time on the level of independence and innovative settings (Salanova et al., 2012).

Reports the results of a review of the situation of agricultural household income in OECD countries for which data are available, and examines the role played by agricultural policy (Birthal et al., 2014; Sugiarto & Ahmad, 2015). The results of the OECD review recommend that government intervention is needed to ensure adequate income levels for widely dispersed farming families more effectively and equitably. The production of laying native chickens is known to have good prospects in doing business (Martini & Arianti, 2021; Padhi, 2016). The production of native chickens can be a tool for developing entrepreneurship, stronger and more promising financial empowerment. Apart from being financially profitable, this farm is also an independent business as a side business (part time labor). Reported the results of their research that socio-economic parameters influenced the choice of farmers for mixed ventures, namely fish-rice-poultry which would maximize their income (Oben et al., 2015; Wolfert et al., 2017). There are 35% of Camerun's 120 farmers implementing integrated fish-rice-poultry business, earning the highest profit of 965,270 FCFA (US $ 1,931) compared to other business combinations. The fact is that the agricultural sector is resilient to the economic crisis that occurred in Indonesia in 1997. In agricultural development, the principle is to develop human resources. Household farmers are generally food crop and plantation farmers (81.95%) and are

small scale farmers (Salahuddin et al., 2021; Slamet et al., 2017).

3. MATERIALS AND METHODS

This research was conducted in West Java for eight districts: Sukabumi, Cirebon, Karawang, Garut, Majalengka, Kuningan, Indramayu, and Subang. This research was conducted from October to December 2012 with four hundred respondents. Respondents were randomly selected from members of the study group and they had received farming technique training

Rice farmer households in Indonesia generally combine commodities other than rice as the main commodity in their farming. These other commodities are generally produced as a side business. This is expected to increase their financial capacity through a combination of commodities in production. This study was conducted to find the right types of commodities for farmers to produce so that they can increase the financial capacity of their households.

The parameter studied is the farmer household financial expenditure for consumption needs. The financial capacity of farm households is assumed to be relevant to the amount of financial expenditure for household consumption. This study is based on data collected from the 2012 BIA project in West Java Province. The results of field surveys and interviews with the help of a questionnaire to 400 respondents consisting of 174 rice farmers, 139 rice-poultry farmers, and 87 rice-sheep farmers. All of these respondents are the target farmers of the 2010 FEATI project. The data that have been compiled are used as material for analysis. Respondents were randomly selected from members of the study group and they had received farming technique training. Four hundred respondents were selected in eight districts as a sample, including: Sukabumi, Cirebon, Karawang, Garut, Majalengka, Kuningan, Indramayu, and Subang.

Data were collected from October to December 2012. The collected data were analyzed descriptively qualitatively. Data grouping is divided into 3 (three) commodity groups of commodities that are prominent in farmer farming, namely: rice, rice-sheep, and rice-poultry.

The statistical analysis of the differences in the financial expenditure of the household

consumption objectives of the farmer from each commodity group was tested for correlation and regression through the F-test (α = 0.05), between the average financial expenditure of a farmer household on the farming of each commodity produced. Regression Linear for Multiple Variables (Korkmaz, 2019; Mardiana et al., 2021):

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + ... + \beta_p x_{ip} + \varepsilon$$

where, for $i=n$ number of being observed, y_i = exogen variabel, x_i = moderator variables, β_0 = konstanta, β_p = number of moderator variabel, ϵ = error model y_i = average for household consumption purposes of farmers, x_i = commodities produced by farmers, namely: rice, rice-sheep, and rice-poultry, β_0 = y-intercept (constant term), βp = the slope coefficient for each explanatory variable, and ϵ = the model's term (also known as the residuals) = galat.

Farm income is measured by the ability of farmer household expenditures per year, the measure of expenditure is the farmer's business activities to exploit land in hectares, the output price is the price at the farm level reported by each farmer for selling rice, live cattle, live sheep, birds are in good condition. Other data such as gender gender (m= 1, f= 0), and land ownership (formal land certificate = 1, otherwise = 0). The results of the analysis are expected that the right combination of commodity production in one production process will increase agricultural yields and income. Thus, increasing farmer household income is characterized by an increase in consumption expenditure.

4. RESULTS AND DISCUSSION

The results of the F test to determine the difference between the average farmer expenditure were presented in Table 1 These results show that there is a significant difference between the average farmer expenditures (F table/ 11.9 > critical/3.0). The biggest average was achieved by the paddy-poultry integration pattern of IDR. 36,599,813 followed by a rice pattern (IDR 25,283,368) and a rice-sheep pattern (IDR 20,598,195).

Further analysis is carried out in particular the paddy-poultry integration pattern which is the largest average expenditure, to determine the level of influence of variables on farmer household expenditure. Regression analysis was used to meet these objectives. The results of the regression

analysis from the data collected were given in Table 2. The Multiple R value of 0.61 indicates the effect of high commodity integration to increase the ability of consumption expenditure by farmer households. This potential can be used as a basis for consideration in an effort to increase farmer household income through the integration of agricultural commodities. How big the effect of the combination of commodities produced on consumption expenditure is can be seen from the R Square amount of 0.37 (Table 2). This value can be interpreted that every increase of one commodity unit in production will result in an increase in financial expenditure for consumption purposes by the farm household by 37%. This is reinforced by the existence of a significant difference in the average expenditure of farmers on the three farming patterns tested as in the analysis of variance with a confidence level of 95% ($\alpha = 0.05$) and have p-value upto 9.64E-06.

The next analysis is the correlation analysis between rice and poultry that are produced simultaneously (rice-poultry combination) in production. The results of the combined correlation analysis of rice-poultry production by farmer households were presented in Table 3. The correlation coefficient between rice and poultry is high (0.71) and has a strong effect on strengthening financial expenditure for consumption purposes by farm households (0.61).

Table 1: Result of F Count of Pattern of Paddy, Paddy-Poultry, and Paddy-Sheep

SUMMARY						
Groups	Count	Sum	Average	Variance		
PADDY	174	4.4E+09	25283368	3.4E+14		
POULTRY	139	5.09E+09	36599813	1.48E+15		
LAMB	87	1.79E+09	20598195	1.05E+14		

Table 2: The Average Expenditure of Farmers on the Three Farming Patterns ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1.63E+16	2	8.16E+15	11.89246	9.64E-06	3.018452
Within Groups	2.72E+17	397	6.86E+14			
Total	2.89E+17	399				

SS means: the sum of squares due to the source, MS means: the mean sum of squares due to the source, F: F-statistic, df: degree of freedom

Table 3: Correlation Analysis Between Variables Correlation

	PDD	LARGE	TAIL	OUTPUT
PDD	1			
LARGE	0.039009	1		
TAIL	0.081207	0.71168	1	
OUTPUT	-0.09456	0.609167	0.38638	1

Rice production by farmers is the main commodity produced in their farming (48%) was shown in Figure 1. Meanwhile, income from poultry production is a by-product for farmers other than rice as the main commodity (22% of rice-poultry). The remaining time spent in running rice farming b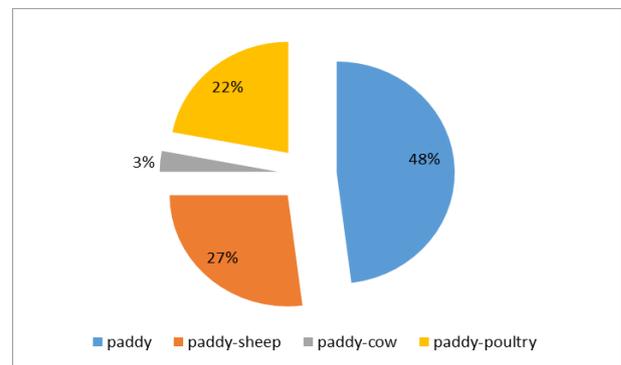y farmers is used to raise poultry. Thus, the income of farmers can be obtained from the main commodity production, namely rice and added by-products from raising poultry

Figure 1: The precentage of small farmers producers

The average financial expenditure for consumption purposes by the farmer household of all respondents according to the commodities produced in sequence are: rice-poultry (IDR

36,599,813, -/year); rice (IDR 25,283,368,-/year); and paddy-sheep (IDR 20,598,195, - /year). So, from the three commodity groups, the combination of rice and poultry production is the most potential commodity integration to be developed as farming by farmer households was shown in Figure 2.
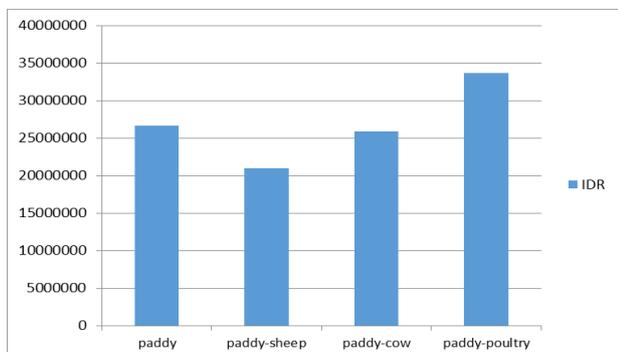

Figure 2: Finance for consumption by farm-household

5. CONCLUSION

The results showed that there was a significant difference (α = 0.05), between the average financial expenditure for the purpose of household consumption of the farmer on the farming of each commodity produced. The highest to the lowest abilities are rice-poultry production (IDR 36,599,813 per year); rice (IDR 25,283,368 per year); and paddy-sheep (IDR 20,598,195 per year). The integration of rice and poultry in farming is the production combination with the highest income and the most potential to be developed as a business by farm households.

SIGNIFICANCE STATEMENT

The integration of rice and poultry in farming is the production combination with the highest income and the most potential to be developed as a business by farm households. This is what the government must be concerned to be developed the farmer welfare and become the common issues for the society and non governmental organization to concern and developed the logistics maintenance all over the word to recover the logistic crisis all over the world in global and the logistic crisis anticipation in Indonesia.

REFERENCES

Alsop, R., & Heinsohn, N. (2005). Measuring empowerment in practice: Structuring analysis and framing indicators. The World Bank. https://doi.org/10.1596/1813-9450-3510

Birthal, P. S., Negi, D. S., Jha, A. K., & Singh, D. (2014). Income sources of Farm Households in India: Determinants, Distributional consequences and policy implications. Agricultural Economics Research Review, 27(1), 37. https://doi.org/10.5958/j.0974-0279.27.1.003

Foran, T., Butler, J. R. A., Williams, L. J., Wanjura, W. J., Hall, A., Carter, L., & Carberry, P. S. (2014). Taking complexity in food systems seriously: An interdisciplinary analysis. World Development, 61, 85–101. https://doi.org/10.1016/j.worlddev.2014.03.023

Golay, C. (2010). The food crisis and cood security: Towards a New World Food Order? Revue Internationale de Politique de Développement, 1, 215–232. https://doi.org/10.4000/poldev.145

Khairiyakh, R., Irham, I., & Mulyo, J. H. (2016). Contribution of agricultural sector and sub sectors on Indonesian economy. Ilmu Pertanian (Agricultural Science), 18(3), 150. https://doi.org/10.22146/ipas.10616

Korkmaz, M. (2019). A study over the Formulation of the Parameters 5 or Less Independent Variables of Multiple Linear Regression. Journal of Function Spaces, 2019, 1–14. https://doi.org/10.1155/2019/1526920

Mardiana, M., Anisa, S. N., & Yuda, D. (2021). Produk Domestik Bruto dan Kurs sebagai determinan impor pupuk Indonesia. Sorot, 16(1), 35. https://doi.org/10.31258/sorot.16.1.35-45

Martini, A., & Arianti, N. N. (2021). Analysis of the layer Farm business on BUMDes "Mandiri" and Breeder Partners in Babakan Bogor Village Kabawetan Subdistrict Kepahiang District. Jurnal Sain Peternakan Indonesia, 16(3), 251–258. https://doi.org/10.31186/jspi.id.16.3.251-258

Oben, B. O., Molua, E. L., & Oben, P. M. (2015). Profitability of Small-Scale integrated Fish-Rice-Poultry Farms in Cameroon. Journal of Agricultural Science, 7(11), 232–244. https://doi.org/10.5539/jas.v7n11p232

Padhi, M. K. (2016). Importance of Indigenous Breeds of Chicken for rural economy and their

improvements for higher production performance. Scientifica, 2016, 1–9. https://doi.org/10.1155/2016/2604685

Richter, A. W., Hirst, G., van Knippenberg, D., & Baer, M. (2012). Creative self-efficacy and individual creativity in team contexts: Cross-level interactions with team informational resources. Journal of Applied Psychology, 97(6), 1282–1290. https://doi.org/10.1037/a0029359

Salahuddin, La Ode Muh Munadi, Muhammad Amrullah Pagala, & Rina Astarika. (2021). Agricultural households and farmer welfare in North Kolaka Regency. International Journal of Science, Technology & Management, 2(4), 1203–1211. https://doi.org/10.46729/ijstm.v2i4.261

Salanova, M., Lorente, L., & Martínez, I. M. (2012). The Dark and Bright sides of Self-Efficacy in predicting learning, innovative and risky performances. The Spanish Journal of Psychology, 15(3), 1123–1132. https://doi.org/10.5209/rev_SJOP.2012.v15.n3.39402

Schnitter, R., & Berry, P. (2019). The climate change, food security and Human health Nexus in Canada: A framework to protect population health. International Journal of Environmental Research and Public Health, 16(14), 2531. https://doi.org/10.3390/ijerph16142531

Slamet, A., Nakayasu, A., & Ichikawa, M. (2017). Small-Scale Vegetable Farmers' participation in Modern Retail Market Channels in Indonesia: The determinants of and effects on their income. Agriculture, 7(2), 11. https://doi.org/10.3390/agriculture7020011

Sugiarto, M., & Ahmad, A. A. (2015). Analysis of income distribution among goat Farmer Households in Banjarnegara District, Central Java Province Indonesia. Animal Production, 17(2), 123. https:// doi.org/ 10.20884/ 1.anprod.2015.17.2.508

Turner, M., Beckett, J., & Afton, B. (2003). Agricultural sustainability and open-field farming in England, c.1650-1830. International Journal of Agricultural Sustainability, 1(2), 124–140. https:// doi.org/ 10.3763/ ijas.2003.0112

Wolfert, S., Ge, L., Verdouw, C., & Bogaardt, M.-J. (2017). Big Data in Smart Farming – A review. Agricultural Systems, 153, 69–80. https://doi.org/10.1016/j.agsy.2017.01.023

Wollenberg, E., Vermeulen, S. J., Girvetz, E., Loboguerrero, A. M., & Ramirez-Villegas, J. (2016). Reducing risks to food security from climate change. Global Food Security, 11, 34–43. https:// doi.org/ 10.1016/ j.gfs.2016.06.002

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