

Accelerating Strategies in Developing Superior Agricultural Commodities in Maybrat, West Papua Province

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Abstract The objectives of conducting research on the acceleration of the development of superior agricultural commodities are to make an inventory and a map of the leading commodities in the agricultural sector in Maybrat Regency, West Papua, Indonesia, as well as designing and formulating a model for accelerating the development of superior agricultural commodities by taking into account the criteria for leading commodities. The analysis tool is the Model Composite Performance Index (CPI). From the results of the analysis, it was found that the commodities analyzed are commodities that farmers have cultivated for a long time, but some commodities are introduced by outsiders in Maybrat Regency, West Papua, Indonesia. In addition, it was found that the five main aspects of developing superior agricultural commodities in Maybrat are: increasing local government interventions, improvement of production facilities and infrastructure, increasing market opportunities, encouraging an increase in business capital, and production continuity improvement. The low application of agricultural zone development programs, the lack of implementation efforts to produce fresh competition, and the implementation of harmonious agricultural zone industrial ties hinder the development of agricultural zones. So that the role of the government in accelerating the development of superior commodities in the agricultural sector becomes important and strategic; without government intervention, efforts to accelerate the development of superior commodities will run in place.

However, it should also be understood that farmers/breeders/fishermen as business actors in the agricultural sector also have a strategic role in the intended acceleration effort.

Keywords Agroindustry, Agricultural Commodities, Composite Performance Index, Fisheries

1. Introduction

The impact of air pollution on consumer demand and food supply will ultimately change food prices. In recent years, national development policies that support more sustainable agricultural practices have emerged, in addition to various plans, policies, and programs designed to address specific environmental and socio-economic challenges for sustainability agriculture [1]. Previous research [2] evaluates agricultural and energy policies' impact on food security and air pollution.

The importance of agriculture in the Maybrat community can be seen from the lifestyle of the people, where most of the people work as farmers. However, some characteristics of farmers appear universal, while others appear specific to a particular country or culture [3]. Nevertheless, the view is to cover the most important and broad-minded topics, including land reform and rural

development, technological advances and productivity growth, changing food consumption patterns, rural education and human capital accumulation, and poverty alleviation [4]. Farmers need to design their farms to meet their complex needs better; linking global trends and regime shifts to agricultural yields can also work when considering potential future challenges and their implications for farmers and policymakers worldwide [5].

In Maybrat, there are at least 68 companies in the industrial category. Twenty-two companies are engaged in the handicraft industry, 20 in the chemical industry, and ten in the food and clothing companies. There are six companies engaged in repair services. The companies available in Maybrat are still very minimal, so there needs to be an effort by the local government to capture the moment and create opportunities for investors to invest their shares in the area to advance the regional economy [6]. Paying attention to such a situation, it is necessary to try to accelerate the development of the favorite commodity of the Maybrat agricultural zone, which will become references for the government or business actors to increase the expected economic efforts and regional economic development.

The main purpose of carrying out this research is to prepare a roadmap/guideline for accelerating the development of the agricultural sector for the local government of Maybrat and as input in preparing agricultural sector investment planning, using an appropriate analytical basis to accelerate the development of the agricultural sector. The objectives of accelerating the development of superior agricultural commodities are to examine inventory and map the superior commodities in Maybrat and to design and formulate a model for accelerating the development of superior agricultural commodities by considering the criteria for leading commodities.

2. Literature Review

To feed the world's growing population, more food requires a natural science that addresses food production and breaks down barriers between different disciplines and areas of analysis [7]. The process of short-term recovery in the economy can be achieved by increasing the productivity of the agricultural sector, which can also have an impact on development in the long term [8]. Adjustment of agricultural policies is the key to agricultural sustainability [9]. In addition, more efforts are needed to reduce dependence on products from outside regions by optimizing domestic investment that can increase domestic agricultural production [10]. Increased production is driven by public decision-makers' efforts to adjust future agricultural policies to promote sustainable food production and food security [8]. In addition, increasing production is required industrialization of the agricultural sector, where industrial agriculture reduces biodiversity in

previously underappreciated ways [11].

The agricultural production process in recent decades has undergone a significant pattern change. When mechanization is used for agricultural systems, production systems tend to favor specialization, which can be accelerated by sharpening comparative advantage among producers and fostering local or regional trade [12]. Meanwhile, [13] suggests that buyer availability, fair prices, quality of appearance, risk of rejection, and other work priorities in agriculture must be balanced to move crops from the field-to-field market successfully. However, a more comprehensive investigation is needed on the adverse impact of the feminization of agricultural labor on agricultural production [14]. The impact of the production process on the agricultural sector is also in the form of waste, so to assess the impact of environmental management, the government needs to increase the level of compliance with emission management and the level of compliance with wastewater disposal [15].

In the development of superior commodities in an area, we need to consider many factors driving the increase in production. Production management can be profitable, but it can also disrupt production per area and impact the ability of the system to produce food and its profits [16]. Where farming systems are integrated between old and new crops, even in a much smaller area, it brings long-term and short-term benefits during the transition period from monoculture to mature agroforestry systems [17]. In addition, crop intensification, common in smallholder farms to increase food security and generate income, the need to include intercropping as part of a rotation with one of these crops is an important element for intensifying rotational cultivation as they also address the risks associated with food insecurity that can result from the complete failure of one crop in a season [18-20].

In addition, it can assist with a review of the state of knowledge of agricultural practices, technologies, and management systems and also help identify the views of various stakeholders on agricultural systems and factors related to agricultural productivity, efficiency, vulnerability, resilience, adaptability, adaptive capacity, and transformability. This study attempts to address this issue and proposes a set of indicators that will facilitate agricultural sustainability assessment [21-24].

3. Research Methods

The approach to be implemented in this study is quantitative, by measuring several variables and indicators. The various measurement results of these variables and indicators are then analyzed to find and formulate strategic issues of investment development based on superior commodities for processing natural resources. Based on the formulation of the resulting strategic issues, the policy strategies considered the most appropriate to develop investment in Maybrat would be determined in the future.

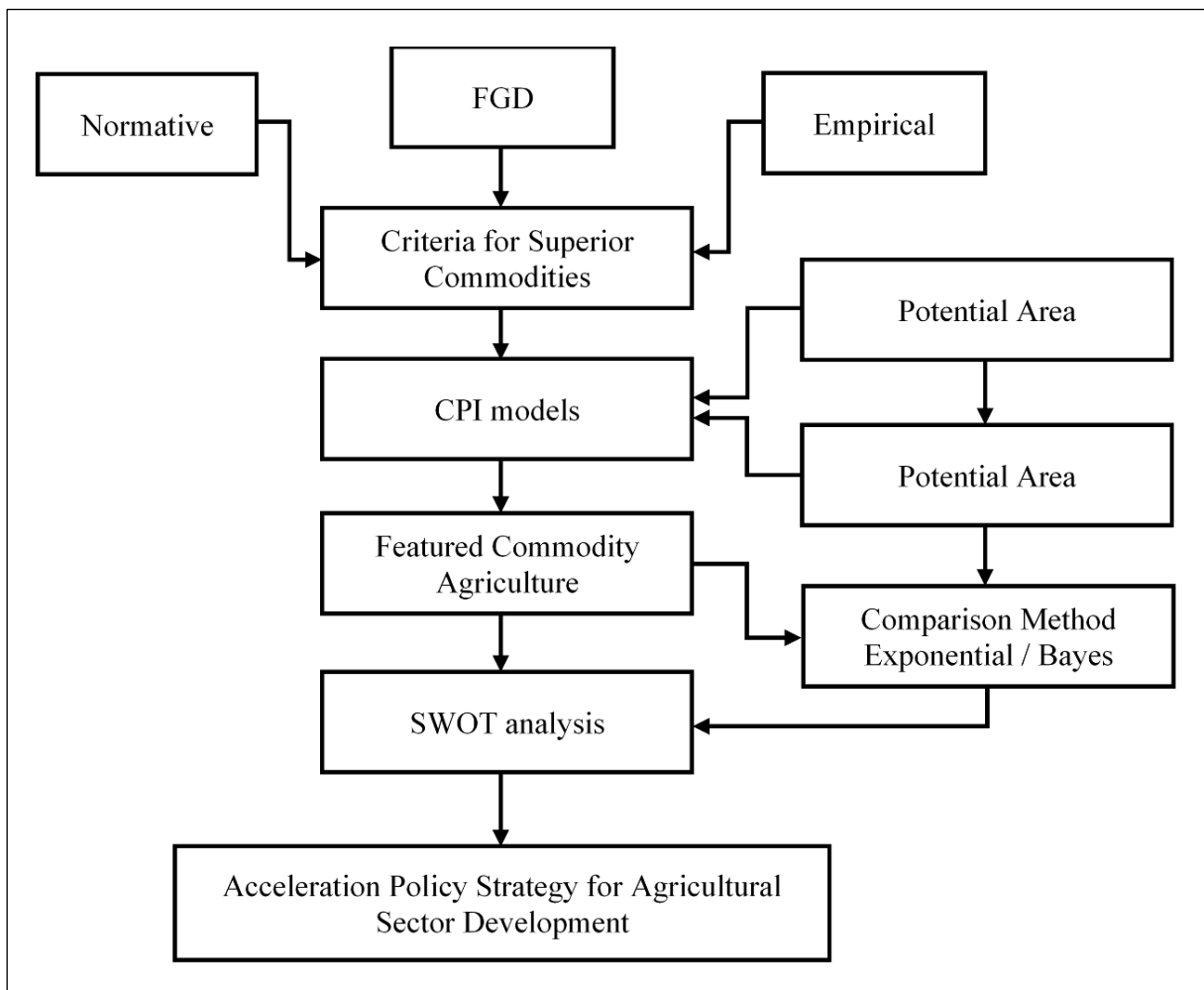
In accordance with the focus of the problem in this study, the research subjects that become the unit of analysis are regional government entities, especially OPD, which includes economic affairs, investment, PUPR, and transportation, as well as community business actors for superior regional products.

The population in this study is divided into two parts: the district population and the main commodity stakeholders in each observation area. There is also a sampling method used in this study: a two-stage sampling with the following stages: Determination of the sample district area using a purposive sampling technique and a sample of stakeholders as respondents or informants.

The types of data used in this study are secondary and primary data. The data collected in this study consist of 2 measurements, namely qualitative data and quantitative data. Quantitative data is in the form of an interval or ratio scale. At the same time, qualitative data is in the form of verbal and descriptive. According to the source, the data needed comes from (government agencies, such as the

Department of Agriculture, Livestock, Plantation, Forestry, and Fisheries, as well as Bappeda and BPS (economic business actors, especially those processing regional superior agricultural products).

The methods used in collecting data and information in this study are: survey, literature study, and focus group discussion (FGD). This research will produce a policy strategy to accelerate the development of superior agricultural commodities in Maybrat, which is carried out through several stages to describe the formulation of criteria for developing superior commodities based on empirical and normative studies, as well as through FGDs, description of the leading sector based on the sectoral contribution to the economy, description of agricultural sector commodities, determination of superior agricultural commodities using the Composite Performance Index (CPI) model, and, the formulation of a strategy for accelerating the development of superior agricultural commodities in Maybrat is carried out using an empirical and normative study approach, as well as through FGD.



Source: Original by author

Figure 1. Framework for Accelerating Development of Agricultural Sector in Maybrat

Figure 1 shows the framework for accelerating the development of the agricultural sector in Maybrat. Moreover, the determination of superior agricultural commodities is carried out by assessing potential using a score of 1-5 against 17 criteria for leading commodities, that are community production (K1), large quantities (K2), job absorption (K3), technology application (K4), raw materials (K5), capital (K6), production facilities and infrastructure (K7), market opportunity (K8), favorable price (K9), profitable trading system (K10), added value (K11), competitive (K12), private partnership (K13), environmentally friendly (K14), local government intervention (K15), production continuity (K16), and tax income (K17).

In addition, to examine Composite Performance Index (CPI), the procedure for using the CPI (Composite Performance Index) is to set a minimum standard number which is then converted to a value of 100:

$$A_{ij} = [X_{ij} (\text{min}) / X_{ij} (\text{min})] \times 100$$

The next is to identify criteria with a positive trend (a value that continues to be high is very good) and a minus trend (a value that decreases in value will be good). For criteria with a positive trend, the minimum score for each criterion is changed to 100, while the other numbers are proportionally higher:

$$A_{(i+. j)} = [(X_{(i+. j)}) / X_{ij} (\text{min})] \times 100$$

Meanwhile, for criteria with a minus trend, the minimum number in each criterion is changed to 100, while the other numbers are proportionally lower:

$$A_{(i+. j)} = [X_{ij} (\text{min}) / (X_{(i+. j)})] \times 100$$

As a result, the total CPI value for each alternative is calculated by the following formula:

$$I_i = (A_{ij} \times P_j)$$

in which P_j is the weight of importance for the j criteria.

4. Results

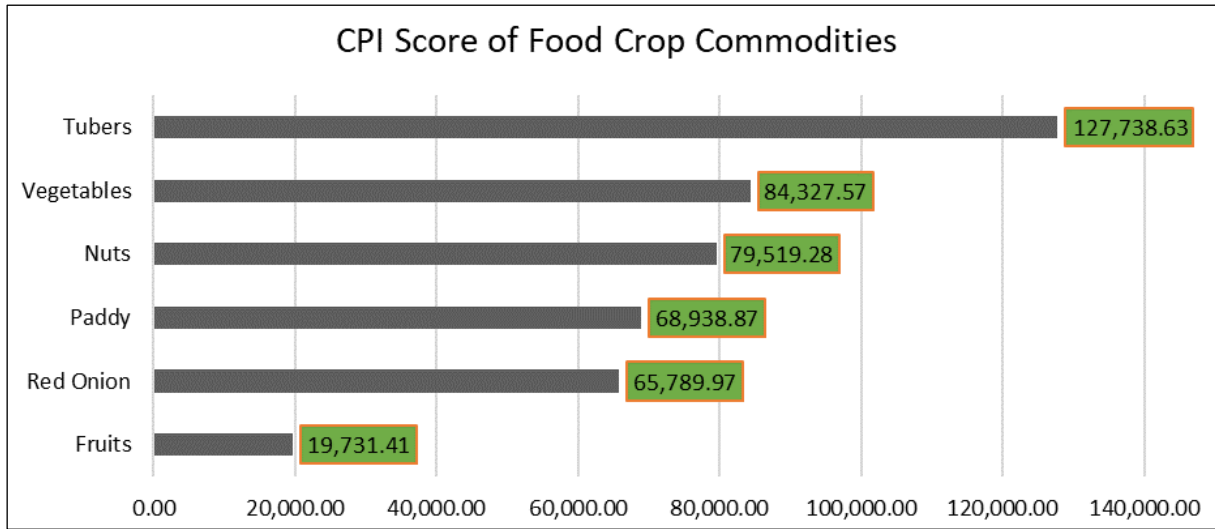
4.1. Brief Overview of Research Object

The GRDP of Maybrat at Current Prices (ADHB) shows the economic value in the current year against the base year of 2010 by taking into account the effect of inflation. ADHB's PDRB 2018 Maybrat amounted to 677.02 billion rupiahs. Meanwhile, on the basis of constant prices (ADHK), which ignores the effects of inflation, it is worth 444.09 billion rupiahs. ADHB's PDRB for expenditures in Maybrat 2018 mostly started from government expenditures of 640.32 billion rupiahs or 94.58 percent. Followed by household consumption expenditure of 559.34 billion rupiahs, or contributing 82.62 percent. The smallest donation was given by the LNPRT expenditure,

which was only 20.56 billion rupiah or only charity 3.40 percent. This is due to the large number of net exports that exist, where the number entering outside the region is much greater than exports outside the region. In terms of development, LNPRT activities were the fastest, with 7.64 percent, followed by household consumption at 5.21 percent. Meanwhile, the smallest development occurred in net exports, which slowed to 0.86 percent in 2018. The matched income per person in 2018 was 5,168 thousand rupiahs, which means that each community wants at least 5,168 thousand rupiahs per person-years to fulfill his life [25].

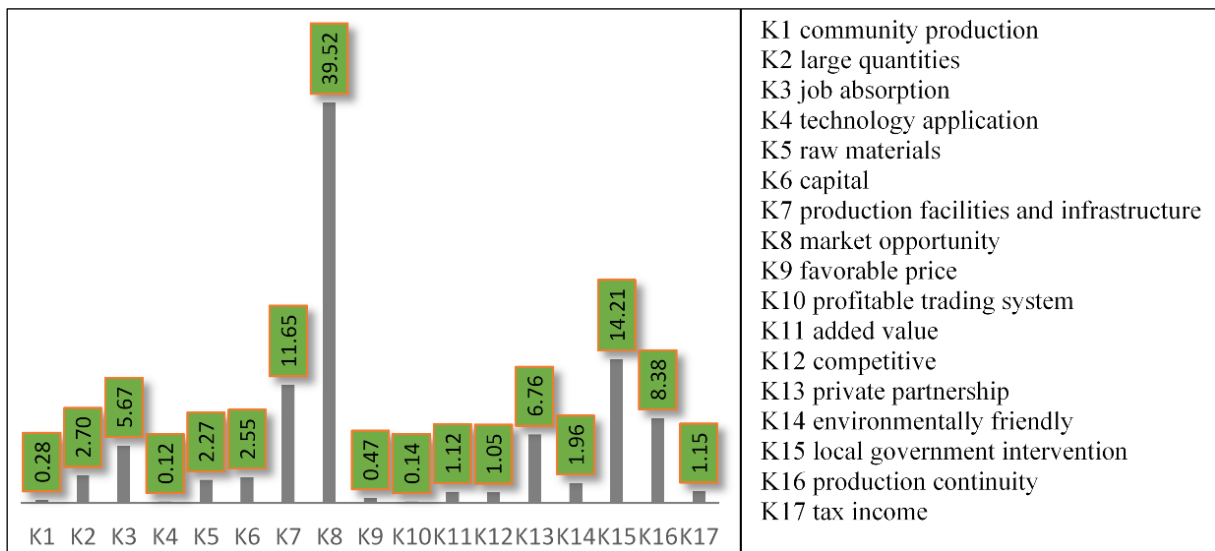
In seeking acceleration of development, utilization and management of natural resources as an alternative booster have been carried out by many other regions, namely by encouraging sectors that have a direct relationship with natural resources. Contributions through agriculture, forestry, and fisheries to the formation of GRDP in 2018 (current prices) reached a value of 202.53 billion rupiahs or 29.91 percent. The forestry and logging business subcategory is 17.71 percent, which is the largest contributor to creating added value in the agriculture, forestry, and fisheries business fields, reaching 59.20 percent [6]. The subcategory that also contributed the second largest contributor was Agriculture, livestock, hunting, and agricultural services, which recorded 39.5 percent, which consisted of horticultural plants (20.1 percent), plantation crops (10.6 percent), livestock (6.1 percent), food crops (2.1 percent), and agricultural and hunting services (0.5 percent). The fisheries subcategory ranks last by contributing 1.33 percent. The development of economic growth for the agriculture, forestry, and fisheries sectors has fluctuated for almost the last 5 (five) years. The growth of this sector/category increased from 2.37 percent in 2017 to 3.38 percent in 2018 [26].

The population in 2018 Maybrat was 40,102 people, with a composition of 20,407 men and 19,695 women. The division of the population by age group displays detailed data on Maybrat's population condition, which is still a little expansive or a bell, where the young population is large (already shifted slightly towards proportionality), but the old age population is very small. By comparing the male-to-female population, it reaches a value of 103.62, meaning that for every 100 female residents in Maybrat, there are 103 to 104 male residents in Maybrat [22]. The achievement of employment indicators in Maybrat is quite good. Of the 29,949 working-age population in 2018, there was 69.35 percent of the population belonged to the workforce or 20,770 people, while 9,179 residents were classified as a non-labor force. While the open unemployment rate (TPT) Maybrat in 2018 was only 4.78 percent. If illustrated, then there are only 1 in 20 people in the labor force who become unemployed. This figure is quite different from the provincial figure which is at 6.49 percent [26].



Source: Data processed

Figure 2. CPI Score of Food Crop Commodities



Source: Data processed

Figure 3. Criteria Assessment in Food Crops

4.2. CPI of Agricultural Leading Commodity

Based on CPI data processing (Figure 2), it was found that in the food crop sector, the commodity with the highest score was tubers, vegetables, and legumes. At the same time, the lowest are paddy/fields, shallots, and fruits.

In aggregate, the highest criteria assessment for all of the leading investment commodities in the food crop sector is more dominant in the criteria for market opportunities (K8) (Figure 3). This happens because the tuber commodity is a superior commodity that has been produced by the community for a long time and is a commodity/product that has been produced for a long time by the indigenous

people of Maybrat. However, the commodity of tubers itself is one of the staple foods in the Tanah Papua region, so the community widely consumes it. But on the other hand, the public still views that the superior commodity of tubers has the opportunity to be marketed, both in raw form and in commodities derived from tubers, such as flour, chips, and other products.

In the fishery sector, all of the leading commodities assessed are land aquaculture commodities, where pond/cage cultured fish get the highest CPI score (Figure 4). Fish consumption in Maybrat has been quite high over the past few years, which is marked by an increase in fishery production, underscoring the importance of fishery

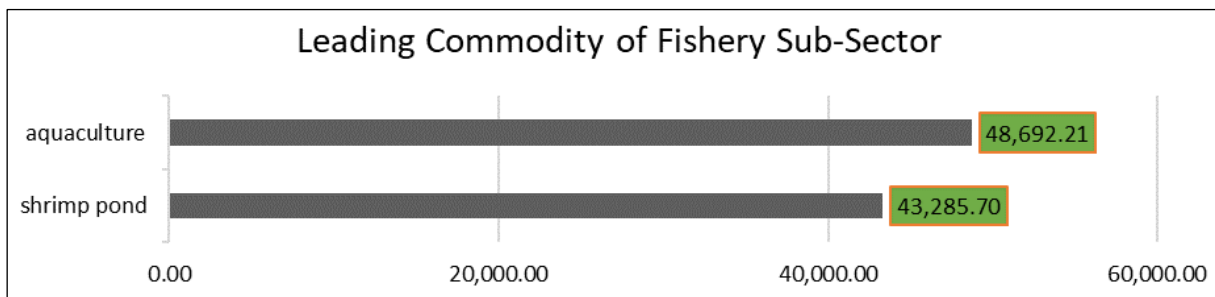
commodities in the community’s economy. The commodity of pond/cage cultured fish is a fish commodity that is considered by the informants to be the most potential commodity and is in demand by the community in Maybrat.

The biggest contribution of criteria in the assessment of leading commodities in the fisheries sector is the criteria for market opportunities (K8). The market opportunity for the fishery sub-sector, especially the commodity of aquaculture ponds/cages, is currently quite potential. The increasing interest in fish consumption encourages increased market opportunities for the fishery sub-sector commodity. This condition, of course, requires good government intervention as well as the main strategy to encourage increased market opportunities for fishery commodities. Both through improving production facilities and infrastructure as well as other supporting facilities and infrastructure (Figure 5).

For the plantation sub-sector, the only commodity that gets the highest CPI score is cocoa (Figure 6). It is because

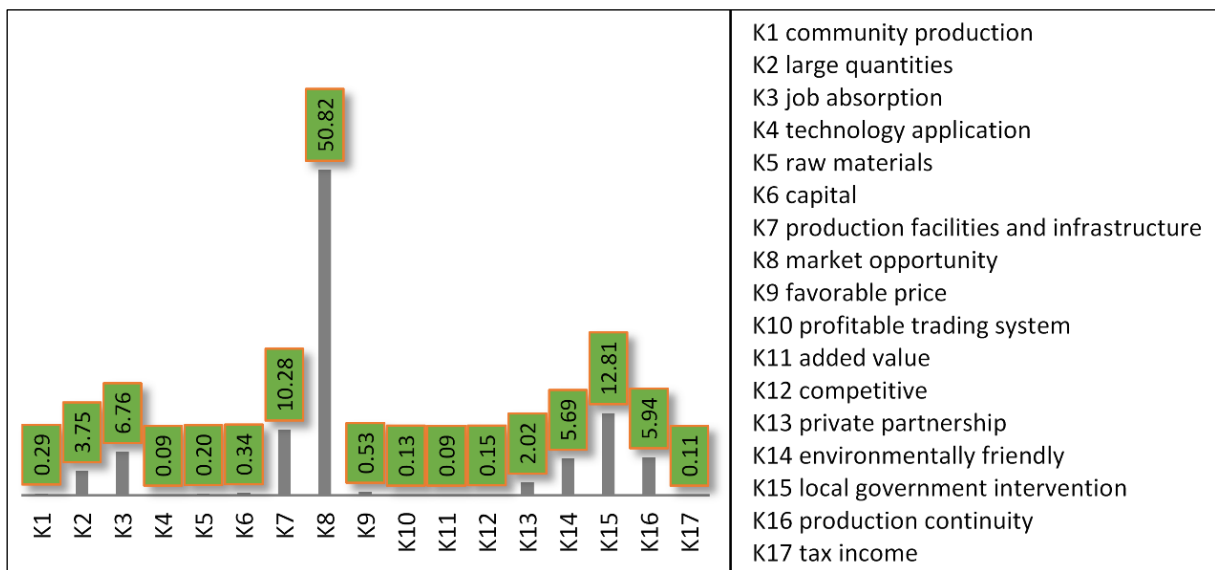
the wider community has known the cocoa plant both in Maybrat and among people in the West Papua region. This condition causes cocoa to be considered the leading commodity in Maybrat by beating other commodities such as red fruit and coffee plants.

The biggest contribution to the assessment of leading commodities in the plantation sector is the criteria for having market opportunities (K8), local government intervention (K1), and the availability of production infrastructure (K7) (Figure 7). Determination of the criteria for having market opportunities in the plantation sector shows that plantation crops have potential opportunities and have been produced and known by the people of Maybrat for quite a long time. It prompted the informants to determine cocoa commodity as a leading commodity with the criteria of Having Market Opportunities as a criterion that must be encouraged to increase the productivity of plantation crops, especially for cocoa commodity.



Source: Data processed

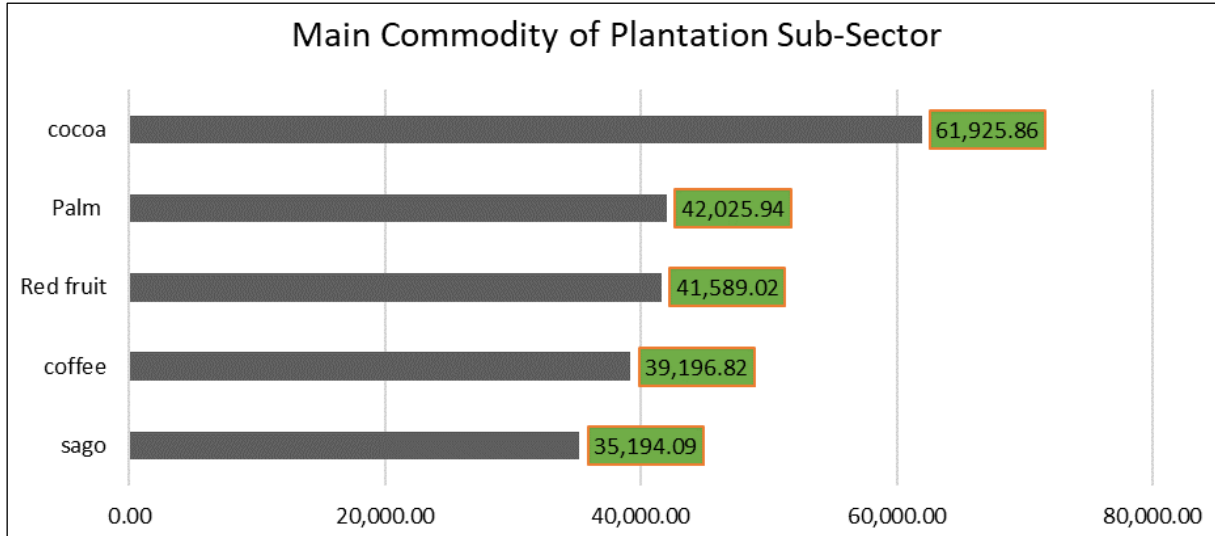
Figure 4. CPI Score of Fishery Commodities



- K1 community production
- K2 large quantities
- K3 job absorption
- K4 technology application
- K5 raw materials
- K6 capital
- K7 production facilities and infrastructure
- K8 market opportunity
- K9 favorable price
- K10 profitable trading system
- K11 added value
- K12 competitive
- K13 private partnership
- K14 environmentally friendly
- K15 local government intervention
- K16 production continuity
- K17 tax income

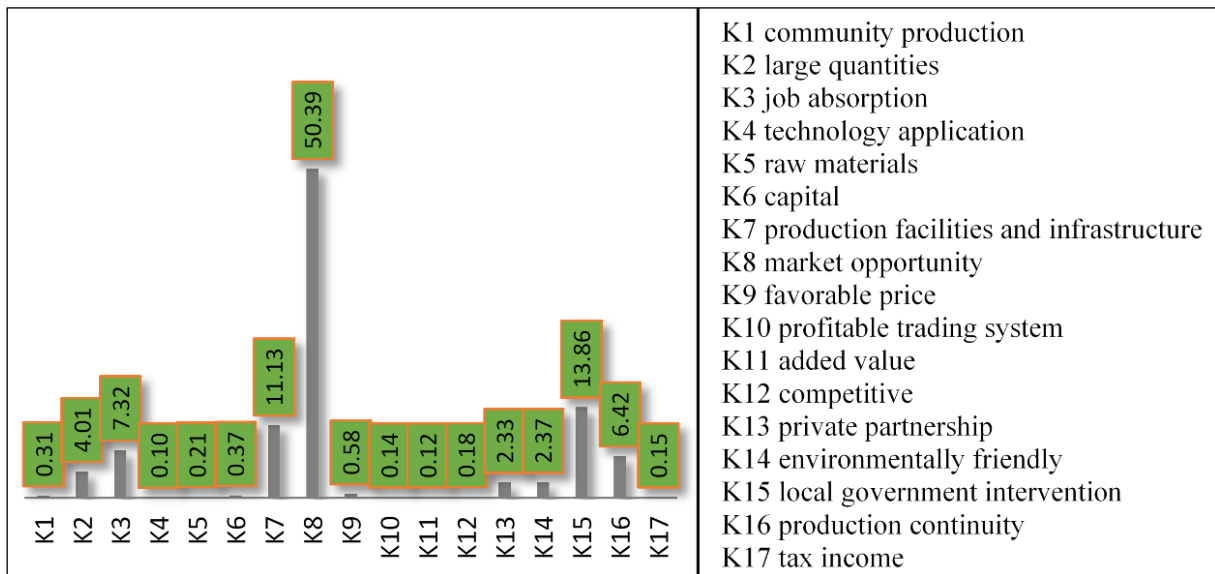
Source: Data processed

Figure 5. Criteria Assessment in Fisheries



Source: Data processed

Figure 6. CPI Score of the Plantation Commodities



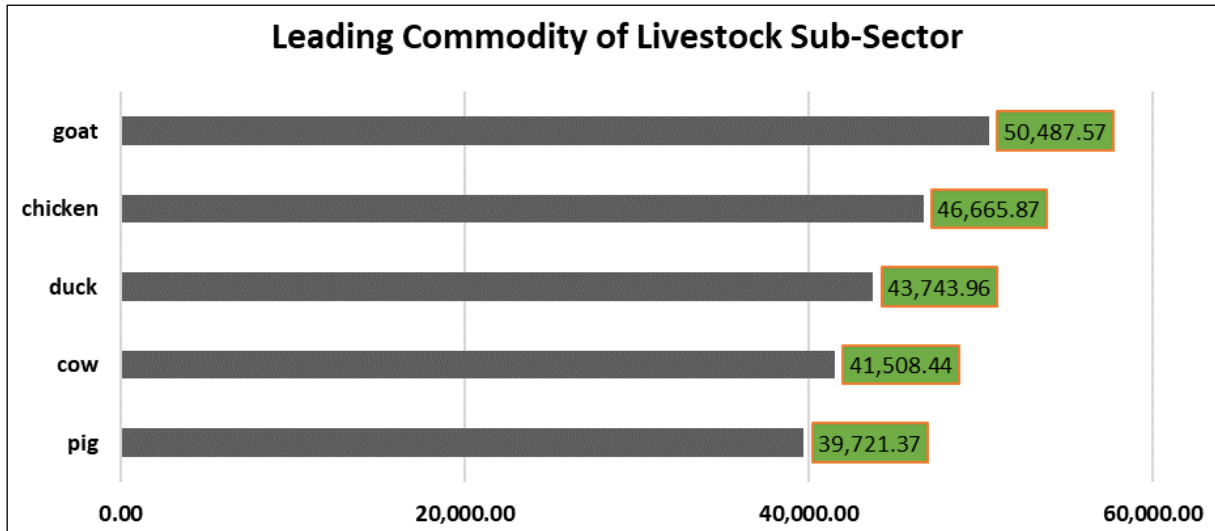
Source: Data processed

Figure 7. Criteria Assessment in Plantation

In the livestock sector, it is also seen that only one commodity dominates the CPI score, namely goat livestock (Figure 8). Goat commodity is considered the most superior commodity to other commodities because goat commodity is a commodity that is quite easy to raise compared to pig or cow commodities. Goat livestock is also a commodity that has long been known by the people in the Maybrat area and has been produced for quite a long time.

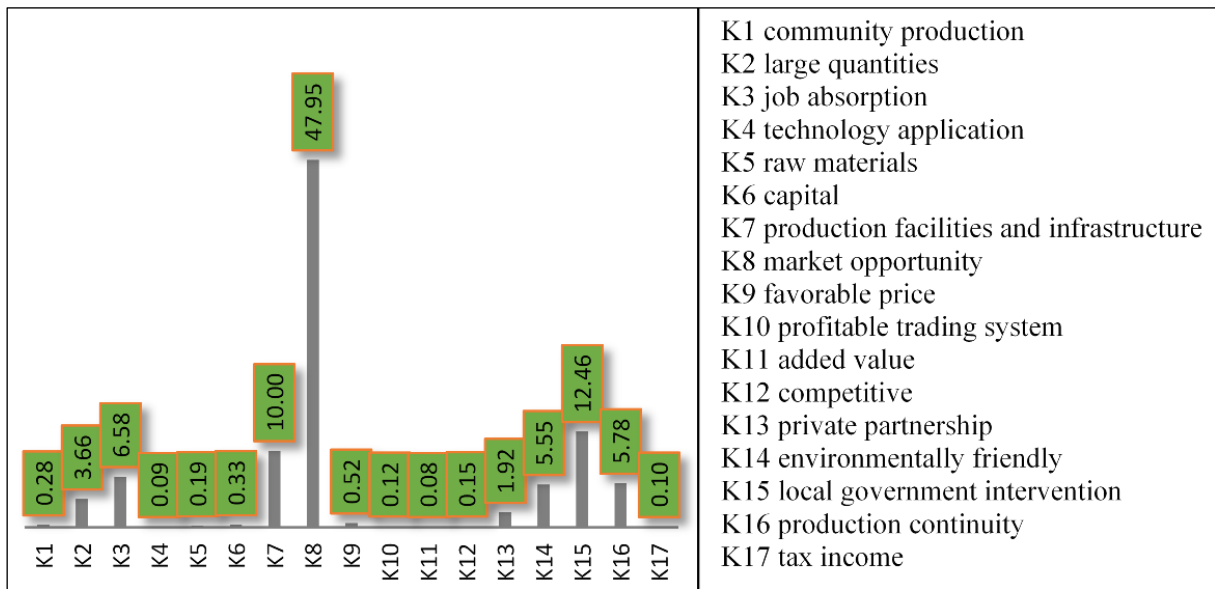
The contribution of the greatest criteria in the assessment of leading commodities in the livestock sector

is the criteria for market opportunities (K8) (Figure 9). The commodity of goats is considered very potential considering that feed for goats is not too difficult to find by the people in Maybrat. However, government intervention in the development of livestock sector commodities needs to be encouraged to achieve the ratio of public meat consumption in Maybrat. In addition, it is necessary to encourage the provision of facilities and infrastructure to support the production of livestock sub-sector commodities that are able to encourage increased productivity and access to markets.



Source: Data processed

Figure 8. CPI Score of the Livestock Commodities



Source: Data processed

Figure 9. Criteria Assessment in Livestock

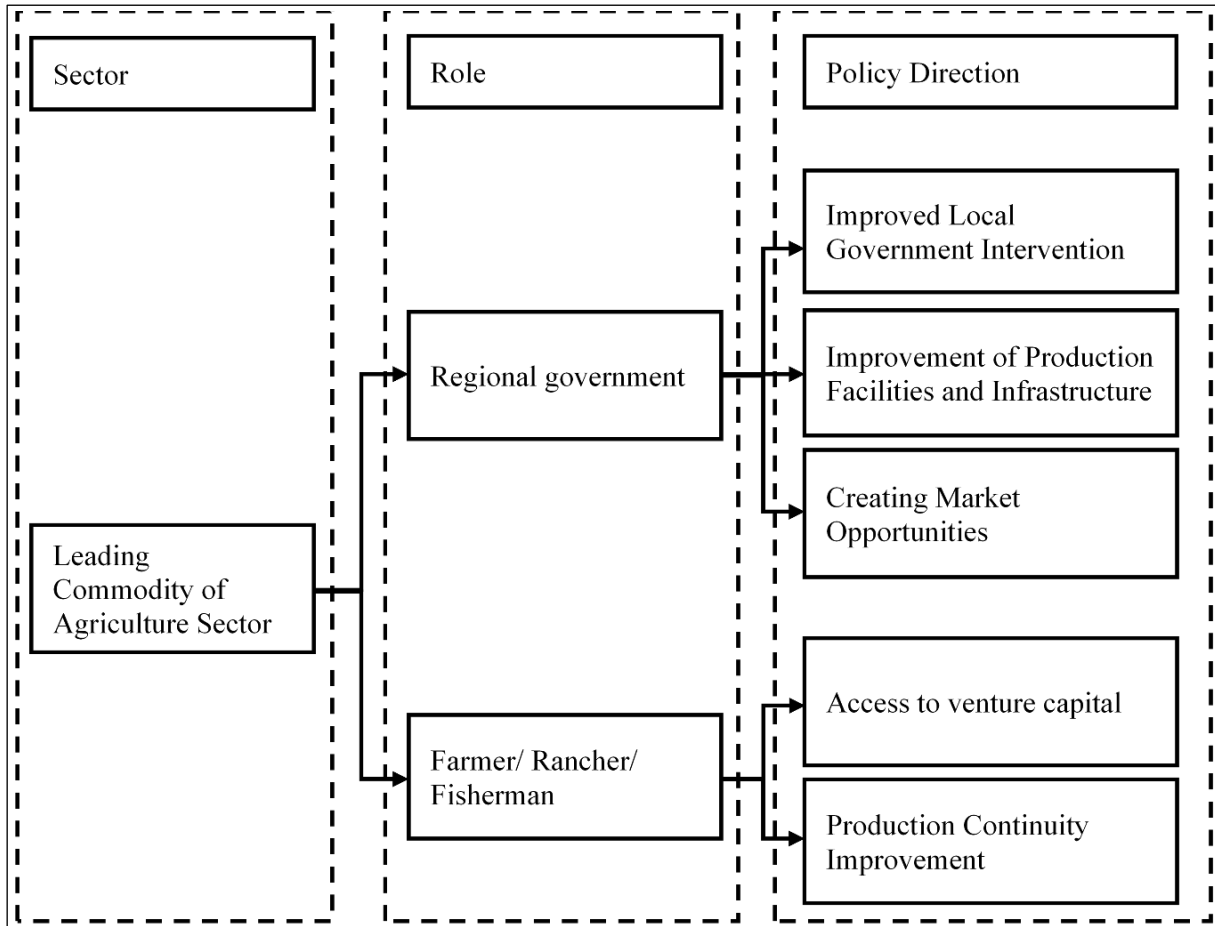


Figure 10. Model for accelerating the development of superior agricultural commodities Source: Data processed

5. Discussion

The model for accelerating the development of superior agricultural commodities is generally emphasized the main causes of inhibiting the development of leading commodities in the Maybrat district. Based on the results of the FGD conducted with stakeholders in Maybrat, it was found that five main aspects that became obstacles in the development of superior agricultural commodities in Maybrat were: (increased local government intervention, improvement of production facilities and infrastructure, increasing market opportunities, encouraging an increase in business capital, and (production continuity improvement. Meanwhile, the model for accelerating the development of superior agricultural commodities is systematically described in Figure 10.

The efforts to accelerate acceleration of the development of the superior commodities of Maybrat based on the development acceleration model are directed at some development policies. The first is a general policy. There are also accelerating strategies through general policies, namely: creating a healthy business competition climate and harmonization of industrial relations, creating a new economic center (special economic zone) with the

availability of reliable facilities and infrastructure, accelerating the implementation of industrial relations which encourage business competition, acceleration of the implementation of ease of doing business through local tax incentives, synchronization and harmonization of regional investment policies, mapping of distribution/value chain of superior commodities in supporting business/industry clusters in regional/regional economic development.

The second is agriculture & plantation sector policy. The policies in the field of agriculture and plantations are to increase the development of the agricultural sector in the plantation sub-sector with an agroindustry model (especially corn, sweet potatoes, and peanuts), development of competitive leading commodity clusters, facilitate clarity of land status to encourage the development of agricultural & plantation clusters, increased production of agricultural and plantation products, improving the quality, quantity, and continuity of agricultural and plantation products, optimization of strategic agricultural and plantation promotion models capable of increasing investor interest, increasing research in agriculture and plantations to produce agricultural and plantation sector commodities that are able to meet regional and national markets, increasing the use of

appropriate and environmentally sound technology in the development of the agricultural and plantation sectors.

Moreover, the fisheries sector policy can be conducted through the development and optimization of the utilization of human resources in the field of fisheries to support the development of the modern fisheries sector based on business, development of competitive fishery commodity clusters, facilitating clarity of land status to encourage the development of superior inland fisheries clusters, increased production of competitive fishery products, development of a strategic field promotion model capable of increasing investor interest, development of a strategic fishery promotion model capable of increasing investor interest, increasing research in the field of fisheries to produce fishery sector commodities that are able to meet regional and national markets, increasing the use of appropriate and environmentally sound technology in the development of the fishery sector.

In the animal husbandry policy, the strategies are to increase some elements through livestock sector policies such as development and optimization of the use of human resources in the livestock sector to support the development of the livestock sector based on appropriate technology [27], optimizing the leading commodity clusters in the livestock sector (cows, goats and pigs) that are competitive, facilitate clarity of land status to encourage the development of superior livestock clusters (cattle, goats and pigs), optimizing the production of competitive livestock products (cows, goats and pigs), optimizing the quality, quantity and continuity of processed products from cattle, goats and pigs, development of a strategic livestock promotion model capable of increasing investor interest, increased research in the field of animal husbandry to produce livestock sector commodities that are able to meet regional and national markets, increasing the use of appropriate and environmentally sound technology in the development of the livestock sector.

In terms of trade and service sector policy, the strategies are to increase some elements of through trade and service sector policies to optimize trading businesses that have forward and backward links, develop the transportation sector and financial services sector as a buffer sector for the trade and service sector, optimize trading activities that apply the concept of sustainability (environmentally friendly), optimize of technology and innovation as an effort to create the image of trade and services, creating medium and large scale trade in an effort to accelerate the distribution of superior strategic commodities, optimize business competition supervision through cooperation with external supervisory agencies [28].

In terms of infrastructure sector policy, the acceleration is through infrastructure sector policies to encourage the implementation of public-private cooperation in providing and optimizing regional strategic infrastructure, facilitating private parties/investors in land acquisition/customary land

for optimizing infrastructure development, acceleration of district/national road maintenance, optimizing the implementation of the spatial structure plan in supporting the economic development map of West Papua, development of developing areas through. Provision of strategic infrastructure (electricity, production roads, bridges, water, and ports), development of national roads to support the economic development map of West Papua, and development and optimization of supporting infrastructure for production centers and industrial estates.

Furthermore, the strategies are to increase some elements of through industrial sector policies such as opening opportunities for cooperation between the government and private in the provision and development of infrastructure in industrial estates/regions, develop the agricultural industry by paying attention to the upstream and downstream industries, optimizing the raw material industry and agricultural product distribution areas that support the supply of raw materials, integrated agroindustry development, improving the image of regional agricultural products by prioritizing local wisdom and based on appropriate technology and innovation, development of the trade and service sector, as well as the transportation sector in supporting industrial areas, acceleration of strengthening of business and industrial institutions in supporting regional development, encouraging the creation of potential industrial clusters such as the tourism industry based on natural and agro-industrial resources that are sustainable and in accordance with international needs.

Lastly, the strategies to accelerate the development of SMEs can be done through some policies such as mapping of SMEs supporting sectors, encouraging SMEs' cooperation through optimizing domestic and Foreign Direct Investment, development of SMEs' management and technical capacity, encouraging SMEs to participate in regional activities/events as an effort to develop image and business scale, optimize the use of CSR in business and industry, Develop an innovation center institution as a driving force for SMEs development.

6. Conclusion

From the results of the analysis, it was found that the commodities analyzed were commodities that farmers in Maybrat had cultivated for a long time. However, there was something interesting in the findings of this leading commodity in the agricultural sector, where there were also commodities that were not managed commodities and cultivated by the indigenous people of Maybrat for generations. The commodities in question are shallots, paddy/fields, coconut, cocoa, coffee, cows, ducks, chickens, and goats. In addition, it was found that the five main aspects of developing superior agricultural commodities in Maybrat are increased local government

intervention, improvement of production facilities and infrastructure, increased market opportunities, increased business capital, and increased production continuity improvement.

The findings in this study are the low implementation of agricultural sector development programs and the lack of implementation efforts to create competitive and healthy businesses and create harmonious industrial relations in the agricultural sector. The role of the government in accelerating the development of superior commodities in the agricultural sector is important and strategic; without government intervention, efforts to accelerate the development of superior commodities will run in place. However, it should also be understood together that farmers/breeders/fishermen as business actors in the agricultural sector also have a strategic role in the intended acceleration efforts.

Based on the results of the analysis on efforts to accelerate the development of superior commodities of Maybrat, the urgent implementation is to invite universities to develop and provide human resources in the agricultural sector who have skills and are able to compete, Develop a business competition system through healthy and harmonious industrial relations, Develop a strategic investment economic zone through the Special Economic Zone (SEZ) model by providing basic supporting infrastructure, Creating large-scale industries through optimizing clusters/industrial centers for superior commodities/products of the region, Optimizing the location of cluster/industrial centers by providing infrastructure that supports ease of investment, Creating a profitable distribution based on a value chain that is integrated with the developed industrial cluster/center.

REFERENCES

- [1] Thomas Schwandt, Zenda Ofir, Dorothy Lucks, Kassem El-Saddick, Stefano D'Errico, "Evaluation: A crucial ingredient for SDG success," IIED Briefing, International Institute for Environment and Development, London, 2016. Retrieved from <https://pubs.iied.org/17357iied>.
- [2] Feifei Sun, D. A. I. Yun, Xiaohua Yu, "Air pollution, food production and food security: A review from the perspective of food system," *Journal of integrative agriculture*, vol. 16, no. 12, pp. 2945-2962, 2017.
- [3] Radhia Bouchakour, Mohammed Saad, "Farm and farmer characteristics and off-farm work: evidence from Algeria," *Australian Journal of Agricultural and Resource Economics*, vol. 64, no. 2, pp. 455-476, 2020.
- [4] Jikun Huang, Scott Rozelle, Xinkai Zhu, Shiji Zhao, Yu Sheng, "Agricultural and rural development in China during the past four decades: an introduction," *Australian Journal of Agricultural and Resource Economics*, vol. 64, no. 1, pp. 1-13, 2020.
- [5] Marta Kozicka, Elisabetta Gotor, Walter Ocimati, Tamar de Jager, Enoch Kikulwe, Jeroen CJ Groot, "Responding to future regime shifts with agrobiodiversity: A multi-level perspective on small-scale farming in Uganda," *Agricultural Systems*, vol. 183, no. 102864, 2020.
- [6] Badan Pusat Statistik (BPS), Kabupaten Maybrat Dalam Angka Tahun 2018, Teminabuan: BPS Kabupaten Sorong Selatan, 2018a.
- [7] Wen-Bin Wu, Qiang-Yi Yu, Verburg H. Peter, Liang-zhi YOU, Y. A. N. G. Peng, Hua-Jun Tang, "How could agricultural land systems contribute to raise food production under global change?," *Journal of Integrative Agriculture*, vol. 13, no. 7, pp. 1432-1442, 2014.
- [8] Wahyu Ariyadi, "Empirical Analysis of Farmers Household Food Security Levels in Salatiga, Indonesia," *Research Horizon*, vol. 1, no. 1, pp. 39-46, 2021.
- [9] Maria José Palma Lampreia Dos Santos, Nawaz Ahmad, "Sustainability of European agricultural holdings," *Journal of the Saudi Society of Agricultural Sciences*, vol. 19, no. 5, pp. 358-364, 2020.
- [10] Qingbin Wang, Yang Zou, "China's alfalfa market and imports: Development, trends, and potential impacts of the US-China trade dispute and retaliation," *Journal of Integrative Agriculture*, vol. 19, no. 4, pp. 1149-1158, 2020.
- [11] Katie L. Burke, "Agriculture is reshaping the avian tree of life: evolutionarily distinct bird lineages are more likely to go extinct in farms than forests, but diversifying crops could curb the loss," *American Scientist*, vol. 102, no. 6, pp. 406-408, 2014.
- [12] Hiroyuki Takeshima, Patrick L. Hatzenbuehler, Hyacinth O. Edeh, "Effects of agricultural mechanization on economies of scope in crop production in Nigeria," *Agricultural Systems*, vol. 177, no. 102691, 2020.
- [13] Lisa K. Johnson, J. Dara Bloom, Rebecca D. Dunning, Chris C. Gunter, Michael D. Boyette, Nancy G. Creamer, "Farmer harvest decisions and vegetable loss in primary production," *Agricultural systems*, vol. 176, no. 102672, 2019.
- [14] Jia-Cheng Liu, Zhi-Gang Xu, Qiu-Fen Zheng, Lil-Lian Hua, "Is the feminization of labor harmful to agricultural production? The decision-making and production control perspective," *Journal of Integrative Agriculture*, vol. 18, no. 6, pp. 1392-1401, 2019.
- [15] Shu-dong Zhou, Felix Mueller, Benjamin Burkhard, Xing-jin CAO, H. O. U. Ying, "Assessing agricultural sustainable development based on the DPSIR approach: case study in Jiangsu, China," *Journal of Integrative Agriculture*, vol. 12, no. 7, pp. 1292-1299, 2013.
- [16] Taise Robinson Kunrath, Pedro Arthur de Albuquerque Nunes, William de Souza Filho, Mónica Cadenazzi, Carolina Bremm, Amanda Posselt Martins, Paulo Cesar de Faccio Carvalho, "Sward height determines pasture production and animal performance in a long-term soybean-beef cattle integrated system," *Agricultural Systems*, vol. 177, no. 102716, 2020.
- [17] Clément Rigal, Jianchu Xu, Guilin Hu, Minghua Qiu, Philippe Vaast, "Coffee production during the transition period from monoculture to agroforestry systems in near optimal growing conditions, in Yunnan Province,"

- Agricultural Systems*, vol. 177, pp. 102696, 2020.
- [18] Eliakira Kisetu Nassary, Frederick Baijukya, Patrick Alois Ndakidemi, "Intensification of common bean and maize production through rotations to improve food security for smallholder farmers," *Journal of Agriculture and Food Research*, vol. 2, pp. 100040, 2020.
- [19] Olaniyan Oluwafolakemi Ayo, "Perceived Effects of Rural-Urban Interactions on Sustainable Agricultural Development in Nigeria," *Universal Journal of Agricultural Research*, vol. 8, no. 4, pp. 77-87, 2020. DOI: 10.13189/ujar.2020.080401.
- [20] Annie Hilda Ong'ayo, James Biriha Ndiso, "Social and Cultural Factors Influencing Gender Disparity in Farmers Field Schools Approach among Smallholder Farmers in Kilifi North Sub-County, Kilifi County," *Universal Journal of Agricultural Research*, vol. 8, no. 5, pp. 158-164, 2020. DOI: 10.13189/ujar.2020.080503.
- [21] Sri Rahayu, Purbayu Budi Santoso, Izza Mafruhah, "Stakeholder Role in Improving Agribusiness Efficiency and Food Security in Developing Countries," *International Journal of Economics & Business Administration (IJEBA)*, vol. 7, no. 4, pp. 464-470, 2019.
- [22] Byomkesh Talukder, Alison Blay-Palmer, Keith W. Hipel, "Towards complexity of agricultural sustainability assessment: main issues and concerns," *Environmental and Sustainability Indicators*, vol. 6, pp. 100038, 2020.
- [23] Tri Widayati, Waridin Waridin, Izza Mafruhah, "Environmental performance and agricultural productivity: Assessing the convergence and divergence of demand-driven agricultural extension," *International Journal of Energy Economics and Policy*, vol. 9, no. 4, pp. 158-165, 2019.
- [24] Muhammad Atif, "The Effects of Energy Consumption, Economic Growth, and Financial Development on CO2 Emissions in Greece," *Arthatama*, vol. 5, no. 1, pp. 13-26, 2021.
- [25] Badan Pusat Statistik (BPS), *Produk Domestik Regional Bruto Kabupaten Maybrat Menurut Lapangan Usaha Tahun 2013-2017*, Teminabuan: BPS Kabupaten Sorong Selatan, 2018b.
- [26] Badan Pusat Statistik (BPS), *Statistik Kesejahteraan Rakyat Kabupaten Maybrat 2018*. Teminabuan: BPS Kabupaten Sorong Selatan, 2018c.
- [27] Hood Laeeq, "Impact of Green Human Resource Management on Promoting Green Employee Behaviour in Russia: A Moderating Role of Employee empowerment," *Arthatama*, vol. 5, no. 1, pp. 1-12, 2021.
- [28] Andriansyah, Andriansyah, Endang Sulastri, and Evi Satispi. "The role of government policies in environmental management," *Research Horizon*, vol. 1, no. 3, pp. 86-93, 2021. <https://doi.org/10.54518/rh.1.3.2021.86-93>.