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Original Paper

Analysis of The Potential Integrated Agricultural Sector in North Maluku Province

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***Abstract*— Agriculture has an important role in human life because it serves as a provider of food, feed for livestock, and bioenergy. Realizing an integrated agricultural system in North Maluku Province is not an easy thing for the government, the community, or the business world. The purpose of this research is to analyze the potential of the integrated agricultural sector owned by each region and analyze the determination of location/region and integrated agricultural potential sector related to economic area development policy in North Maluku Province. As a result based on LQ value, almost all districts/cities in North Maluku Province on average have regional superior commodities according to sub-sectors (food crops, horticulture, plantations, and livestock), except Sula Islands Regency and Ternate City. Especially Sula Islands Regency, the superior commodities are plantation crops and livestock. In conclusion, by using an integrated agricultural approach has not fully applied the concept of integrated agriculture, both programmed under government agencies, companies, or self-help or community individuals. So it needs to be developed well integrated agricultural approach through the pattern of regional and sector/subsector approach into one unit by paying attention to environmental conditions for the realization of an integrated agricultural system in every regency/city in North Maluku Province.**

Keywords*— *Keywords: Integrated agriculture, LQ analysis, north Maluku

I. INTRODUCTION

Agriculture has an important role in human life because it serves as a provider of food, feed for livestock, and bioenergy [1]. The role of agriculture is very strategic in supporting the national economy, especially realizing food security, increased competitiveness, employment absorption and poverty reduction [2]. In addition, it encourages the growth of agroindusti downstream and spurs the export of agricultural commodities to increase state foreign exchange [3]. Agricultural development policies aimed at improving food security, developing agribusiness and improving the welfare of farmers, hint that agricultural products produced must meet the quantity, quality and sustainability requirements so that they have competitiveness and are easily obtained at affordable prices [4].

Food insecurity is still a threat to the people of Indonesia. The Ministry of Agriculture's Food Availability and Insecurity Center noted that 100 districts out of 349 districts in Indonesia are potentially food insecure. These areas have high food needs, but have problems related to support for food crop planting and low accessibility of people to food [5].

Family food security can be realized through yard land. Existing yard land can be used as an integrated agricultural system [6]. Integrated agricultural patterns are a combination of traditional agricultural patterns with modern science in the field of agriculture that continues to grow [7].

Crop-livestock integration agriculture can improve soil quality, improve yields, produce diverse food and improve land use efficiency [8]. Integrated agriculture, can also create new jobs in the countryside so that urbanization is reduced [9, 17]. Alternative integrated agricultural patterns are a combination of plant-livestock-fish, the number can be very large [11,12].

Realizing an integrated agricultural system in North Maluku Province is not an easy thing for the government, the community, or the business world. Existing human resources and limited information that can reach the countryside, is one of the supporting factors [16]. Farmers' attention to land use is limited. In addition, the absence of a special agricultural area becomes an obstacle in the management of new land. The purpose of this research is to analyze the potential of the integrated agricultural sector owned by each region and analyze the determination of location / region and integrated agricultural potential sector related to economic area development policy in North Maluku Province.

II. EXPERIMENTAL SECTION

1. Study location

The implementation of research analysis of the potential of the integrated agricultural sector in North Maluku Province in 2021 covers the region of 8 regencies and 2 cities.

2. Instrumentation

This stage consists of 2 (two) parts, namely (1) Administrative and Biophysical Survey research site, and (2) Socioeconomic Survey.

A. Administrative and Biophysical Survey

The survey was conducted by core personnel with the scope of activities:

1. Coordinate with agencies related to this work.
2. Prepare fieldwork plans, local means of transportation during the main survey, accommodation and other support.
3. Conduct a review and orientation of the survey area to obtain an overview of field conditions and identify local problems and constraints.
4. Description of land use to identify how far the role of commodity management factors affects production, and if errors are found, corrections are made in the field.
5. Ensuring the type of commodity and land use in the field which includes observation of the type of land use and the type of plant. The results of these observations are poured in the commodity matrix and land use.
6. Observation of human resource capacity (HR), institutional development, empowerment and development of appropriate technology and development of regionally specific imagery (branding).

B. Socio-Economic Survey

a). Data Collection Methods

The collection of economic data in the integrated agricultural sector is carried out through interview activities using structured questioners and Focus discussion Group (FGD) to all stakeholders. Stakeholders in question are related government agencies, banking, private sector that can consist of small, medium and large entrepreneurs and exporters engaged in the agribusiness sector, cooperatives engaged in the commodity, farmers and their groups, NGOs engaged in the commodity, community leaders who are concerned with the development.

b). Sample Withdrawal Method

To meet the needs of the preparation of economic recovery document in the integrated agricultural sector for socio-economic surveys conducted with the following procedures:

1. Sample locations are determined purposively, namely locations that have been designated into development areas of the integrated agricultural sector,
2. Data collection is carried out at the above locations, with location samples located in development units of integrated agricultural commodities,
3. Collection of socioeconomic data is carried out at the farmer level, and its supporting institutions with the withdrawal of samples are done randomly,
4. Socio-economic data collected on small, medium and large business actors engaged in integrated agricultural sector (investors, cooperatives and entrepreneurs) will be conducted through Focus Group Discussion activities together with parties representing the government, and NGOs engaged in the assistance of farmers and institutions. The target group is leaders and/or employees / staff who have competence in formulating development strategies and priority programs for economic recovery in the integrated agricultural sector. The implementation of FGD is concentrated in one of the agreed locations.

C. Location Quotient Data Analysis Method

Location Quotient (LQ) is a method of analysis commonly used in the field of economic geography. Location Quotient is an index to compare sub-regional nations in a particular activity with the total share of that activity in total regional activity. More operationally LQ is defined as the ratio of the percentage of total activity in the 1st sub-region to the percentage of total activity to the observed region. The assumptions used in this analysis are that (a) geographical conditions are relatively uniform, (b) activity patterns are uniform, and (c) each activity produces the same product.
The LQ equation can be written:

$$LQij = \frac{Xij \,/\, Xi}{Xj \,/\, X}$$

Where:

X_{ij}: degree of activity to - j in the region to - i

X_i: total activity in the region to - i

X_j: total activity to - j in total region

X: total activity in the total region

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III. Results and Discussion

1. Integrated Agricultural Implementation

Integrated Agricultural System Program is an organic agriculture program that is integrated with livestock and fisheries programs in a region/location, where between the sub-sectors are interrelated so as to create a continuity. The purpose of implementing an integrated agricultural system program is the independence of farmers and meets the needs of farmers daily, weekly, and monthly, where the program falls into the category of environmentally friendly and sustainable programs because it implements 3R namely Reduce, Reuse and Recycle.

Programs that have been carried out, sometimes do not continue in the sense of function and system, because in the planning is less detailed in the calculation of the amount of agricultural products or livestock breeds, as well as the area of land to be used. Therefore, the planning of the Integrated Agricultural System program that has been implemented in regencies/cities in North Maluku Province can help the Institution in planning the program in detail with careful calculations and selection of appropriate types of crops and

livestock, so that the objectives of the Integrated Agricultural System program can be achieved.

The development of integrated agriculture in North Maluku Province to date shows progress, and is expected to develop sustainably. The results of identification carried out throughout the Regency/City showed that the development of integrated agriculture was carried out through government programs, self-help communities / individuals. The results can be presented in Table 1.

The integrated agricultural approach carried out in North Maluku Province has not fully applied the concept of integrated agriculture, both programmed under government agencies, companies, or self-help or community individuals. So it needs to be developed well integrated agricultural approach through the pattern of regional and sector / subsector approach into one unit by paying attention to environmental conditions for the realization of an integrated agricultural system in every regency/city in North Maluku Province.

TABLE 1. INTEGRATED AGRICULTURE PROGRAM IN NORTH MALUKU PROVINCE

Regency/City	Integrated Agriculture Program	
	Government program	**Private/Self-Help/Individual Society**
West Halmahera	Construction of UPT Livestock by West Halmahera Regional Government, with an integrated system	Development of ib technique beef cattle with PO and Brahman types under coconut plantation stands
Central Halmahera	Food Independence Program by The Central Halmahera Regional Government through the OPD of the Agricultural Service	-
Sula Islands	Food Independence Program by The Sula Islands Regional Government through the OPD of the Agricultural Service	-
South Halmahera	Food Independence Program by The South Halmahera Regional Government through the OPD of the Agricultural Service	-
North Halmahera	Food Independence Program by The North Halmahera Regional Government through the OPD of the Agricultural Service	-
East Halmahera	Food Independence Program by The East Halmahera Regional Government through the OPD of the Agricultural Service	Development of Cabe horticultural farming under coconut stands, as well as a blend of nutmeg and coconut plantation crops in Subaim
Morotai Island	Food Independence Program by The Morotai Island Regional Government through the OPD of the Agricultural Service	-
Taliabu Island	Food Independence Program by The Taliabu Island Regional Government through the OPD of the Agricultural Service	Development of integrated cut chicken farms with catfish cultivation fisheries in Fangahu Taliabu village
Ternate	- Through the P4S Program of the Ministry of Agriculture in Ponpes Hidayatullah Ternate, the development of MA11 as a medium for the development of organic fertilizers in horticultural crops, aquaponics systems. - UPPO Program (Organic Fertilizer Processing Unit) in Takom Village for horticulture and cattle farming	-
Tidore Islands	Food Independence Program by the Tidore Islands Regional Government through the Opd of the Agricultural Service	-

Source: data processed from the results of the 2021 survey

2. Integrated Agricultural Sustainability

Integrated agriculture is a system that combines agricultural, livestock, fisheries, forestry and other sciences related to agriculture in one land, so it is expected to be one of the alternative solutions for increasing land productivity, environmental development and conservation programs and integrated village development [18]. It is expected that the short, medium and long-term needs of farmers in the form of food, clothing and boards will be fulfilled with this agroforestry-based agricultural system.

Agricultural and fishery products are expected to be able to provide short-term life, while livestock and plantation products can be utilized for medium-term life. The sale of garden products and people's forest products is now believed to be able to meet the needs of paying for school fees, hospitals, circumcision, mantenan and other long-term needs. Thus, the agroforestry system is able to provide daily, monthly, annual and decadely income for farmers. The Integrated farming model has developed with several more in-depth studies through: ICM (Integrated Crop Management), INM (Integrated Nutrient Management), IPM (Integrated Pest Management) and IMM (Integrated Soil Management) [10].

Integrated livestock system is an effective livestock system that can be applied in the scope of rural communities so as to make breeding activities more efficient and profitable for farmers. There are two options in the process of traveling this

program. First employed cage children who are in charge of feeding, cleaning dirt, managing biogas and composting, maintaining the safety of the cage, and reporting if there are irregularities in livestock both in terms of health and unnatural livestock. Both labor is delegated to breeders with a system of division of tasks and rotating every day. On the other hand, there needs to be experts who are experts who serve as consultants and inseminators. The second option and these experts get wages also from the financial benefits of the program. But this depends on the agreement of the breeder, whether you want the first option or the second option [13].

3. Integrated Agricultural Priority Program

The priority program that will be implemented in supporting the development of integrated agricultural areas in North Maluku is an agribusiness development program directed to facilitate the development of productive and efficient agricultural businesses to produce a variety of agricultural products that have added value and high competitiveness, through the development of nurseries, livestock cultivation and agriculture, animal feed, kesmavet service development, kesmavet services reflected in the provision of sufficient food, amount and quality are affordable and ASUH (Safe, Healthy, Whole and Halal), supported by increased productivity achievements and quality (quality) increase in livestock poipulation.

Activities are prioritized in efforts to increase agricultural production with the development of integrated agricultural areas, efforts to preserve plasma nutfah livestock typical of North Maluku, the development of cheap, quality and local resource-based fertilizers and feed, facilitation of environmentally friendly technology, agricultural ecotensfication through the spread of superior agriculture, the development of superior areas of North Maluku province that are integrated with other subsectors with the application of farming systems, as well as efforts to increase agricultural and livestock commodities with cultivation activities focused on superior commodities in accordance with the potential of the region Figure 1 and Figure 2.

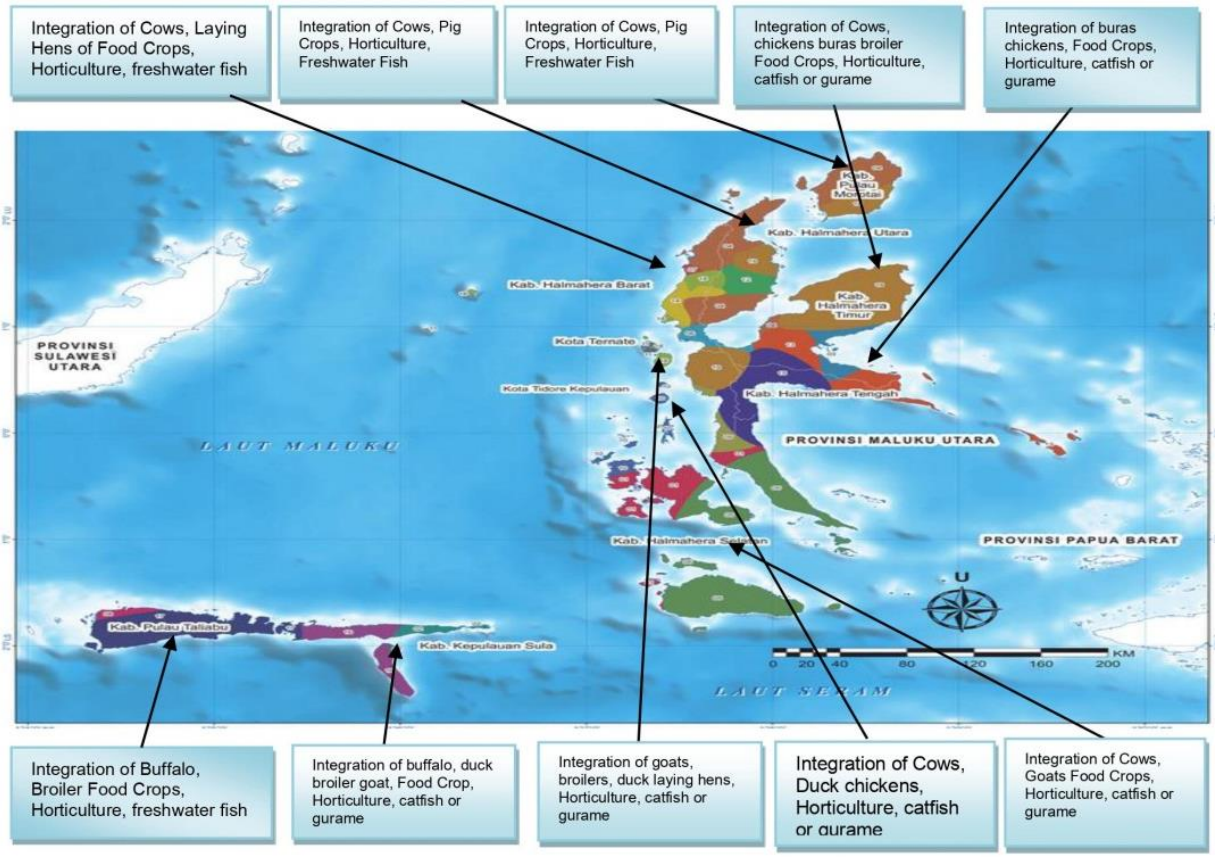

Fig. 1. Integrated Agricultural Development Projection Map based on subsectors and Regions in North Maluku

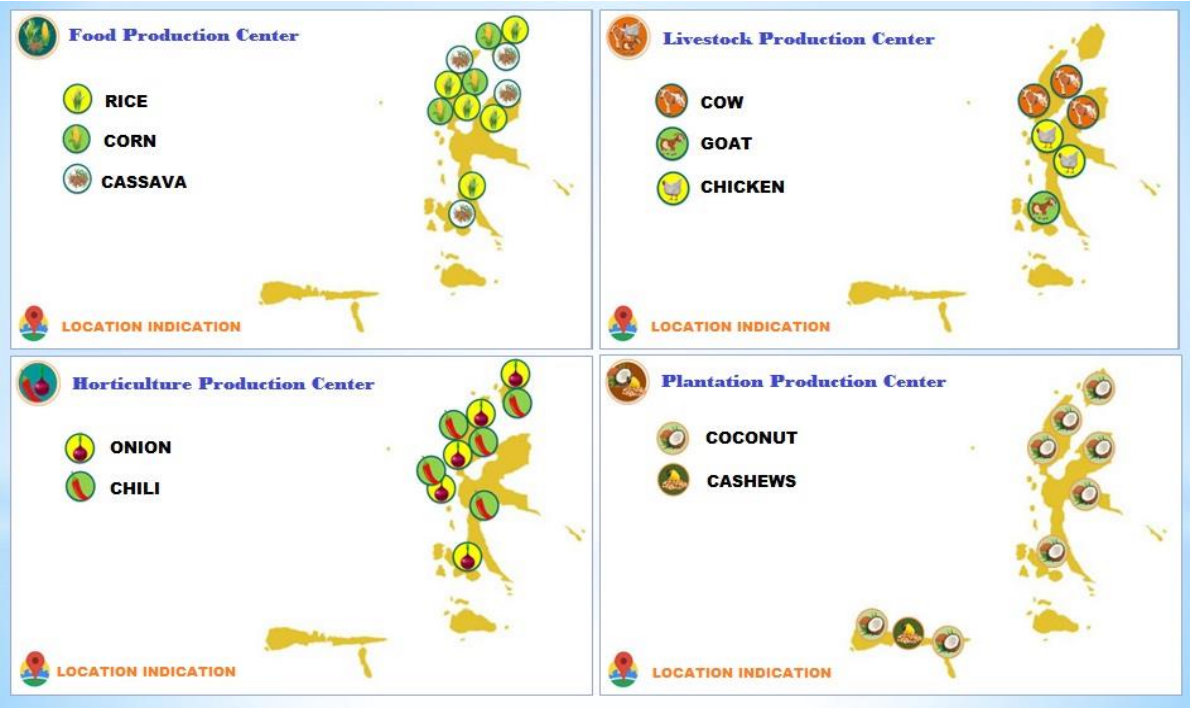

Fig. 2. Map of North Maluku agricultural production center cluster

4. Development of Agricultural and Plantation Commodity Production

Agricultural production, especially the main commodities of food and plantations, became a priorotas program of the North Maluku Regional Government. The demand for agricultural commodities that continues to increase both domestically and internationally requires local governments to continue to strive so that local farmers can increase production every year, to meet local people's consumption of key food commodities. Date in Table 2. It shows that the production of major food commodities has increased. The increase in production of north Maluku's main food commodities in 2021 amounted to 300,772 tons, with a growth rate of 5.37% every year and an average increase in food crop productivity of 1.14% every year.

To achieve an increase in food commodity production in 2017-2021, it is pursued through the expansion of rice field area (rice field printing) dry land expansion and land optimization. The target of increasing production is also pursued by land intensification in the form of input addition activities to improve the existence of food commodity land through balanced fertilization activities, the use of superior varieties, improvement and construction of irrigation networks and control of OPT gradually and integrated.

The increase in production of north Maluku's main commodities in 2019 amounted to 306,805 tons, with an average growth rate of 4.03% annually as well as increasing the productivity of key plantation commodities with an average growth rate of 3.0% each year.

TABLE II. DEVELOPMENT OF NORTH MALUKU FOOD COMMODITY PRODUCTION

No	Commodities	2017	2018	2019	2020	2021	Growth (%Year)
		Tone					
A	*Rice*	*80,617*	*84,809*	*89,262*	*94,038*	*99,378*	5.37
1	Rice Fields	66,977	70,459	74,159	78,104	82,517	5.36
2	Rice Fields	13,641	14,350	15,103	15,934	16,861	5.44
B	*Palawija*	*205,201*	*215,963*	*227,534*	*240,178*	*252,926*	5.37
3	Corn	29,668	31,252	33,055	34,708	36,579	5.38
4	Soybean	1,641	1,729	1,828	1,925	2,028	5.43
5	Peanuts	6,665	7,041	7,460	7,895	8,347	5.79
6	Green Beans	346	364	384	405	429	5.52
7	Cassava	130,086	136,850	144,035	152,043	159,828	5.28
8	Sweet potato	36,795	38,727	40,772	43,202	45,716	5.58
Total		**300,772**	**316,795**	**334,215**	**352,304**	**300,772**	**5.37**

Source: North Maluku Provincial Agriculture Office. Processed 2021

TABLE III. DEVELOPMENT OF NORTH MALUKU PLANTATION COMDITAS PRODUCTION

No	Commodities	2017	2018	2019	2020	2021	Growth (%Year)
		Tone					
1	Coconut	267,920	270,331	272,743	275,154	277,566	0.89
2	Cacao	13,543	14,056	14,569	14,569	14,569	1.86
3	Nutmeg	7,779	8,291	8,547	8,803	9,059	3.90
4	Clove	5,610	5,646	5,683	5,719	5,756	0.64
5	Cashews	1,395	1,458	1,521	1,585	1,648	4.25
Total		295,734	298,758	301,782	304,293	306,805	4.03

Source: North Maluku Provincial Agriculture Office. Processed 2021

TABLE IV. SUPERIOR COMMODITY DETERMINATION RESULTS (LOCATION QUETIENT)

Commodities/ Regencies	Food Crops	Horticulture	Coconut	Cacao	Coffee	Clove	Nutmeg
West Halmahera	Not superior	Superior	Superior	Superior	Superior	Not superior	Superior
Central Halmahera	Not superior	Superior	Superior	Superior	Superior	Superior	Superior
Sula Islands	Not superior	Not superior	Superior	Superior	Not superior	Superior	Not superior
South Halmahera	Not superior	Superior	Superior	Superior	Superior	Not superior	Superior
North Halmahera	Not superior	Not superior	Superior	Not superior	Not superior	Not superior	Superior
East Halmahera	Not superior	Superior	Superior	Not superior	Not superior	Not superior	Superior
Ternate	Not superior	Superior	Not superior	Not superior	Superior	Superior	Superior
Tidore Islands	Not superior	Superior	Superior	Superior	Superior	Superior	Superior
Taliabu Island	Not superior	Superior	Superior	Superior	Superior	Superior	Superior
Morotai Island	Not superior	Superior	Superior	Superior	Superior	Superior	Superior

Efforts to achieve the target of increasing plantation commodity production during the period 2017-2021 are carried out through extensive activities, intensification, rehabilitation/ rejuvenation and diversification of plantation crops, with details including the increase in the area of the main commodity plantations over the next five years covering an area of 20,950 ha increased by 6.0% from 2017 covering an area of 318,542 ha to 337,659 ha in 2021, the growth of area is very evident in nutmeg commodities at the rate of Growth averages 5.12% per year (Table 3).

5. Superior Commodity Analysis (Location Quotient)

This method aims to find out the sub-sector base / superior in North Maluku Province. Sub-sectors that have an LQ value of more than one are sectors that are able to export some of the added value they generate. Conversely, sub-sectors that have an LQ value smaller than one are sectors that still meet the domestic / local market and tend to import from other regions.

The rationale of the use of LQ techniques based on basic economic theory has the following meaning: because the base industry produces goods and services both for the market in the region and for markets outside the region, the sale of proceeds outside the region will bring revenue into the area. The income stream leads to an increase in consumption and investment, which ultimately increases regional income and employment opportunities (income generating and job creation) [14, 15].

Because in the short term exports are better than imports, the sector that has been able to export is a sector that has the ability to create income and employment opportunities (income generating and job creation) more broadly. The estimated LQ coefficient of each region in North Maluku Province gives results as seen in the following Table 4.

Based on the location quotient analysis in Table 4. Above, it can be known that there is not one area in North Maluku Province that has an advantage in food crops. Meanwhile, areas where horticulture crops are the leading commodities are West Halmahera Regency, Central Halmahera, South Halmahera, East Halmahera, Ternate and Tidore islands, have better LQ values during the period 2017-2021 where the LQ value is greater than 1. Coconut commodities are the leading commodity for regencies / cities in North Maluku Province, except ternate city. Furthermore, cocoa commodities are the leading commodities for the regions of west Halmahera Regency, central Halmahera, Sula Islands, South Halmahera, and Tidore Islands.

While clove commodities are the superior commodities for Central Halmahera Regency, Sula Islands, Ternate City, and Tidore Islands City. Then, nutmeg commodities are the superior commodities of all regions in North Maluku Province, except Sula Islands Regency. In general, from the results of the calculation of LQ above there are commodities that have a comparative and competitive advantage, of course, attention is needed to be developed as a superior commodity in the development process of West Halmahera Regency in the future.

IV. Conclusion

In order to realize the success of development in the field of integrated agriculture in North Maluku Province based on agricultural regions and subsectors, directed and comprehensive agricultural development planning is needed. In accordance with the studies of the priority areas of integrated agricultural development in North Maluku Province, based on the picture of regional conditions and three aspects of assessment, namely the general overview of the region, integrated agricultural programs and concepts, and their economic impact.

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