

Contestation Of Science And Local Knowledge

(Case Study: Horticultural Farmers In Waihatu Village)

Leunard Onisivorus Kakisina, Paulus M. Puttileihalatand, Jeter Donald Siwalete

Department of Social Economics Agriculture, Faculty of Agriculture,

Pattimura University,

Maluku, Indonesia.



Abstract – The research aims to examine the development of modern agricultural systems and the content process between local knowledge and science which is the basis for modern agriculture. The study used a qualitative research design using case studies and in-depth interviews, observations, and documents, with the case study method. The results showed that the development of modern agriculture in horticultural crops is inseparable from the hegemony process through government institutions. The contestation process in horticultural land produces a form of domination (zero sum game), coexistence, and hybridization between science and local farmers' knowledge. The domination (zero sum game) of science on local knowledge is manifested in the form of programs to increase the production and productivity of horticultural crops as part of a national program to increase food production. The coexistence between these two knowledge entities is due more to the technical limitations of modern agriculture to be applied, especially in local horticultural lands. The hybridization between science and local knowledge shows that the two knowledge entities can complement each other's shortcomings and limitations. The novelty of this study recommends that a model for the development of modern agriculture based on local knowledge is the main strategy that needs to be implemented in formulating horticultural agricultural development policies. Policies to increase agricultural production must be implemented in the form of activities or comprehensive development programs concerning technical, economic and social aspects.

Keywords – Science, Local Knowledge, Zero Sum Game, Coexistence, and Hybridization.

I. INTRODUCTION

Research with the theme of the contestation between science and local knowledge has been carried out, including; [1] research in Jamaica on local knowledge of local farmers plays an important role in farming, because it has been practiced since the days of slavery and plays an important role in the food security of their households. Where contextually, local knowledge or traditional knowledge is very valuable, easily adaptable in the face of changing risks and uncertainties. One of the local knowledge referred to is agricultural pests and diseases. [2], which conducted research in Bikita District, Zimbabwe on the capacity of farmers to increase agricultural production, especially corn, sorghum and cowpeas. The study concluded that the skills of subsistence farmers had positive implications by attending the training conducted by the local agriculture agency. It can be seen from the farmers being able to produce their own food even in the midst of unexpected rain and heat waves.

[3], conducting a cooperative research on mountain cereal farmers in Switzerland. shows that (i) maintaining local value-based quality is a dynamic process linking local and extra-local resources. (ii) product flow, knowledge and information exchange, quality control, and innovation are governed by horizontal and vertical relationships between local and extra-local

resources, and these dual relationships build trust in networks and beyond, (iii) enable cooperatives to continue reproducing its values by weaving it into a quality creation cycle. We conclude that we need to understand the value-based quality characteristics of cooperative products as a result of the iterative cycles of local and extra-local knowledge creation and resource exchange. Furthermore, [4] examines local knowledge in the environment and discourse development from dichotomy to knowledge in the southeastern part of Nicaragua. The results showed that knowledge production is seen as a social negotiation process involving many actors and complex power relations. That the problem lies in knowledge as one of the main challenges in developing anthropology as an approach whose subject remains a dichotomy between subject and object, facts and values, and rational and practical, for critical reconstruction.

Likewise, [5] who examines contingent, contestant and knowledge change in south-eastern New South Wales Australia, shows that indigenous knowledge is dependent on, contested and changes in culturally determined ways. These aspects are often overlooked in educational practice that prioritizes the authenticity and knowledge of indigenous peoples. Meanwhile, [6] examines the contestation in knowledge production on the Alaska-Shell North Slope. That challenges to the co-production of knowledge include logistics, cultural differences and decision contexts, and the balance of trade-offs between perceived credibility, legitimacy, and relevance. It is necessary to devote time to this problem to build trust, develop an adaptive governance approach in building capacity among actors to translate community concerns.

[7] who examines the contestation of vocational education and training and partnerships in an innovation activity in Africa, Asia, America and Europe, finds that the general trend in innovation studies can be hybridized. Where traditional knowledge, training and beliefs are combined with new forms of knowledge and technology to create new knowledge systems. The findings suggest that the importance of traditional ecological knowledge systems as reservoirs of experience can provide important insights for the design of adaptation and mitigation strategies to address global environmental changes. Meanwhile, the research results of [8] in the United Kingdom, Solomon Islands and Australia on integrating local and scientific knowledge for environmental management, found that the integration of different types of knowledge is inherently complex and knowledge classification is arbitrary and knowledge integration perspectives are qualitatively different. that there is no single optimal approach to integrating local and scientific knowledge and encourages a shift in science from knowledge integration product development to knowledge development that focuses on process integration problems. This process needs a systematic and reflexive system so that many views and various methods are considered in relation to environmental management issues.

In Indonesia, there are several studies with the theme of this study including; [9] which examined the development of modern agriculture and the content process between science and local knowledge of farmers in tidal swamps in Barito Kuala Regency, South Kalimantan. The results showed that the development of modern agriculture in tidal swamps is inseparable from the hegemony process through government institutions. The contestation process in tidal swamplands produces forms of coexistence, domination, and hybridization between science and local knowledge of farmers. The dominance of science over local knowledge is manifested in the form of programs to increase rice production and productivity as part of the national program to increase food production. The coexistence between these two knowledge entities is due more to the technical limitations of modern agriculture to be applied, especially in tidal swamp type A. Hybridization between science and local knowledge shows that these two knowledge entities can complement each other's shortcomings and limitations.

[10] conducted research in three locations namely Labuku Village, Maiwa District, Enrekang District, Ilan Batu Village, West Walenrang District, Luwu Regency and Segeri Village, Segeri District, Pangkep Regency. The results showed that the traditional farming techniques in Labuku, Ilan Batu, and Segeri villages were characterized by rainfed rice fields, did not use chemical fertilizers such as plant fertilizers, rice disease repellents, and rat control but instead used betel leaves, betel nuts, and lime. Even so, high quality rice is harvested once a year. The conclusion of this research conducted is that traditional knowledge-based agriculture always uses environmental resources. This has a direct impact on creating a green environment and indirectly counteracts the negative impacts of modern agriculture.

Research [11] who conducted research in Ubud, one of the tourist villages in Bali, on how different the structure of the agricultural system is. The results show that the linkages between various institutions have created a space for farmers to implement it, which is manifested in various emerging strategies at the micro level. This diversity of farming styles and strategies shows that farmers have the ability to perceive and solve problems. Thus, their capabilities based on their locality are a manifestation of their resilience, which should not be ignored, as they may become the seeds for future agricultural development. Likewise, research and policies developed in agriculture argue that scientific knowledge must replace traditional knowledge in

agricultural practices to increase productivity. However, this opinion has been challenged by the emergence of a new paradigm which suggests that local knowledge should be considered very important in the use of sustainable and balanced development resources [12]. As is known, the area of paddy fields before the damage to the irrigation dam in 1993 was 400 hectares. Meanwhile, until this research was conducted in February 2020, farmers who cultivated lowland rice were only 5% or less than 10 hectares. The form of exploitation is carried out with water sources from self-made wells and channeling water to the fields using a water pump and the cultivated area is less than 0.5 hectares. This had to be done because generally these farmers could not afford to buy rice for family consumption. Another factor that causes some farmers to continue working on lowland rice is that the farmers have decades of experience in managing and developing lowland rice fields. In addition, farmers also have prevailing socio-cultural values and produce specific local knowledge about lowland rice management. This knowledge constitutes long-standing and developing traditions and practices in the region, which are manifested in community wisdom, knowledge and learning.

In line with the urgent need for the family's economic needs for food, especially those from lowland rice, while being hampered by the absence of irrigation water, almost all farmers (95%) switched to cultivating horticultural crops. The types of horticultural crops that are cultivated are vegetable horticultural crops such as corn, tomatoes, cucumbers, chilies, mustard greens, eggplant, beans and kale. According to farmers, switching their business to horticultural crops is more profitable when compared to lowland rice. This is caused by several factors, namely; good selling price, fast harvest age, many plants cultivated and planted all the time.

With regard to the business function conversion which was carried out on a large scale by local farmers, since 2010 the local government has designated the village as a center for horticultural crop production. In encouraging and spurring production, the government is maximizing the existing area with the introduction of modern agricultural technology. It is also realized that the introduction of modern agricultural technology has had an impact on ecological and social damage [13]. In other words, the introduction of a modern agricultural system based on chemicals and agricultural mechanization has threatened the existence of local knowledge that has been integrated into the social system of society. Apart from having a negative impact on the environment in disguise, it is also capitalistic hegemony which leads to impoverishment of the peasant community [14]. Even the green revolution that has been carried out so far has reduced traditional agricultural systems and buried local knowledge with an environmentally friendly nuance [15].

It should be explained here that before the introduction of modern agricultural systems (1998-2009) by the government, local farmers used production inputs such as seeds / seeds from their quality products. This process can be done alone or from other farmers who usually give each other if other farmers want to plant certain commodities. It is also realized that farmers' local knowledge also has limitations in facing the challenges of globalization, population pressure and increasing community needs. This is what [16] said that local knowledge is vulnerable to economic pressures, modern technology that is spreading rapidly, and rapid population growth. Therefore, a special approach is needed so that the existence of local knowledge in the development of globalization and modernization of agriculture is now able to support the socio-economic life of farming communities on horticultural crops. This is because in [17] view the difference between the two knowledge entities lies only in substance, methodology and contextual.

The introduction of modern agricultural technology by the government is in the form of production facilities (input) for superior seeds for several horticultural crops, namely corn, tomatoes, cucumbers and chilies, as well as alsintan (agricultural machinery), namely hand tractors. Especially for hand tractor assistance, only 2 units were given, whereas there were 40 farmer groups in Waihatu Village. The types of seeds given were for Talango and Bisi 816 maize, tomatoes (F1 Synta and F1 Sakura), cucumbers (Milly Austin and Hercules Plus F1), and chilies (Red Kriss and Columbus). In addition to assistance for production inputs and agricultural machinery, there is also assistance from the local agricultural office, namely agricultural extension agents.

The development of new technology in the form of panca cultivari whose main element is the use of national superior seeds is a new thing for farmers because so far agriculture has been cultivated with local varieties that have adapted to local environmental conditions since decades ago. The implications of the use of superior varieties of course must be accompanied by technological packages such as the use of fertilizers, more intensive tillage and maintenance, and the use of pesticides for controlling pests and plant diseases. In addition to introducing new knowledge to farmers, this technology package also requires additional venture capital to apply it. This new knowledge that enters the life of farmers interacts with local knowledge that has been owned by local farmers. The process of contestation of these two knowledge entities results in a form of coexistence,

domination and hybridization. The forms of contestation that occur are influenced by the condition of the ecosystem and the social system of the community, including various forms of government intervention through agricultural development programs. In this context, the aspects of interest and the communication process are important parts that will lead to the direction of the contestation.

Based on the above background, the purpose of this study is to analyze the development of modern agricultural systems and the content process between local knowledge and science which is the basis for modern agriculture.

II. RESEARCH METHOD

a. Research Design

This research uses a mixed approach (quantitative and qualitative). According to [18], qualitative and quantitative data can be combined into one database which is used side by side to strengthen one another. The research design used was a case study design in the form of a single case. The single case study in this research is a case study of modern agricultural systems and the content process between local knowledge and science which is the basis for modern agriculture. Specifically, this study looks at the contestation process between local knowledge and scientific knowledge about plant cultivation. This research is to see how the process of contestation between local knowledge and science (agricultural modernization). [19] argues that critical theory bases its study of society in the context of the process and course of history as a whole. Through this critical theory paradigm, this research activity is more aimed at criticism, transformation, recovery, and emancipation. This research also tries to see how the contestation process between local knowledge and science (agricultural modernization).

b. Research Instruments and Procedures

Research instruments are tools or facilities used by researchers in collecting research data so that their work becomes easier and better, in the sense that it is more accurate, complete, systematic so that it is easier to process. The instruments used in this research are observation, questionnaires and documentation. While the research procedure in this study refers to the stages suggested by [20], namely: (1). Making a research design. Starting from determining the problem to be studied, preliminary studies, formulating the problem, objectives, determining the research methodology, and finding sources that can support the course of the research; (2). Research Implementation. Includes data collection, data analysis obtained through observation, interviews and questionnaires, so that conclusions can be drawn.

c. Population and Sample

The research was conducted in Waihatu Village, Kairatu Barat District, West Seram Regency, Maluku Province in August-September 2021. The data on the number of farmer groups in Waihatu village were 16 farmer groups, where each farmer group consists of 20 members, so the population in the study This is 320 farmers. Of the population, 25% were taken as a sample, namely 80 farmers.

The sampling procedure is carried out by means of probability sampling. Probably sampling is the drawing of a sample using the probability method which is carried out randomly (random) and can be done by means of a draw. One such probability sampling procedure is systematic random sampling. This sampling procedure is carried out by numbering the population. The first sample is drawn randomly, then it is carried out systematically according to a certain interval. Furthermore, the selection of informants was carried out purposively with the snowball sampling method. According to [21], informant retrieval using this method is an approach to placing information from key informants. Informants taken in this study were farmer figures, village officials, members of the legislature, district officials and officials at the district and provincial levels.

d. Data collection technique

The data collected in this study are primary and secondary data. Primary data collection techniques are as follows: (a) Observation or observation techniques include various matters relating to the observation of farmer activities with various livelihood strategies prior to mining and gold mining. (b) Purposive sampling technique, namely selecting a sample of people who know with certainty about the strategy of household income. This data was obtained by conducting in-depth interviews with the community and key informants. In-depth interviews using a questionnaire in the form of structurally written questions given to respondents according to the research problem. (C) Participatory observation [22]; [23], in which the author is directly involved in people's daily lives by listening to and distinguish what society as research subjects have said and done.

e. Data Processing Techniques

The data that has been collected will be processed and data processing will be carried out by:

- **Triangulation.** Triangulation is a data validity checking technique that uses something other than the data as a comparison to the data. There are three types of triangulation, namely triangulation with sources, triangulation with techniques, and triangulation of time. In this study the authors used triangulation using sources, namely by checking the data obtained through several sources, namely; testing the credibility of the data on the use of books and journals, then tested with literature which is the subject of the research and adapted to existing theories.
- **Reduction.** Reduction, namely summarizing, choosing the main things, and focusing on the research theme. Reduced data will provide a clearer picture of the transformation of household income according to the literature.
- **Presentation of Data.** After the data is reduced, the next step is to present the data. The data is presented in the form of narrative text. Data is presented by grouping according to each sub-chapter.
- **Draw conclusions.** It is a continuation of presenting the data, namely describing the various data that has been obtained which then makes conclusions which are the results of the research.

f. Data analysis technique

Researchers used descriptive qualitative methods in analyzing data. The data obtained through interviews in this study were analyzed using qualitative descriptive analysis, namely by means of the data obtained from interviews with informants who were thoroughly described. Interview data in research is the main data source which is used as material for data analysis to answer research problems. Data analysis begins with conducting in-depth interviews with respondents and informants. Then the researchers made simple tabulations using MS excel. The processed data is displayed in a table to facilitate exposure of the conditions of the research location.

The content of local knowledge and science is the main focus of this research, seen from the ability of each farmer to maintain or adopt knowledge. Furthermore, the researcher made data reduction by means of abstraction, which is taking data that is in accordance with the context of the study and ignoring unnecessary data. Data from in-depth interviews, field notes and other documents were analyzed qualitatively by gathering local knowledge and scientific knowledge. The two types of knowledge then examine the contestation patterns in the cultivation of horticultural crops, both in the Zero Sum Game pattern, the pattern of coexistence and the pattern of hybridization.

This research is a case study through a qualitative approach. This research paradigm uses critical theory. Methodologically, critical theory is dialogic and diallic in nature, so that research is built through dialogue between researchers and research subjects. Dialectical dialogue naturally aims to transform ignorance and misunderstanding into awareness or as a form of intellectual transformation [24] ; [25]. This research also tries to see how the process of contestation between local knowledge and science in agricultural modernization. [19] argues that critical theory bases its study of society in the context of the process and course of history as a whole. Through this critical theory paradigm, this research activity is more aimed at criticism, transformation, recovery, and emancipation. Data collection was carried out through farmer informants, farmer leaders, village officials, agricultural officers from the village, sub-district, district to provincial levels. The selection of informants was carried out purposively with the snowball sampling method. According to [21], informant retrieval with this method is an approach to placing rich information from key informants.

Data analysis was carried out in the form of coding which was the process of decomposing data, drafting, and rearranging it in a new way. The steps in this analysis begin with open coding consisting of phenomena labeling, finding and naming categories, composing categories. Next, it is followed by axial coding, which is placing data back in new ways by making links between categories. The next stage is selected coding, namely selecting the core categorization and linking other categories to the core category [26].

III. RESULTS AND DISCUSSION

3.1 Research Location Conditions

West Seram Regency is part of Maluku Province, this regency blossomed from Central Maluku Regency in 2003, West Seram Regency has an area of 84,181 square kilometers or about 11.82 percent of the total area of Maluku Province. Geographically, West Seram Regency is located at 02 ° 55 'LS– 03 ° 30' LS and 127 ° 30 'East Longitude - 128 ° 55' East Longitude. The population of West Seram Regency until the end of 2019 is 208,009 people. The largest population is in Huamual District with a population of 47,396 people, the second largest population is West Seram District 35,240 people and the third largest population is Huamual Rear District 33,222 people. Meanwhile, the sub-district with the lowest population was 152 people in Elpaputih District. For the area, the widest sub-district is Taniwel district with an area of 1,181.32 km², the second widest is Elpaputih district with an area of 1,165.74 km², the third widest is Huamual district 1,162.99 km², while for the sub-district with the smallest area is Kairatu Barat district 132.25 Km²[27].

Waihatu Village is a transmigration village originating from Central Java since 11 November 1973. The transmigrants from Central Java, came from 7 districts, namely Banyumas, Kebumen, Wonosobo, Grobogan, Pati, Blora, Wonogiri. The population of this transmigrant number is 200 families. Before occupying the settlement project, the transmigrant residents from Central Java were placed in the village of Waimital (between November 1973-June 1974) because the new settlement project would be opened in July, August and September 1974. Transmigration residents began to occupy new settlements with conditions a very unworthy house. The house frame is made of logs, walls made of sago fronds and bamboo, roof of sago leaves. Around the house is still a jungle, and toilet facilities are not available. Yard land cannot be used because it is still thickets. In order to survive, transmigrant communities only depend on government assistance in the form of rice, salted fish, cooking oil, salt and kerosene, while clearing their yards so that they can be planted. The only plants cultivated are root crops such as cassava, taro, and sweet potato. At that time, the settlement location was called "Bumi Harjo". In 1975, 200 transmigrants came again, consisting of 100 heads of families from East Lombok Regency, NTB Province and 100 heads of families from DKI Jakarta. They stay in a family from Central Java for 2-3 weeks, then occupy their respective homes. In 1975, "Bumi Harjo" was replaced with "Waihatu". The word Wai is taken from the name of Waisamu Village, and Hatu is taken from the name Hatusua Village, because Waihatu is located between Waisamu and Hatusua.

Waihatu Village has a land area of about 713 hectares. Most of the land area (84%) consists of rice fields and shrubs and alang-alang, the rest is allocated for residential areas and plantation crops. Thus, from the start, Waihatu Village was designed by the government to become one of the centers for lowland rice production to supply rice needs in Maluku. The area of rice fields is based on the number of transmigrant family heads of 300 ha (400 x 0.75 ha) plus approximately 100 ha of purchases from the people of Hatusua, Waisamu, and Lohiatata. Of the total area of rice fields, currently cultivated is approximately 30 ha, which uses the Kairatu III dam irrigation, the rest uses the Kairatu II dam, a small part is planted with vegetable horticulture, most of which are abandoned due to dam damage.

The plantation area should have been 200 ha (400 x 0.50 ha) based on the number of transmigrant family heads. But that is cultivated approximately 10 hectares. The rest are shrubs and reeds. Because the land is located on a steep hill, valley or slope, people are not interested in cultivating it. In 1992, Djajanti Group company planted HIT (industrial plantation forest) reforestation, but the condition is now neglected. The area of the settlement based on the calculation of the number of transmigrant family heads is 100 ha, that is, 400 heads of households multiplied by 0.25 ha, plus 13 ha for basic facilities and infrastructure such as school buildings, Community Health Centers (Puskesmas), Village Unit Cooperatives (KUD). , houses of worship (mosques and churches), roads and bridges and village halls.

The use of the most extensive area is 400 ha (56.10%) for the use of rice fields. Transmigrant farmers generally have skills in working on rice fields. However, due to the breakdown of the irrigation dam in Waihatu Village, non-paddy rice farming (vegetable horticulture) was more dominant than wetland rice or paddy fields.

3.2 From Paddy Fields to Horticulture

Since being placed as a transmigrant in 1973, almost 100% of Waihatu residents have cultivated lowland rice as the main crop which is the government's effort to self-sufficiency in food, especially rice. So that at that time (1973-1993) this area was designated by the Maluku local government as one of the centers for lowland rice production. The history of the transfer of

lowland rice land development to horticultural farming has been carried out since 1996 until now. This diversion was caused in 1993, there was fatal damage to the irrigation dam as a result of the massive floods that hit the area. The development of modern agriculture, namely horticultural crops with the use of superior seeds, has been carried out since 2010 which was initiated by the agriculture agency. Various government efforts and programs in the horticultural sub-sector are more directed at efforts to increase production and achieve self-sufficiency. This agricultural development program is based on the development of new technology in the form of five farms whose main element is the use of superior seeds. However, these national superior seeds are not in demand by local farmers because according to them the production is low when compared to the production of horticultural crops from seeds/seedlings produced by them themselves. Changes in farming techniques are also one of the reasons it is difficult for local people to apply new knowledge about cultivating superior varieties. This factor is closely related to the existence of supporting institutions in the agricultural system. For local farmers, the traditional horticultural farming system with local varieties is an agricultural system that uses local inputs with low capital and requires little external input. The modern horticultural farming pattern requires a relatively long time (3-5 months) and is technically related to the rules desired by the use of these superior seeds. The reason why many farmers are not interested in cultivating national high yielding varieties with short life is not only related to technical aspects but also social and economic aspects (Figure 1).

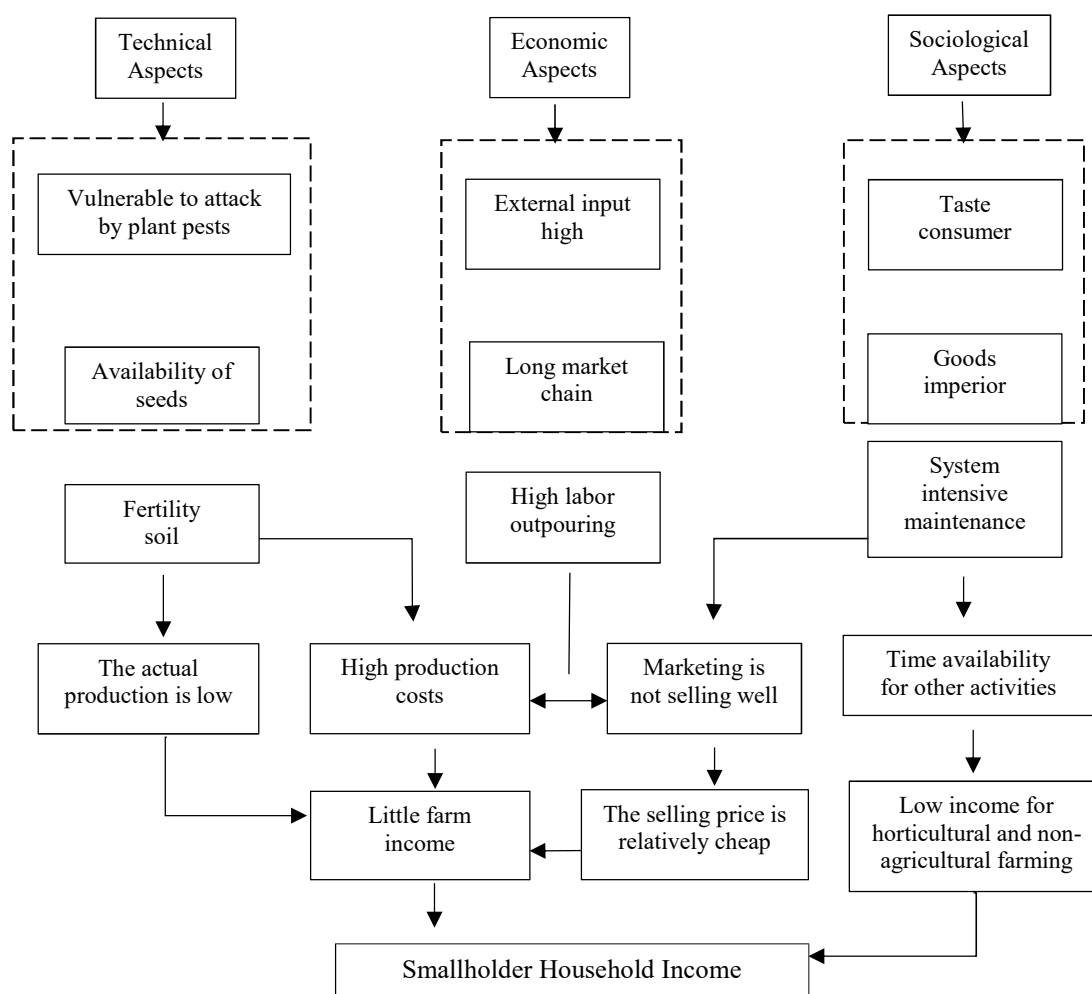


Figure 1. Factors causing farmers to be less interested in cultivating superior horticultural crops

3.3 Contestation of Local Knowledge with Science in Horticultural Land Management

The government's interest in the success of the horticultural crop production increase program is the main factor driving the development of modern agricultural science and practice. This is as stated by [28] that science will only be formed in a medium of interest. New knowledge and technology in agriculture are introduced through various agricultural development

programs implemented by the government. This program aims to increase production by applying modern knowledge and technology in agriculture. Farmers are introduced to superior seeds, artificial fertilizers, pesticides and intensive management techniques because these crops are short-lived. Through agricultural extension activities, farmers are given new knowledge and techniques in cultivating horticulture. Farmer groups were formed to facilitate the training of farmers and were equipped with various demonstrations about modern farming techniques and methods by implementing five farming methods.

Agricultural progress in the region is indicated by an increase in productivity through the application of modern agricultural techniques. The traditional farming model is considered low in productivity so that it needs to be replaced with superior varieties that have high productivity with the application of five farms. This view then developed into an ideology about modern agriculture as a basis for increasing the welfare of farmers. This ideology then makes local knowledge difficult to develop and even seems to be dominated by modern agricultural science and technology. As stated by [29], basically human knowledge cannot be separated from its existence. Those who adhere to the ideology of a particular social system will find it difficult to see the truth of another social theory that is not based on the existing system. This is possible because of its interest in maintaining the system.

Modern agricultural techniques based on superior varieties are not only changing the way of farming, but also overhauling the entire existing agricultural system, including existing institutions in society. Farmers who are familiar with the use of local varieties with local knowledge always try to maintain their existence to achieve the goals of their farming activities. The horticultural farming system has traditionally been supported by various traditional institutions such as mutual cooperation institutions, production sharing systems, providers of capital / loans and product marketing. For them, increasing income and welfare are goals that must be achieved through agricultural activities. High productivity and production is only one way to achieve the goal of increasing income and welfare among various other means.

The above conditions illustrate that farmers respond back to new knowledge and practices which they think are not in accordance with the conditions surrounding their lives, both in terms of agricultural technical aspects as well as local socio-economic and cultural aspects. The development programs carried out always refer to the target and are oriented towards success. The target of increasing production is a measure of the success set in an agricultural system. This is the basis for the strategic actions of local agricultural development officials to develop superior horticultural farming systems on commonly used horticultural lands. Whereas in the view of [30] these strategic actions are purposeful rational actions that are categorized into social interactions, but are not genuine. An interaction that is genuine is an interaction that is carried out in communicative actions. Communicative action refers to actions directed by mutually agreed norms based on mutual expectations among the interacting subjects.

3.3.1. Forms of Domination Contest (Zero Sum Game)

Domination (Zero Sum Game) a form of knowledge over other knowledge can occur if that knowledge has advantages or advantages over others. Subjectivity and interests are factors that play a role so that a form of knowledge is embraced and becomes dominant. Farmers in horticultural land who have been cultivating horticultural crops for a long time with production input from their own business, which are knowledge that has developed to the entry of new knowledge about modern horticultural cultivation. New knowledge provided to farmers in the context of production improvement programs through agricultural extension activities.

The dominance of local horticultural farming systems over superior horticulture has different patterns and causes. For farmers, they only plant local horticulture because technically superior horticulture cannot be planted in this area. This is because the microclimate conditions in this region are not in accordance with the requirements for the seeds/superior seeds, such as humidity, air temperature and so on. In addition, cultivating superior horticultural crops requires relatively large production costs compared to local horticultural crops, such as standard and timely fertilization, pest eradication and other technical aspects. As a result of the application of these standards, local farmers find it very difficult to meet them because of limited working capital when compared to local horticultural crops. Even though the production of superior horticulture, the results are not much different from local horticulture which both have the same selling price.

The above phenomenon shows that the resistance of local farmers to superior horticulture is stronger than local horticulture. Farmers feel they already have experience about the difficulties and failures in cultivating superior horticulture. This experience has formed their resistance to superior horticulture. However, they also do not completely reject the modernization of

agriculture, such as the use of chemical fertilizers, pesticides and modern equipment that they still use in local horticultural farming.

The dominance that occurs in the use of soil processing equipment over the use of hand tractors that occurs in superior horticultural crops is due to technical considerations and the availability of only 2 units for 40 farmer groups. According to them, the earth-moving equipment with hoes is better because it does not poison the soil when compared to a hand tractor that uses fuel that can be spilled during soil processing. Likewise, the dominance of the use of chemical fertilizers and pesticides over the use of organic materials is more due to government programs. In the early stages of the introduction of these chemicals, farmers receive assistance and subsidies with the aim of increasing production. The ease of obtaining, practical and quick results shows that the knowledge and technology of using this chemical is also quickly accepted by the public. Even now they are very dependent on the use of these chemicals. The widespread use of these chemicals has backfired on the government itself. The existence of dangers and potential environmental damage due to the use of these chemicals has made the government undertake a program to reduce these chemicals, especially pesticides. The implementation of the UPSUS (Special Effort) program is one of the government's efforts to reduce the use of these chemical pesticides. The ease of obtaining, the relatively low price and its practicality makes it difficult for farmers to return to the old ways they had done, namely mechanical and botanical.

In organizational and social institutional aspects, the domination of farmer groups is the main symptom that occurs in business lands. This process is driven by the entry of government programs in the context of agricultural development, fostering farmers and spreading agricultural technology. The dominance of farmer groups formed by the government over groups that were before the existence of modern agriculture. This is because superior horticultural land is carried out with agricultural development programs and the spread of modern agricultural technology is relatively good when compared to local horticulture. Several government programs are shown in Table 1.

Table 1. Comparison between local horticulture business with superior horticulture

Comparison Components	Horticultural	
	Local	Excellence
Knowledge base system	Knowledge of agricultural land management through local agricultural systems	Unity of agricultural systems based on equality (commodity, spread, and domicile)
The main basic principle	Group/community	Group
The governing system of norms	The rules are mutually agreed upon	Based on official regulations (Permentan 273/2007)
The elite at play	Chairman of farmer groups	Head of farmer groups, Agricultural instructor
Purpose	Farming development and group identity	Business improvement and development
Interest	Maintenance of plants and increase in soil fertility	Farmers development and credit distribution, introduction of government technology packages / programs

Source: Results of primary data processing and analysis, 2021

Another social institution that has now lost its existence is food storage along with the development of superior horticulture as a commercial commodity. The buying and selling system is a choice that must be made by farmers to meet the increasing needs of life as well as the increasing number of inputs or production facilities that must be purchased and the development of the wage system. Now farmers prefer the buying and selling system and working capital is saved in the form of savings in the bank. Farmers who do not have sufficient capital can borrow it from collector traders in the surrounding villages or villages, either in the form of money or production facilities such as fertilizers, seeds and so on.

The creation of such a pattern is an implication of the development of superior horticultural crop agriculture as a commercial commodity that aims to benefit from farming and the development of a capital system in rural agriculture. The comparison between the granary system and the buying and selling system can be seen in table 2.

Table 2. Comparison between the Granary System and the Buy and Sell System

Comparison Components	System	
	Barn	Buy and sell
Knowledge base system	Knowledge of food reserves and farming capital for the following season	Fresh funds in the form of money for survival and business
The main basic principle	Groups and communities	Individual
The governing system of norms	Togetherness	Price levels and market forces
The elite at play	group leader	Collecting traders
Purpose	Food availability	Advantage
Interest	Food safety	Price stability

Source: Results of primary data processing and analysis, 2021

3.3.2 Forms of Coexistence Contest

The form of a contestation of coexistence between science and local knowledge results in a form of coexistence if the two knowledge entities each maintain their existence. Although the existence of these two entities is recognized in people's lives, a further process will result in marginalization. This is due to the existence of a knowledge entity that is more developed and recognized by the local community. Each of the knowledge entities embodied in the agricultural system has different interests. Modern horticultural agriculture based on science is more oriented towards productivity and efficiency, while traditional agriculture with local knowledge is more oriented towards sustainability and harmony with nature. As [28] said, science cannot be separated from its interests. Likewise, what was said by [29] about knowledge and existence that cannot be separated, so that it is difficult to unite two views that have different backgrounds.

The form of coexistence in the aspects of modern agricultural cultivation techniques (superior seeds) in Waihatu shows a more diverse form compared to local horticulture. The existence of local horticultural farming systems and superior horticulture is more due to the preference of farmers and the inclusion of agricultural programs implemented by the local Agriculture Service. For farmers who choose to plant local horticulture, technical, economic and social considerations are the basis for why they cultivate these local varieties. On the other hand, farmers who plant superior horticulture are more likely to follow government programs, such as the UPSUS (Special Efforts) and SLPTT (Integrated Crop Management Field School Program) which require farmers (farmer groups) to cultivate superior varieties. Those who take part in this program receive free seed assistance, coaching and field practices that are funded through the program's funds. This is different from the existence of using traditional tools chosen by farmers due to technical and socio-economic aspects. Farmers who have large agricultural areas tend to use hand tractors, on the other hand, those with narrow land prefer hoes to cultivate the land. At a time when wage labor is difficult to obtain at the same time of harvest, farmers are forced to choose their own labor.

Working closely with the organizational and social institutional aspects, the existence of the mutual cooperation system and the wage system is closely related to the development of the technology used and the economic conditions of the farmers concerned. Likewise, the farm financing pattern does not show a different pattern for each land type. For farmers who have extensive land and large capital, they prefer a wage system to work on their land. On the other hand, farmers from the lower middle class, the choice to do mutual cooperation is one way to reduce expenses in farming activities. The difference between these two types of farming can be seen in table 3.

Table 3. Comparison of local horticultural systems with superior horticulture in horticultural crop farming activities

Comparison Components	Horticultural	
	Local	Excellence
The knowledge system which is the basis for implementation	Local knowledge of the farming community about horticultural crops	Labor efficiency and increased productivity
The main basic principle	Group/Community	Individual
The governing system of norms	Compactness within the group or community	Daily or piece rate
The elite at play	Group leader	Land owner
Purpose	Group cooperation and solidarity	Timeliness of farming implementation
Interest	Reduction of production costs	The volume of work that can be completed

Source: Results of primary data processing and analysis, 2021

3.3.3 Hybridization Contest Forms

The hybridization contest is a combination of science and local knowledge that produces new forms of knowledge as a result of shared understanding. In the context of horticultural crop management, this hybridization occurs when these two knowledge entities have the same view of an object. As stated by [31], local knowledge in contestation can form a hybrid through a process of cultural hybridization. Such conditions can be found, for example, when the local knowledge that farmers have in overcoming soil fertility is in accordance with the scientific perspective in overcoming the problem.

This type of contestation occurs in each horticultural cultivation, in this case the use of production inputs. On the narrow land for local horticultural crops, the application of a multiple cropping system is a combination of corn and eggplant to obtain a wider harvest area. Meanwhile, for modern farmers, generally the form of business is by applying a mono cropping system (one type of plant). This hybridization process allows local horticultural farmers to have an agricultural system with a diversification pattern between food crops and horticultural crops. The hybridization pattern that was formed was more due to the awareness of farmers about the importance of having a variety of agricultural businesses to meet family needs.

The hybridization contest in superior horticulture is more due to the government program to develop land potential for food self-sufficiency. The agricultural pattern is known as 'sanam incense' (one crop, two harvests) as a model for applying agricultural systems which are part of the government's program to increase horticultural production. This pattern is a form of approach to developing superior horticulture without reducing farmers' opportunities to grow local horticulture. This incense planting system can accommodate government programs in increasing horticultural production and farmer income without losing the opportunity for farmers to cultivate local horticulture. In summary, the comparison between local horticultural farming systems and superior horticultural farming systems can be seen in Table 4. The hybridization process in the institutions and social organizations that are formed is a combination of arisan group activities with farmer group activities to help capitalize the farmer groups' farming businesses. The group arisan activity that it does can help provide loans to its members for working capital. During the growing season, this production is sold and bought for fertilizer according to the needs and the amount of savings. This model is a combination of the form of a food barn and farm financing carried out at the farmer group level.

This hybridization process is an implementation of the creation of a communicative process between adherents of local knowledge entities and science as a communicative act [30]. The mutual understanding generated in this communication process generates a new form as a mutually agreed consensus. The awareness created through this consensus will avoid the possibility of a coercive relationship and place each other as outsiders in communication. In this form of hybridization, coercion can be avoided and will instead emphasize cooperative characteristics in realizing the interests of each knowledge entity.

Table 4. Comparison between local horticultural farming systems with superior horticultural farming systems

Comparison Components	Horticultural	
	Local	Excellence
Knowledge base system	Local knowledge obtained from interactions with farmers who participate in government programs	Modern science and agriculture developed through agricultural development programs (green revolution)
The main basic principle	Adaptive and sustainability	Productivity and efficiency
The governing system of norms	Experience and understanding of natural phenomena	Recommendations from agricultural agencies and research results
The elite at play	group leader	Group leader, agricultural extension
Purpose	Fulfilling food needs and profits	High production and profit
Interest	Fulfilling the food needs of families and other consumers	Fulfilling local, regional and national food needs

Source: Results of primary data processing and analysis, 2021

IV. CONCLUSION

The entry of science through the development of modern agriculture in the life of farmers in Waihatu village creates a contestation with local farmers' knowledge. The form of the contestation between science and local knowledge is determined by the nature and role of science in local knowledge. Science and technology that are eliminating local knowledge tend to produce a form of domination (zero sum game), while those that are substitution tend to produce coexistence, and those that are complementary tend to produce hybridized contestation forms.

4.1. Research Implications

- Empirically, science is more likely to increase horticultural crop production, but it is more expensive for farmers to develop due to limited business capital.
- Based on rationality based on local knowledge, farmers are more likely to work according to their abilities, because they can conserve the environment and produce organic products even though productivity is low.

4.2. Research Limitations

The respondent's lack of understanding of the questions in the questionnaire as well as an attitude of concern and seriousness in answering all the questions. The subjectivity problem of the respondents may result in the results of this study being susceptible to bias in respondent's answers.

4.3. Suggestion

1. For the Government

- Change the paradigm of increasing horticultural crop production for food self-sufficiency with the use of high external inputs to farmers.
- There must be a radical effort to change the mindset of farmers in an effort to increase compulsory production based on LEISA (Low, External, Input, Sustainable, Agricultura).

2. For horticultural farmers

It is recommended to maintain the cultivation of horticultural crops with local knowledge, but also pay attention to various new innovations that can increase production, especially organic inputs.

3. Advanced Researcher

- Contestation of local knowledge and scientific knowledge in the cultivation of food crops such as lowland rice.
- Farmers' perceptions and attitudes towards organic and non-organic horticultural farming patterns.
- Income and contribution of food crop farming and other sectors to household income levels.

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