Sodality: Jurnal Sosiologi Pedesaan Vol. 09 (02) 2021 | 34694
https://doi.org/10.22500/9202134694

Modernization and Shifting Practices of Local Wisdom on Corn Farming in Gorontalo Province

Modernisasi dan Pergeseran Praktik Kearifan Lokal pada Pertanian Jagung di Provinsi Gorontalo

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Received: March 6, 2021 | Revised: August 20, 2021 | Accepted: September 9, 2021 | Online publication: September 20, 2021

ABSTRACT

Modernization of agricultural technology has dominated farming activities in Gorontalo. This paper describes the change of farming practices from local wisdom and social solidarity to modern technology. The research used a qualitative approach with 25 farmers as participants with the aim to explore their knowledge and observe their farming activities. This study found that local farming practices are no longer in existence. This local wisdom consists of the traditions of *mopo'a huta* and *panggoba* as farming systems which are based on social solidarity and are environmentally friendly. This has been replaced by a modern farming system that is considered more effective with abundant production. Modernization in the farming system, apart from having a good effect, has also resulted in many changes, both economically, socially, culturally and ecologically. This research concludes that as the results of corn farming modernization: 1) there has been a shift in labor and capital, 2) there has also been a shift in local wisdom, and 3) there are environmental degradation and social inequality.

Key Words: farming technology, local wisdom, mopo'a huta and panggoba tradition

ABSTRAK

Modernisasi teknologi pertanian telah mendominasi aktivitas pertanian di Gorontalo. Tulisan ini mendeskripsikan perubahan praktik pertanian jagung dari berbasis kearifan lokal dan solidaritas sosial menjadi berbasis teknologi. Penelitian menggunakan pendekatan kualitatif dengan menjadikan 25 petani sebagai partisipan untuk didalami pengetahuannya dan diamati aktivitas pertaniannya. Penelitian ini menemukan bahwa praktik pertanian berbasis kearifan lokal sudah tidak ditemukan lagi. Kearifan lokal ini terdiri dari tradisi mopo'a huta dan panggoba sebagai sistem pertanian yang berbasis solidaritas sosial dan ramah lingkungan. Tradisi ini berganti dengan sistem pertanian modern yang dianggap lebih efektif dengan hasil produksi yang melimpah. Modernisasi di dalam sistem pertanian selain memberikan efek yang baik juga telah mengakibatkan banyak perubahan, baik secara ekonomi, sosial budaya dan ekologi. Penelitian ini menyimpulkan bahwa sebagai akibat dari modernisasi pertanian jagung: 1) telah terjadi pergeseran tenaga kerja dan modal, 2) terjadi pergeseran kearifan lokal, dan 3) terjadi degradasi lingkungan dan ketimpangan sosial.

***Kata Kunci**: teknologi pertanian, kearifan lokal, tradisi mopo'a huta dan panggoba*

Published under Department of Communication and Community Development Science, IPB University and in association with Ikatan Sosiologi Indonesia
E-ISSN: 2302-7525 | P-ISSN: 2302-7157

INTRODUCTION

Modernization is a complete transformation of traditional or pre-modern society towards society with established technology and social organization (Sztompka, 2004). Society cannot avoid it and must adapt themselves with the existing changes with positive and negative consequences (Rosana, 2015). Like what happens in the farmer society, agricultural modernization which has been considered as a solution to increase farmers well-being (Yuliatmoko, 2010) has caused changes that threatens small farmers and ecological damage (Munthe, 2007). Farmers faces high agricultural production costs when adopting agricultural technology, while the results obtained are not stable because there are pest attacks which result in crop failure (Asikin, 2020). Agricultural technology is needed as a condition to increase production and to ward off plant pest attacks. Research done by Margaretha and Syuryawati (2017) showed that there were 44% farmers that could not do a plant pest eradication, 34% farmers carried out physically and mechanically pest controls, only 12% of the farmers used technology. Meanwhile, the excessive use of agricultural technology has threatened the environmental stability (Arif, 2017), even though the farmers community in the village have their own ways to overcome agricultural problems (Hunowu et al., 2020; Pakuna et al., 2020; Suparmini et al., 2013; Tamu & Dako, 2018).

Agricultural technology implementation which continues to be pursued by the government has pushed the economic growth. However, the high economic growth which keeps improving within several cases in a developing country does not automatically eliminate inequalities in development (*disparity*). Development inequalities generally happen to income, spatial, and sectoral aspects. The initial clue is that the rich get richer while the poor get poorer, developed regions keep rapidly developing leaving under-developed regions (Mopangga, 2011). Generally the village is characterized by the number of poor residents, limited employment alternatives, and low level of workforce productivities (Ernawati, 2008). The farmers group which was established by the government to distribute aids to the farmers apparently is only enjoyed by a small number of farmers. The aids of tractors, pick-up cars, and agricultural technology tools actually become the means for rich farmers to exploit small farmers. This is what was said by (Tjondronegoro, 1978): farmers organization (HKTI) is not more than a connecting bridge between the government policy and the farmers who are active in the government programs. Those who enjoy the facilities are farmer activists (high class) that are a few in number. On the other hand, small farmers that are in a larger number are actually exploited by the farmer activists. This phenomenon happened not only in the rice field agricultural sectors, but also in the corn agricultural sectors which are now more favored.

Nationally, corns have become an interesting and strategic commodity after paddy. Besides having a great potential, corn commodity prospects are also suited to be developed in dry land. The big corn market potential has an opportunity to make corns as both national and international commerce commodity. Corn development in a larger scale with higher production is potential to increase the farmers' income and regional economy. As an animal feed ration (*food for feed*), especially poultry, corns are the main component with 60% proportions. It is predicted that more than 58% needs of domestic corn is used for feed, while for food it is only around 30%, and the rest is for other industrial needs and seeds (Panikkai, 2017).

Those potentials are utilized by the government of Gorontalo Province by introducing agricultural technology through agropolitan programs which have attracted farmers. Local corn seeds which were originally obtained by mutual sharing among farmers, have been replaced by super quality seeds (hybrid) and fertilizers distributed by the government for free since 2007 through BLBU-BLP program (direct aid of quality seeds and fertilizer) (Hutagaol & Hartoyo, 2013). Giving fertilizer to plants which was previously never done by farmers, requires farmers to adapt with the government instruction. This condition has changed the traditional corn agricultural system. Some farmers who have succeeded to apply this new technology are now followed by other farmers. Farming practices based on local wisdom have undergone changes towards technology-based modern agriculture. Within 18 years running of corn agropolitan program, there have been many fundamental changes. Those changes have shown both positive and negative impacts. Positively, there is an increase of production; some farmers with wide lands started to show economic stability which can be seen through their ability to buy vehicles and fancy house furniture. In the meantime, small farmers are still struggling with debts and receivables, especially when they experience harvest failure. Opening a new land in a slope contour has created an ecological threat when the rainy season comes. Tons of soil of unstable land are drifted due to the use of chemical substances and pile up on rivers and lakes (Lapolo, 2019).

The phenomenon of environmental damage has never been as severe as this. The change of traditional agricultural practices into modern practices is the cause. In traditional agriculture, farmers cultivate agricultural lands based on local wisdom. This wisdom becomes the defense fortress against environmental damages.

When farmers turn to using agricultural technology, local wisdom which used to protect its harmony is eroded. The changes include the following: switching scientific knowledge which tends to be inhuman, mass-eradication of pests, killing weeds instantly, and giving farmers an opportunity to open lands in the hillsides with supported hybrid corn variety which has a strong root structure so that it does not easily fall down in a slope. Even though the government policy orders not to give seeds and fertilizer aids for the land on certain slopes, this policy is unable to stop the opening of lands in hillsides.

Many studies have been carried out on the existence of agricultural local wisdoms and the appearance of agricultural technology, among others, study on surviving traditional agriculture in the technology onslaught (Iskandar, 2004), technology business which is riding the agricultural modernization (Tjondronegoro, 2013), agricultural innovation and adoption (Adawiyah, 2018), farmers' heavy dependence on pesticides (Arif 2017), and economic inequalities (Sajogyo, 1977). Based on the results of the studies above, this article aims to find out that behind the convenience given by the agricultural technology advances in corn cultivation in Gorontalo, there are also some changes from corn agricultural practices based on wisdom and social solidarity to those of economic base.

Local wisdom which shapes the agricultural system which is based on social solidarity and is environmentally-friendly is considered as ineffective to fulfil the demand for food availability so that the pretense of modern technology can accelerate as well as improve production (Dewi, et.al, 2017). This policy has shifted the local wisdom existence, both in traditional agriculture and in social system which were built in the traditional agricultural practices. Environmental damage caused by the massive land opening for corn agriculture has been shown by Lapolo (2019) in this region. Therefore, modern agricultural technology has shifted the local wisdom with promises to give solutions towards food shortage, as well as to create a new problem that is suffered by small farmers, and also threatens the environment.

Previous research show that technology has an important role in every life aspect (Febriyantoro & Arisandi, 2018; Karakara & Osabuohien, 2019; Ngafifi, 2014). The presence of technology not only creates fundamental changes on socio-economic community development (Dlodlo, 2009), but also causes many changes in agricultural fields (Hunowu, 2020a; Yuliatmoko, 2010). Agricultural technology has given a way out, so there is an increasing amount of corn production (Mohammad, 2008). Several facts show a tendency that rich farmers become more prosperous (Sajogyo, 1977). Farmers who initially have traditional patterns, thanks to technology, change into modern and capitalist ones (Burger, 1962).

Rural capitalization cannot be avoided in the technology business (Tjondronegoro, 2013). This is shown by the large dependency of farmers on various products that come from the capital owners in the agricultural sector (Rinardi et al., 2019). Those production enhancements are only enjoyed by the rich farmers while the poor farmers feel the risks more (Mosley & Verschoor, 2001); these farmers are stuck in the poverty satanic circle. They return to their original condition, namely having low capital (Nurjihadi & Dharmawan, 2016). There has been an increase of the number of farm workers and farmers who have no land (Tjondronegoro, 2013). On overcoming the plant pests, there has been an enhancement of using hazardous substances in corn farming (Suhari, 2014). In fact, traditional farmers have a local wisdom to overcome plant pest attacks, which is by implementing *molapo dan mopo'a huta* tradition to persuade evil spirits not to create plant pests (Hunowu et al., 2020) and apply *panggoba* tradition to anticipate plant pest attacks (Tamu & Dako, 2018).

The success of plant pest prevention becomes the key to agribusiness. There are two ways that can be done by farmers to overcome plant pests. The first is a traditional agriculture. At first the farmers kill the plant pest as a natural reaction in a simple way, physically and mechanically. The wider the agricultural area is, in line with the increasing population, both techniques are no longer reliable to withhold the growth rate of population and the pest ferocity (Arif, 2017). Several researchers found that the right planting time can suppress pest attacks (Margaretha, 2009). The second method is by using an agricultural technology. Farmers spray the plants with pesticides to kill the plant pests. Then, they use herbicides to kill molds and to nourish the plants. Pesticides are proven to be able to increase agricultural products, but at the same time they damage the environment (Arif, 2017; Hunowu, 2020b).

This article is based on the argument that modern agricultural technology has improved the agricultural production at one side, but it also has minimalized human force and shifted the local wisdom function to overcome plant pests. Modern agricultural technology has become one of the solutions to provide food materials for human needs; at the same time, this technology has increased the number of farmers who are entangled with debts and threatened the environment as a result of a massive use of toxic substances. These

become the questions of this research: 1) How can human labor be shifted by technology? 2) How can local wisdoms decay, environment degrade, and social inequality occur?

METHOD

This research used a critical theory paradigm. As has been said by Denzin and Lincoln (2000), this paradigm is a criticism on social and intellectual life which accurately reveals a community's characteristic. In this context, the research is trying to find out the gaps that occur due to the government's policy in the farming sector. The data were collected using a qualitative method to know more the farming practices in the corn farmer community in Molamahu Village, Pulubala District. This district is designated as the production center area of " a million tons of corn" in Gorontalo Regency (Pido, 2012). This district is the area of the second highest corn producer, and the area covers 19 districts. Molamahu Village is the location of a ritual event called *mopo'a huta* which is carried out every year (Hunowu & Pakuna, 2020).

Twenty-five farmers were chosen as participants in this research to be given an in-depth interview, and their farming activities would be observed. These farmers that became the key participants in this research were chosen based the following considerations: (a) farmers were chosen because of equal social class, namely land owners and labors. These farmers belong to farmers' groups and independent farmers. (b) Farmers of the social class came from two categories based on age, namely old and young farmers. The participant category selection was also based on the representation of economic, educational, social, and cultural background of each farmer. This method was expected to help get a comprehensive description of the modernization activities and local wisdom practices on corn farming in Gorontalo and other influencing factors. Farmers that were directly involved in the local wisdom practices were interviewed deeply to obtain information on the process of local wisdom practices, challenges and problems they faced, and the supporting system given to the young as well as old farmers.

Data were collected using an interview guidance as a basis for formulating questions. The questions were open-ended covering two aspects: firstly, those related to land processing and production tool utilization (seeds, fertilizer, growth regulator, pesticides, and inoculation); and secondly, those related to local wisdom practices applied by most farmers who carried out *dayango* and *panggoba* tradition as an effort to handle plant pests. Field observation was carried out from the late 2019 to early 2020 by visiting farmers to get a picture of their life situation, whether they were young farmers or old farmers. At the same time, a series of interview were also carried out to *panggoba* (a person who knows well the right time for planting) and *wombuwa* (the head of *mopo'a huta* ritual) and also public figures. The interview was aimed to obtain a clarification of socio-culture related to corn farmers' local wisdom practices in the community from a variety of perspectives.

The interview was also aimed to get a socio-cultural context assumed to become an important basis for the shift validity of the corn farmer's local wisdom practices. Interview with *panggoba*, *wombuwa* and public figures was also aimed to get information about the people's condition covering the following aspects: economy, education, social, and culture, in order to understand the determinants for the shift in the corn farmers' local wisdom practices, since most corn farmers were only independent farmers. Interview with public figures was carried out to get information on the shift of local wisdom practices. Besides *wombuwa* and *panggoba,* in-depth interview was also carried out to village officials. The in-depth interview with these stakeholders was aimed to get information on the supporting system obtained by corn farmers.

The results of the interview were classified thematically to prove that there was a shift on the traditionally farming practices in handling plant pests. Data classification was also carried out, besides thematically, according to the aspects involved. The significance of experience differences was analyzed according to the existing parameters, such as landowner farmers, cultivating farmers and labors. Old farmers tended to adopt traditional farming, while young farmers tended to adopt modern farming. The results of the interview in the local language were translated into Bahasa Indonesia with some modifications without changing the meaning. Statements that have similar opinions were put into a data display.

Analysis and interpretation of primary data (interview results with informants and direct observation) and secondary data (data from Agricultural Office and Statistics Center Bureau of Gorontalo) were carried out with the following steps: (a) Data identification and classification: identification was carried out to sort out the interview results in order to get statements related directly to local wisdom practices and their causal factors. Data identification was also carried out to get data related to the statistical number of corn farming production. Besides, this step was useful for carrying out validity and reliability testing through data triangulation; (b) Data Presentation: data were presented through narrative description on information of the interview results,

observation, and secondary data process. Data that were in accordance with the research variables (number of corn farmers, process and causes of local wisdom practices, and supporting system for independent farmers and classy farmers) were presented in order to get a comprehensive picture for the conclusion and recommendation of the research; and (3) Drawing conclusion: this was carried out by interpreting each aspect obtained from the data analysis, and then explaining it briefly and clearly in order to answer research questions on modernization and shift of the corn farmers' local wisdom practices in Gorontalo.

RESULTS AND DISCUSSION

The economic structure of Gorontalo Province is still dominated by agricultural sector, although in its development it is still low compared to non-agricultural sector (Mopangga, 2011). The government of Gorontalo Province since 2002 has made a corn-based agropolitan program simultaneously. The harvesting area of corn, which in 2003 was only 45,718 ha, then increased up to 58,716 ha, and in 2004 it reached 72,529 ha. Within three years, the harvesting area of corn increased by 58.64%. Corn production reached 130,252 tons, and then in 2003 it increased up to 183,9988 tons, and in 2004 increased again up to 270,418 tons. Within three years there was a 92.87% increase in corn production (Mohammad, 2008). The latest data on corn production in Gorontalo Province in 2020 showed that it reached 643,512 tons with a harvesting area of 129,131 ha (BPS 2021). Thanks to this program, there was an improvement in macro economy between 2002-2008, such as the increase of income per capita from 2.5 million to 4.9 million, economic growth increased from 6.45% to 7,51%, and poverty decreased from 32.13% to 24.88%. From the viewpoint of micro economy, corn production increased from 7,000 tons to 752,727 tons. In 2011 the economic growth was 7.68%, poverty 18.02% and open unemployment 4.61%. Corn production was 605,000 tons or below the target of RPJMD 2007-2012, i.e. 1 million tons of corn (Baruadi et al., 2013). In terms of macro economy, there was an improvement of farmers' welfare, although ecologically it showed a threat.

Economically, agricultural modernization has shown a surprising result with a food surplus. However, socio-culturally agricultural modernization made small farmers not only suffer but also marginalized from agricultural sector (Tahir et al., 2019). Marginalization of farmers from their own land was an impact of a massive use of farming technology. Agricultural modernization cannot be separated from technology business imported from developed countries such as fertilizers and pesticides. There was an increase in production, but at the same time there was an increase in the number of farmer labor and farmers who had no land. There was an increase in crop harvest, but at the same time the number of farmers who had no land also increased (Tjondronegoro, 2013).

Corn is the second commodity after rice that has been cultivated by people in Gorontalo in Molamahu post-era of hunting and gathering. Corn is a reliable food for Gorontalo people to survive; besides, apart from its suitability with topography and weather, it can be consumed young (Hunowu, 2020b). Corn cultivation for hundred years has produced local corn (*binte kiki, binte daa, binte damahu*). These three types of corn have been developed traditionally using a simple technology. This corn cultivation for hundreds of years according to a public figure has caused a change in the community. A variety of traditions were formed; for example, *huyula* and *tiayo* as a mechanism of mutual cooperation, *mopo'a huta* and *molapo* rituals as a mechanism to anticipate plant pests and draught, *panggoba* tradition to determine a good day to plant, and *bilohe* and *toliango* traditions as a mechanism of social security.

> *"All these local wisdoms have been practiced from generation to generation and have shown good farming results. When the harvest is abundant, the surplus is kept in hulipo as a provision of food for months. Farmer community are not lacking in food although their land is small, due to bilohe and tolianga traditions, meaning sharing food with the needy based on love" (AN, Community Leader, Gorontalo 12/5/2020).*

This local wisdom naturally undergoes a change. Since Gorontalo was officially separated from North Sulawesi, around 2003, farming modernization has been vigorously performed through corn agropolitan programs (Mohammad, 2008). The Regency government proclaimed a one million-corn-harvest program (Pido, 2012). Within this period, modern farming products were introduced and supplied by the government to farmer community through packaged aids like superior seeds, fertilizers, pesticides and herbicides. Farmers started to adopt new methods of corn farming. They left local corn varieties and shifted to hybrid corn varieties. The types of hybrid corn varieties the farmers usually grow vary, among others hybrid corn Bisi-2 and NK,77 (Bahua, 2008). This is admitted by a participant farmer who has long used hybrid corn seeds.

"Local seeds have long been difficult to find; most farmers have used hybrid corns. Besides they are easy to get, the quality is also good. Initially I grew bisi-2 seeds, then came NK33 and 77 which have higher quality. The price is indeed more expensive. I grow these seeds, like others, when I have enough fund" (ZB, Molamahu Village, 11/10/2020).

Quantitatively, hybrid corn produces plenty of crops, but it is not palatable. One farmer still cultivates local corn seeds whose crop is specifically used for consumption. "*Local corn is already rare. As long as it is still grown, the seeds will always be available. I still maintain local seeds although only on a piece of land, and the crop is for consumption. The rest of the land is grown with hybrid corn for sale" (AP, Molamahu Village, 9/11/2020).*

The success of one or two farmers who have followed the government's guidance through an extension worker has encouraged other farmers to adopt the technology. The abundant crops can no longer be accommodated in *hulipo*, so they are sold to cover the production cost and other needs.

Table 1. Data of Corn Production in Gorontalo Regency 2011-2020

Year	Land Area (ha)	Production (ton)
2011	20,130	92,879
2012	25,143	114,350
2013	24,319	114,299
2014	24,989	117,448
2015	26,667	125,334
2020	26,817	142,863

Table 1 shows that there has been a consistent increase of land area and corn production in Gorontalo Regency. In the local level, this consistent increase in corn production also happened in Molamahu Village, as is shown in Table 2 below.

Table 2. Data of Corn Production in Molamahu Village in the 2019-2020 Harvest Period

Year/Harvest Period	Area (ha)	Harvest (ton)
2019/May-July	618.83	2,926.23
2019/Oct-Dec	619.24	3,211.27
2020/May-July	623.65	3,426.17
2020/Oct-Dec	624.71	3,123.55

Table 2 shows the four-time corn harvests in Molamahu Village in the last two years. Within two years' period there has been an increase in land area and corn harvest. In spite of that, there is a decrease in the second harvest in 2020 as a result of downy mildew attack (*tabongo*), yellowing leaves, and it cannot be eradicated by spraying. The average harvest per hectare was 5 tons. It was unlike the local wisdom application, where the harvest was lower and the work was tiring. As has been admitted by one of the farmers:

"Corn harvest in a traditional farming ranged around 1-2 tons per hectare, the work was tiring, but the cost was low. If there was a failure in harvest, farmers did not suffer much because the production process did not cost a lot of money, and the labor was not paid. All the work was done together. On the other hand, in the modern farming, the harvest is abundant, but when it fails, farmers have to pay for the production cost for labor, seeds, fertilizers, and pesticides in the following harvest" (BB, Molamahu Village, 24/2/2020).

Change in farming practices from a traditional method to a modern one has caused a domination of technology in all kinds of corn agribusiness. This change can be found in the transition from human labor to machine in some types of work, the appearance of socio-economical gap between rich farmers and poor farmers, eradication of pests using pesticides and fertilization which cause environmental degradation.

Some young farmers admitted that corn production using technology is much higher than using traditional methods.

> *"Farming results using technology are very high. The use of superior seeds produces two corn cobs in one stem with bigger size. Using local seeds, one corn tree only produces one cob with smaller size. The working process using technology is easier, not to mention planting pattern without processing. However, the cost is higher" (DH & BB & DH Molamahu Village, 23/1 & 21/2/2020).*

Based on the research results, it can be said that corn farming technology has indeed made the job easier and increased production, but it also causes some new problems by shifting human labor and local wisdom, and creating environmental degradation and social inequalities.

The Shift of Human Labor by Technology

The shift of using human labor to non-human labor has made male and female workers lose their jobs or change jobs. That there was a shift of human labor by technology was stated by the following farmer:

> *"Farmers who have very small land must become "wage earners" from other farmers. With a couple of cows belonging to rich farmers, small farmers get salary by plowing the rich farmers' land. As soon as a non-waged farming system appears, in which land does not need to be plowed in every planting season, there is no longer plowing work. Instead, small farmers would earn money by hauling sacks of corn cobs from the planting area to the threshing area. Initially, there were a lot of orders, but little by little this job has been taken over by motorcycle taxis that could pass through any areas in the hills and even mountain slopes. In the meantime, the shelled corn to be hauled to the corn shelter has been taken care of by open-hood vehicles. Finally, this hauling job can no longer become the source of income. Then, I become a labor for planting, fertilizing, and harvesting"* (ZB, TS, Molamahu Village, 11/12/2019).

Another case shows that every farmer must have cash money to pay labor. In the past they could exchange manpower, as has been said by two farmers below.

> *"If we have one hectare of land to be plowed, we must have enough cash to hire labor. If it is done by ourselves, it will be difficult and need several days. If it is done by labor, it just needs one day. In the past, we just exchanged manpower, for example for a week I would work from one cornfield to another to help other farmers according to the agreed schedule. In the following week those farmers whom I helped would work for me in the cornfield and the work could be done in a half or one day. This system no longer exists; only a few people are ready to do this. Thus, if we don't have enough cash in our pocket, the job will be delayed and will not run as expected."* (FI, DH, Molamahu Village, 23/2/2020).

Table 3. Change of Work Type

Type of Work	Traditional	Modern
Plowing the land	Carried out together (*huyula and tiayo*) exchanging manpower	Renting a tractor
Weeding the grass	Carried out together (*huyula and tiayo*) exchanging manpower	Spraying with herbicides
Fertilizing plants and eradicating pests	Carrying out dayango *ritual, molapo ritual and Panggoba tradition*	Using superior seeds, fertilizers, pesticides, and herbicides
Harvesting	Carried out together with 6:1division	Contract/ wage system

Type of Work	Traditional	Modern
Shelling	Carried out together by banging with wood	Renting a threshing machine
Hauling	Using a cart by manpower (*tiayo)*	Hiring a motorcycle taxi or car
Crop Harvest	Kept for food consumption, and some sold for other needs	Sold to pay for technology (debt), to buy rice and other needs

Change in types of work happened from land preparation until post-harvest as can be seen in Table 3. This shows that types of work become more individualistic and wage-based. This change is in line with the use of farming technology which becomes massive. Previously, the work was carried out together with social bonds. These social bonds change to become client-patron bonds. Social bonds are reciprocal relations among farmers. This has changed and become lending money and paying debts. This is admitted by old farmers who have lived in the pre-agricultural modernization era.

> *"In the past, plowing the land was carried out together (tiayo), for one week I would help other farmers, and the next week they would help me with my work. We trusted each other and needed each other. Together we plowed the land, weeded the grass, harvested the crop, shelled the corn and banged the wood. We felt close, and had meals together. Now, everything's gone. We must be in a hurry to finish the work. We eat individually, bringing our own food. Basically, if there is money, the work is done"* (MM, BB, Molamahu Village, 21&24/2/2020).

The abundant corn production nowadays and the limited production in the past are admitted by one Gorontalo cultural practitioner Alim Niode (Interview, 7/42021). According to him, crop harvest in the past was not as plentiful as nowadays, but this small harvest did not cause food shortage and hunger. There was a local tradition that was able to tie people together so that they did not have food shortage, namely *bilohe* and *tolianga* traditions (social security). *Bilohe* means care for families and neighbors who lack food, and *tolianga* means sharing food voluntarily. Farmers who still have excess supply of corn in *hulipo* (barn) would share with other farmers who were lacking. Nowadays, this caring and sharing tradition has gone because corn production is abundant. Although there are some rich farmers who help small farmers, this assistance is in fact in the form of loan which must be repaid when the harvest comes (thus, it has an exploitative nature).

Change of human labor utilization by technology has a great impact. At least, data have shown two general effects experienced by farmers: the loss of job as a source of another income besides land produce and the loss of social solidarity of exchanging manpower and social security by sharing food. Social rooms on the basis of solidarity have been replaced by client-patron bonds which tend to be exploitative.

Exuviation of Local Wisdom

Corn farming needs adequate knowledge support, especially to ward off plant pests which attack in turns. The research results show that farmers' knowledge system related to plant pest management has shifted from traditional to modern knowledge which relies on agricultural technology. A farmer who owns a big land said:

> *"In fact, plant pests can be handled well, depending on how we treat them. To ward off plant pests, we must apply the available farming technology well, namely using superior seeds resistant to pest attack, giving fertilizers and spraying pesticides with recommended dose and in an appropriate time. Pest attacks happen because we fail to comply with the set rules so that mildew or plant diseases cannot be handled earlier and they develop to become plant pests"* (IJ, JH, Molamahu Village, 12&14/11/2019).

Another farmer confessed:

> *"Plant pests are very much influenced by nature and the ruler of nature. Therefore, to eradicate them needs wise means descending from ancestors. For example, when planting, although the seeds are superior, the plants will be attacked by plant pests if we do not consider a "good' day for planting. Farmers now no longer pay attention to this. It is not surprising if we find one piece of land that is*

attacked severely by plant pests while the land next to it is not, Thus, a "good" day is also determined by "good" time, for example on Wednesday from 9 to 12 PM, if we do it after 12 PM the star shift in the universe has already taken place, so the "good" day has passed and the plants will be attacked by pests" (UN, KS, Molamahu Village, 7&10/12/2019).

Besides paying attention to a "good' day, another local wisdom that is being ignored by farmer community is *mopo'a huta* (feeding the land). *Mopo'a huta* is carried out by performing *dayango* ritual. This ritual is aimed to make peace with the evil spirits that usually disturb humans. As has been said by the following farmer:

"When pests come time after time, and they are difficult to handle with technology, there must be something wrong. It is not the fault of using technology, but the fault to take care of nature. Plant diseases and pests do not come by themselves, but they are sent by evil spirits that dominate them. The evil spirits order pests to attack the farmers' plants, whose owners have started to negate their existence. The method is "mengatulu kambungu": carrying out mopo'a huta ritual and preparing some offerings. Mopo'a huta ritual is aimed to fulfill the demand of the ghosts, the ruler of the universe. By fulfilling their demand, plant pests will not disturb farming anymore. However, this ritual is no longer effective because it is carried out perfunctorily. Therefore, although farmers carry out this ritual, their plants are still attacked by pests" (AP, AK, Molamahu Village, 3/2 & 11/3/2020).

The results of the research show that the ancestor wisdoms do not work well any longer. Farmers prefer to rely on farming technology and do not believe in the efficacy of traditional ways. It can be said that there are three things that make a traditional ritual not work well: 1) it is not carried out appropriately, 2) taboos are violated, and 3) there is a technology to handle problems. Besides eliminating traditional methods, farmers have also lost local corn varieties. This is because they are more interested in the hybrid corn that has been distributed for free by the government. Thus, the utilization of this potential local corn has decreased, or even almost disappeared (Suleman et al., 2019). In accordance with the use of farming technology, there are also some dangerous chemicals, as is said by one of the successful farmers:

"Farming nowadays is easier because all materials needed are already available. I use pesticides to eradicate plant pests and use herbicides to kill weeds and nuisance grass. I apply those chemical substances from the information given by friends. There are also advertisements attached to trees, and distributed through sellers and rich farmers. The rich farmers provide agricultural facilities, and we only get these from them and pay them later after harvest" (RH, SM, Molamahu Village, 22-23/12/2019).

Of the twenty-five farmers who become participants in this research, twenty-one have used non-organic fertilizers and pesticides. There are only 4 old farmers who are trying to use organic fertilizers and still pay attention to the "good" day for planting with a guidance from *panggoba*. Most farmers do not care for a "good" day dan and a "good" planting season. Corn harvest in Gorontalo Province almost happens any time. Thus, most farmers have applied technology. Some farmers try to combine traditional knowledge and modern knowledge with the hope that they will be free from pest attacks. In the meantime, old farmers who still keep the traditional ways are those whose land is located near forests.

Table 4. Farmers' Choice for Farming Practices

Category of 25 farmers based on age	**Traditional Wisdom**	**Combined Technology Application**
20 – 24	0	5 0
25 – 30	0	3 2
31 – 40	1	2 2
41 – 50	1	1 3
51 – 60	2	0 3

Table 4 shows how the twenty-five farmers who become participants of this research choose their farming practices. The proportion of farmers who are dominant using farming technology is young farmers aged 20-

24 years old. They do not believe in the efficacy of local wisdom, especially *mopo'a huta* and *panggoba*. The abundance of crop very much depends on the effectiveness of technology application. As is said by the following young farmer, "*I am more confident in the power of technology than in the previous old people's beliefs. Using technology is more practical and gives maximum results. Local wisdoms the old people believe are very complicated and need patience" (SM, Molamahu Village, 23/12/2019)."*

The second category is young farmers aged 25-30 years old, some of whom combine local wisdom and technology. They apply technology, but still consider a "good" day for planting. Meanwhile, more farmers believe in the power of agricultural technology. The third category is adult farmers, aged 31-40 years old. Some farmers still adopt local wisdom and do not use technology, but the rest apply technology and combine it with local wisdom. The fourth category is adult farmers, aged 41-50 years old. Only a small number apply technology. Most of them believe in the power of technology and a few of them combine technology and local wisdom. The fifth category is old farmers, aged 51-60 years old. All still believe in the power of local wisdom, and some combine it with technology. According to old farmers, application of traditional farming does not cost a lot of money, if it is done according to the procedure, *"the wisdom of people in the past if carried out well will be much cheaper because it does not need to buy technology to cultivate corn plants. However, not many people believe in the power of this wisdom any longer" (AK, Molamahu Village, 11/3/2020).*

Old and adult farmers have been influenced by the use of technology. As has been said by the following old farmer, "*I follow other people to apply technology. Because I hire people, when to plant and so on are still under my own control, but practicing using technology is taken over by another worker" (BB, Molamahu Village, 24/2/2020).*

This research shows that 4 out of 25 farmers still maintain using local wisdom without applying technology, while the others have shifted to become modern farmers although some of them still pay attention to the traditional wisdom especially when deciding the time to plant.

Table 5. Local wisdom in the crush of modernization

Type of local wisdom	Aim/Function	Alternative Technology
Mopo'a Huta	Making peace with the ghosts so as not to disturb humans by spreading pests	Pesticides and herbicides
Molapo	Warding off pests by fumigation	Pesticides and herbicides
Panggoba	Stipulating a good day/time for planting	Seasonal calendar
Huyula dan Tiayo	Working together on the basis of reciprocals	Wage/working contract /tractor/herbicides
Bilohe dan Toliango	Sharing food voluntarily (social security)	Giving assistance by providing loans
Hulipo	Container for storing food; some is sold for other necessities	Crop harvest is sold to pay for technology (debt), to buy rice and other needs
Local corn varieties (binte kiki, binta daa, damahu)	Cultivated seeds	Hybrid

Table 5 shows how local wisdom practices have been set aside by technology-based modernization. Almost all functions and aims of local wisdom application have been replaced by technology. The choice of using

technology by the majority of farmers who become the participants of this research is based on the consideration of the easiness to use technology compared to local wisdom application. The presence of technology has, in fact, replaced the function of corn farming local wisdom. All those functions are the ones that the farmers have wanted and expected (manifestation) in order to increase their farming products.

Environmental Degradation and Social Inequalities

The government's efforts to encourage corn farming has resulted in the increase of land area of corn farming which at the beginning of the agropolitan program in 2003 was only 140,423 ha and in 2018 it became 366,210 ha. These data show that there was an increase of land by converting forest land and utilizing steep hillsides. As has been said by one participant: the increased production has made farmers open a new land and make use of hillsides. As a result, many times the farmers' land on hillsides is hit by floods so that it causes economic loss (SM, Molamahu Village, 23/9/2020). This is in line with the previous finding about the existence of environmental damage due to the forest land conversion into agricultural land (Da Conseicao, 2020).

The environmental degradation that really happens is the avalanche and erosion which take away soil nutrients downstream.

> *"In the past it was not like this. The land was not plowed simultaneously; farmers owned some pieces of land and they plowed each one after the other. The aim was to return soil fertility and they did not use fertilizers. Now, the presence of fertilizers has caused farmers to process their land continuously without a break. When the rain comes, there are floods that take away other farmers' corn plants that are grown downstream"* (RH, Molamahu Village, 22/9/2020).

This statement is relevant with the research done by Lapolo (2019) which shows a degradation of environment in the area of Molamahu Village and its neighboring areas. Degradation happens because of domination of corn farming in some forest areas with a high slope so that it causes erosion. As a result, there is a sedimentation which ends up in Limboto Lake. Deforestation causes trees that can keep water gone; consequently, when a long dry season comes, people can hardly get water from the mountain. One research shows that there is a lot of sedimentation from the hill areas flowing into the lower land together with rain water. Tons of soil are eroded downstream and causes silting at some estuaries. This condition has made the land unfertile because the soil nutrients are washed away.

Besides causing environmental degradation, the change of farming practices has also created social inequalities.

> *"Modern farming is preferred by rich farmers, since they have a big capital. Besides cultivating their large land, they also lend seeds, fertilizers and spraying substances to farmers, which will be returned when the harvest comes, with higher rate compared to when farmers pay in advance. Small farmers whose harvest fail will be heavily in debt. There are times when their harvest is only enough for paying their debt. Thus, nothing is obtained, except exhaustion"* (KS, Molamahu Village, 10/9/2020).

The results of the research showed that there was an increase of production to farmers who have tried to expand their planting area. This only happens to high class farmers who have big capital to expand the land, whether by opening a new land or buying a piece of land from small farmers who are in debt.

The research results show that local wisdom practices of corn farming in Gorontalo faced two problems. Firstly, it is found that there are traditional farming practices of technological base which make farmers apply farming technology and use hazardous chemical substances massively. This means that local wisdoms are not considered effective anymore. The government can encourage new technology of eradicating plant pests without using poisons by applying the philosophy of local wisdom. *Mopo'a huta* ritual as a mechanism to make peace with evil spirits, the plant pest spreaders, can be used as a base to create pest repellent technology by using ultrasonic waves as has been found by Madiun farmers (Ama, 2020; Tuluk et al., 2012). Secondly, there are many human resources that are not empowered (unemployed people) due to the use of technology from preparing the land until post-harvest. In such a condition, the application of traditional local farming by utilizing simple technology such as applying *huyula* (working together), exchanging human power (*tiayo*), can handle the extinction of local wisdoms existing in corn farmers in Gorontalo. Thus, farmers work based on economic needs to get income, not based on reciprocals, exchanging human power to finish the job.

Knowledge on local wisdoms in the society can only be found in old farmers. This condition has made local wisdoms become rare in the following farmer generations, and so their concern with maintaining the local wisdom practices in corn farming in Gorontalo does not work well.

In order to handle various problems that make local wisdom practices of corn farming in Gorontalo disappear, the government should prepare a comprehensive supporting system. The availability of institution and the empowerment of *panggoba* (a person who understands astronomy including a good day for planting corn) can become an initial step of the government to overcome the problem of the extinction of local wisdom practices in corn farmers, especially small farmers, in order to reduce the existence of new poor farmers. The government is expected to apply steps to maintain local wisdoms, especially the local wisdom of corn farmers by applying an innovative program that can help the poor corn farmers. This is done in order to empower farmers towards environmentally-friendly agriculture.

CONCLUSION

This writing has shown that application of agricultural technology has caused a shift in some aspects. Firstly, there is a shift in human power and investment. Traditional farming that relies heavily on human resources has been replaced by technology that is faster and more effective. The use of technology that needs big investment has caused a big amount of cost that has to be returned by farmers to the investors that have lend them some loans for paying labor and production facilities.

Secondly, there is a shift in local wisdom practices of corn farmers. The function of local wisdom to handle plan pests has been replaced by a technology that is faster and more effective compared to the local wisdom that is complicated and takes a long time. Farming local wisdom that is related to efforts to maintain the harmony of humans and their environment concerning the knowledge of determining a good day to grow plants is only owned by old farmers. This community has been pushed aside when applying traditional methods; moreover, the power of local wisdom is considered ineffective since it does not produce maximum results as what happened in the past. Young farmers prefer to believe in the power of technology to handle pest problems as long as it is carried as instructed.

Thirdly, there is a degradation of environment and social inequality. The use of chemical substances and opening a land in a slopping area have caused environmental damage. The results of this research have become a chamber for explaining how agriculture modernization not only opens a path for increasing production and farmers' welfare, but also reproduces social inequalities, knowledge inequalities, loss of social solidarity, and threat of environmental damage. The existence of agricultural technology has turned corn farmers into poor farmers because they are continuously pushed to use farming technology through aided packages as a reason to accelerate work preciously done by using agricultural local wisdom practices.

Based on these findings, it is necessary for the authority to create a breakthrough to take the middle way by combining traditional farming practices and the modern ones. Farmers can use farming technology and at the same time also apply *panggoba* tradition when deciding good days for planting, and carry out *mopo'a huta* and *molapo* traditions to anticipate plant pest attacks. Another alternative is to create a new technology to ward off plant pests without poison by applying the local wisdom philosophy that all God creatures can live harmoniously and by referring to *tasawuf* concept, humans *zuhud* appreciate the right to live for every God creature. Plant pest mass-killing by spraying toxic substances not only resist the harmonious concept but also take away the right to live of God creatures. Besides producing a specific agricultural pattern, technologizing local wisdom-based corn farming is expected to be able to minimize domination of agriculture technology that degrades environment and widens social gaps of the farmers' economy.

This research tends to consider local wisdom practices as knowledge that is being put aside by the onslaught of agricultural technology (science knowledge) in which local knowledge that tightened social bonds in the past has been replaced by knowledge that is oriented towards economic benefits and exploitative relation. Further research is important to carry out to find out more how massively agricultural technology is used and how severe the environmental damage it causes. This study is important to be used as a foundation for the government to produce an agricultural development policy that does not merely increase economy but the most important one is an agriculture that is environmentally-friendly.

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