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Agricultural Modernization: Process and Influences among the Farmers in Cilacap, 1979-1999

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Abstract

This study discusses changes in the use of technology in agriculture in Cilacap during the 1979-1999 period. This study uses a socio-economic approach to examine changes in agricultural cultivation technology in Cilacap. The study also analyzes the relationship between changes in agricultural cultivation technology in Cilacap and the development of agricultural production in Cilacap in the same period. This study uses critical historical research methods, which include four steps. First, heuristics, namely collecting relevant historical data or sources. Second is source criticism, studying the authenticity and credibility of the sources obtained, namely in terms of the physical and content of the sources. Third, interpretation is scrutinizing for interrelationships of meanings related to historical facts. Fourth is historiography or writing, namely the delivery of synthesis in historical works. Agricultural modernization was a government policy to increase agricultural production, especially rice as a staple food in the Cilacap Regency area. The Mass Guidance Program, or BIMAS, marks the modernization of agriculture in the Cilacap district by providing production facilities in the form of fertilizers, seeds and pesticides to farmers. Through the Community Guidance Program, farmers knew how to grow crops properly. They started using superior seeds, chemical fertilizers, anti-pest insecticides, integrated cultivation systems, and so forth. Farmers were able to increase their agricultural production through a series of changes in agricultural cultivation, especially rice. As a result, Indonesia experienced food self-sufficiency during the early 1980s.

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Introduction

The modernization of agriculture denotes a transformation process from the conventional or traditional lifestyle, habits, and culture of farming communities towards modernity, particularly in relation to technology and social organization, encompassing agricultural tools or mechanisms. The adoption of technology is a key determinant in the level of agricultural production. In the agricultural sector, the role of technology is vital for the success of farm productivity. Technology influences every activity, action, and human behavior. It has the potential to alter patterns of

relationships and human interaction. Human activities are largely influenced by the presence of technology (Prayoga et al., 2019, p. 96). Humans can accomplish anything with technology. However, technology has a dual face; at one moment it can be a friend, at another, it can turn into an adversary (Martono, 2012; Yulia, 2019, p. 79).

In 1968, the introduction of agricultural modernization, more commonly known as the Green Revolution, began. Since then, there have been changes in agricultural production, social aspects, and socio-economic welfare driven by the Green Revolution due to the numerous transformations within rural farming communities, with the aim that Indonesia could achieve rice self-sufficiency. The Green Revolution marked the agricultural modernization that has occurred in Cilacap. The Green Revolution program led farmers to understand the use of inorganic or chemical fertilizers, pesticides, and superior seeds. Some of the programs implemented at that time were the modernization of new agricultural technology, the use of irrigation for paddy fields for food and horticultural crop cultivation, as well as the formation of groups and provision of credit for farmers (Rinardi et al., 2019, p. 126).

One of the regions that implemented the Green Revolution program was Cilacap. The Green Revolution was initiated in this area due to its potential to be developed as a rice-producing region. This can be inferred from the land allocation distribution in Cilacap. In 1979, Cilacap had an area of 214,257.398 hectares, consisting of 12,244.318 hectares of paddy fields. Agricultural products included Bimas paddy crops in 1979 with a total area of 4,953 hectares, producing 23,007.74 tons. In 1980, the area increased to 7,053 hectares, but the production decreased to 22,715.461 tons. According to According to Five Year Development Plan 1984-1985, in 1984, the area for paddy crops was 104,706 hectares, producing 539,759 kg, while in 1985, the area increased to 106,800 hectares, producing 562,302 kg.

Overall, Cilacap is not only a paddy field area. It also serves as a dryland region. This can be deduced from the abundance of plantation products in Cilacap. According to Five Year Development Plan 1984-1985, plantation products included coconut crops in 1979 with a total area of 25,145 hectares, producing 6,409 kg. In 1980, the area increased to 27,713 hectares, and the production also increased to 8,036 kg. In 1979, the area for clove crops was 2,860 hectares, producing 56,805 kg, while in 1980, the area increased to 4,526 hectares, producing 75,612 kg. Based on these data, the people's plantation business has been improving, particularly for cloves, which had a significant increase Five Year Development Plan (Repelita).

The implementation of the Green Revolution has indirectly caused issues in rural communities, including those in Cilacap. The introduction of a new system within these communities, such as the modern agricultural system implemented by the government, has brought about both progress and adverse effects on the social and cultural life of the people in Cilacap. Changes in the form of social transformation have also occurred, altering the social distance and work relationship patterns of farmers from collective action to individual action. This means that prior to the modernization of agricultural activities, the community solidarity was mechanical, characterized by a high tendency for mutual assistance in farming. However, this has transformed into

organic solidarity, denoted by a fading spirit of mutual aid, being replaced by the implementation of a wage system in production activities. Based on the above explanation, it is clear that Cilacap has been successful in implementing the Green Revolution program. However, there have been several issues arising during its execution. This is because, ecologically, Cilacap is not purely a paddy field region but is mixed with dryland and even coastal ecology. Therefore, the main issue is how the Green Revolution policy is implemented in Cilacap as an effort to modernize agriculture in the area. Secondly, in the implementation of agricultural modernization that impacts the productivity of food crops, the role of the government in increasing production is crucial, which is marked by various agricultural policies.

The composition of historical scientific works is executed using the critical historical method, which relies on sources or literature to seek and excavate information about historical facts. The stages of historical research according to Kuntowijoyo consist of five steps: topic selection, heuristic, criticism, interpretation, and historiography (Koentjaraningrat, 1985, p. 19). The first stage, Heuristics, is the process of historical researchers collecting historical sources.

Further source tracing was conducted, among others, at the Cilacap Regency Agriculture and Food Service. Some of the sources obtained included production results from each district, especially rice, secondary crops, and horticultural plants from 1979-1999. The next source search was conducted at the Central Statistics Agency of Cilacap Regency. In the search, several sources were obtained, including agricultural data on Government, Finance, Geographic Transportation, and Population.

This study also utilized secondary sources derived from books and reports relevant to the research topic. The use of secondary sources constitutes testimonies not originating directly from eyewitnesses, that is, from someone who was not present at the narrated event (Gottschalk, 1975, p. 35). Secondary sources are useful for providing additional information necessary for the perfection of this thesis. Secondary sources in the form of literature such as books and articles relevant to the research topic were used to ensure the truth and complete data found by the author. The use of these secondary sources can sharpen the analysis in providing explanations for the problems described in this thesis (Koentjaraningrat, 1985, p. 19). Secondary sources were obtained at libraries such as the Cilacap Regency Public Library and the Central Java Provincial Public Library. Thus, to obtain secondary sources, a literature study needs to be conducted. A literature study is a data collection technique where literature and source books are studied and read.

The subsequent step involves source criticism. Source criticism is an examination activity to ascertain the validity and authenticity of historical sources through external and internal criticism. Fundamentally, these two steps, source collection and source criticism, are not strictly separate activities. In practice, many historians concurrently undertake both the collection and criticism of historical sources. Criticism of the collected sources is essential to test their truth or accuracy, hence historical work is the product of a scientific process that can be justified (Daliman, 2012, p. 65). There are two

types of source criticism: internal and external criticism. First, internal criticism is carried out through the process of reading the discovered written and oral sources. Thus, the data can be selected, reviewed, sorted, and verified for their truth. Secondly, external criticism involves testing the authenticity of historical sources. External criticism is only expressed towards what is apparent to the senses and information explaining the condition. In criticizing oral sources, it is also done by taking into consideration who is interviewed, their profession, and their proximity to the object of the author's research focus. This thesis employs internal criticism. The result of source criticism is historical facts.

The next stage is interpretation or explanation. Interpretation means interpreting or giving meaning to the facts or evidence of history. The interpretation of the facts obtained from source criticism is an effort to find relationships among relevant historical facts, thereby chronologically indicating past events that interrelate. The historical facts relevant to the modernization of agricultural technology in Cilacap Regency are then studied to find one fact with another in a framework of chronological and causal relationships.

Therefore, the changes in agricultural modernization can be explained and subsequently understood correctly. The historical facts are obtained from sources that have been tested through internal criticism. At this stage, the use of concepts and social sciences is beneficial in explaining the relationship between facts, namely the relationship between the government and farmers with their socio-economic conditions. Once the interpretation process of the historical facts or evidence is completed, the process of historiography begins. The data that has been interpreted is then arranged according to the chronology of the event under study. The resulting interpretation becomes a point for a historical reconstruction. This reconstruction contains data that have been sorted and the meaning contained therein has been extracted. Interpretation is carried out by analyzing every possibility that can connect one fact with another that has been found and collected. Through this method, coherence or interconnection between these facts is obtained, the focus to be written is found, so it can then enter the next stage, which is the writing of history or historiography.

Historiography is the final stage of the historical reconstruction process. After the sources have been collected and then criticized to become data and then interpreted into historical facts, the final step is to compile all sources into a complete narrative in the form of a chronological narrative. At this stage, the synthesized facts are presented in the form of historical writing using good and correct Indonesian language so that it can be well understood by readers. In the critical history method, historiography is the final stage of writing a history thesis for the purpose of finding and collecting data and then writing them. Historiography contains the meaning as rewriting historical facts or actualities in the past in the form of historical stories using scientific, good and correct Indonesian language.

Overview of Cilcacap Regency

Geographic

The Cilacap Regency, with a total area of 214.257.398 hectares, is geographically located between 7°45'20" and 7°30'00" South Latitude (SL) and 108°04'30" and 109°30'30" East Longitude (EL) (Cilacap Statistical Beuareu, 1979, p.1). The regency comprises 269 villages and 15 sub-districts. Cilacap has a tropical climate, experiencing both dry and wet seasons. The maximum temperature of 32.1°C occurs in February, while the minimum temperature of 22.22°C occurs in August. The average highest rainfall occurs in December, around 420 mm, and the lowest in July, around 17 mm. The soil types in the Cilacap Regency vary, including Latosol, Alluvial, Grumusol, Regosol, Litasol, and Podsolic soils.

The population in 1979 was 1,311,304 people and increased to 1,685,430 people in 1999. The male population increased from 641,982 in 1979 to 828,709 in 1999, and the female population increased from 669,322 in 1979 to 829,721 in 1999. Consequently, the average growth rate of the population in the Cilacap Regency is about 0.54% per year. Proportionally, this increase in population has been accompanied by an increase in the productive age population, leading to a rise in job seekers, unemployment rate, and demand for education-related facilities. The majority of the Cilacap Regency's population works in the agricultural sector, with 378,920 people involved. The trade sector employs 45,934 people, the industrial sector 32,699 people, and other sectors employ 184,446 people.

The economy of the Cilacap community predominantly depends on agricultural production. This is due to the fact that a large proportion of the Cilacap people earn their living as farmers. One of the factors leading people to work as farmers and farm laborers is the rural community's lack of skills outside of the agricultural sector. Generally, the people of Cilacap Regency utilize agricultural produce to meet personal needs and sell to others. This is intended as a strategy to generate enough rice to purchase daily necessities for their families (Scott, 1984, p. 4).

The harvest is used to meet daily needs, and any excess production is sold to exchange for clothing and food. In Sidareja sub-district, farmers often sell unhusked rice directly in the market, hoping to engage in immediate transactions. Farmers who sell unhusked rice through Village Unit Cooperatives (KUD) consider this method impractical because of the system which involves depositing the unhusked rice or goods and receiving payment at a later date. Wealthy farmers usually store their harvest and sell when prices are high, hoping to reap substantial profits. Conversely, farmers who sell unhusked rice directly in the market are typically tillers or laborers pressed by daily needs.

Demography

Socio-cultural conditions play a significant role in regional development, particularly in enhancing the quality of community resources in Cilacap Regency. This is evidenced by the remarkable progress in the Cilacap community's economy. In general, improvements in human resource quality are marked by the level of education,

religious practices, and community traditions.

Education is an endeavor to develop personality, instill knowledge, and equip young people with skills tailored to their development and environment. The nurturing and development of the younger generation should start as early as possible, beginning from the growth stages of children, teenagers, and young adults. Moreover, cultural development efforts are pursued in controlling, maintaining, and developing regional culture preservation to enrich national cultural patterns, thereby strengthening national identity.

The population of Cilacap, in general, adheres to state-recognized religions or beliefs, namely Islam, Christianity, Catholicism, Hinduism, and Buddhism. The state of religious life can be observed through the number of followers and worship facilities. The number of Muslims in Cilacap Regency in 1979 was 1,277,239. In 1989, this increased to 1,407,877, then rose again in 1999 to 1,606,118. The number of Protestant Christians in 1979 was 12,592. By 1989, this went up to 14,503, and then further increased to 17,319 in 1999. The Catholic population in Cilacap Regency in 1979 was 7,713. This number grew to 12,764 in 1989 and then rose to 15,793 in 1999. The number of Buddhists in Cilacap Regency in 1979 was 10,756. By 1989, this decreased to 5,936, but slightly increased to 5,752 in 1999 (Koentjaraningrat, 1982, p. 210).

The village community possesses a strong sense of kinship, prioritizing togetherness and mutual cooperation, while preserving old traditions (Aeni, 2020, p. 131). The Cilacap Regency community has several traditions, including death ceremonies, four-month and seven-month pregnancy rituals, Earth and Sea Almsgiving. Besides these, there are still ongoing cultural practices in the field of agriculture. Before planting rice, people would conduct or create a *Miniti Tandur*, a ritual offering containing incense flowers. When the rice begins to mature or is nearing harvest, farmers typically make a *tumpeng bosok* and market snacks to present to the Goddess Sri.

The tradition of Sea Almsgiving, previously often referred to as *nyadran laut*, involves casting offerings into the sea. This *nyadran laut* tradition is performed annually during the *Sura* month, or the first month of the Javanese calendar. The cultural development of the Dayeuhluhur community is influenced by the past events of the Cilacap region. In the border area between Central Java and West Java, Sundanese culture has evolved and been influenced by Javanese culture. Despite the influence of Javanese culture, Sundanese culture still maintains its unique characteristics, especially in the social hierarchy of the community.

The Green Revolution in Indonesia

The modernization of agriculture in Indonesia began with the Green Revolution program. This initiative introduced and expanded the use of modern technology in farming. The term "Green Revolution" was first used in 1968 by the former president of USAID (United States Agency for International Development), William Gaud, who is noted for disseminating new technologies in agriculture (Bauman, 1996, p. 18). According to Gaud, the advancements in agricultural fields were revolutionary, hence

he referred to it as the Green Revolution, which marked significant developments in agriculture. The Indonesian government enthusiastically welcomed the discovery of new technology through the Green Revolution.

President Soeharto, who assumed office as the President of Indonesia in 1967, began to restore the economic conditions. His focus was directed towards controlling prices following the chaos of the G30S/PKI event (Maryoto, 2009, p. 134). The government program through the Ampera Cabinet was solely aimed at rescuing the national economy, particularly eradicating inflation, saving state finances, and securing the people's basic needs. The government prioritized stabilization and economic rehabilitation due to the price increase, which indicated an inflation rate of around 650% in early 1966 (Poesponegoro, 1993, p. 565). In his efforts to stabilize and rehabilitate the economy, President Soeharto established a program called Repelita.

The Five-Year Development Plan was implemented based on the General Pattern of Long-Term Development, which was organized according to the Basic Pattern of National Development. Long-term development has a direction and strategy covering a span of 25-35 years (Poesponegoro, 1993, p. 577). The Five-Year Development Plan aimed to realize development in various sectors such as agriculture, mining, industry, and infrastructure. The plan was divided into five stages, each implemented progressively over five-year periods. The first stage was implemented from April 1, 1969, to March 31, 1974. This first stage emphasized agricultural development with the goal of breaking economic backwardness through the renewal process in the agricultural sector, as the majority of the population relied on agricultural products. This agricultural development included food crops, plantations, fisheries, livestock, and forestry, implemented in an integrated manner through efforts of intensification, extensification, diversification, and rehabilitation.

Agricultural intensification is an effort to increase the utilization of existing agricultural land. Agricultural extensification is the expansion of land by finding new areas that can be planted and produce crops that can meet the food needs of the community. This agricultural extensification can be done individually (by farmers) or follow programs implemented by the government. Agricultural extensification or land expansion is carried out independently, continuously, and under full supervision by the government. One such method is by driving the transmigration program. Diversification or variety of agriculture is an effort to replace or increase the yield of one type of crop (monoculture) towards agriculture that is diverse (multiculture) (Mubyarto, 1999). Diversification can be divided into vertical diversification, aimed at increasing added value through processing and improving product quality, and horizontal diversification, which is carried out to increase production yields by planting various types of crops. One of the objectives of the diversification program is to increase farmers' income by optimally utilizing natural resources to achieve the highest possible income. This can be achieved through the appropriate farming system and must be adjusted to the potential resources owned by the farmer.

The expansion of agricultural networks and the development of farmer institutions were also pursued to support these activities. The emphasis on agricultural

development in the Five-Year Development Plan prompted President Soeharto to take the initiative to increase food crop production, particularly rice, at a time when the agricultural world was witnessing efforts referred to as the Green Revolution to boost rice production. The term 'Green Revolution' has been known in Indonesia since the 1960s. The Green Revolution in Java, in particular, was pioneered by the Bogor Institute of Agriculture (IPB) through agricultural extension services in 1963-1964. Superior rice seeds from the International Rice Research Institute (IRRI) in Los Banos, Philippines, were sent to Bogor in 1966. Simply put, the Green Revolution can be interpreted as a systematic effort to significantly increase rice production through the use of superior seeds, chemical fertilizers, pesticides, irrigation, and post-harvest technology. The Green Revolution transformed traditional farming systems into modern, technology-based farming systems.

The Green Revolution itself is a program aimed at rapidly increasing agricultural production, especially food production. This increase in food production is achieved through the use of superior varieties, appropriate modern inputs, and good farming practices. This needs to be done to rapidly increase food production to meet pressing food needs, especially due to population growth in developing countries (Wiradi, 2000, p. 213). The Green Revolution is based on three important pillars: water supply through irrigation systems, the use of chemical fertilizers and pesticides to guarantee production, and the use of superior varieties as high-quality raw materials.

Implementation of the Green Revolution in Cilacap

Agricultural production can be enhanced in three ways: increasing production by expanding the land, improving soil productivity, and increasing the use of land. According to Palapac, production enhancement can be obtained in two ways: expanding the land used for the cultivation of the concerned crops and intensifying cultivation, which means increasing the harvest yield per unit of land area (Hohnholz, 1986, p. 136). The Green Revolution represents a transformation from traditional farming systems to modern agricultural systems. This transformation is built on the availability of three factors: a biological revolution in the form of superior rice seeds (high yield variety), a chemical revolution in the form of various types of manufactured fertilizers and pest control drugs (Khudori, 2008, p. 32).

Farmers in Cilacap Regency share characteristics with agricultural activities in other agrarian areas. That is, economic activities and developments are determined by natural conditions, traditions they adhere to, business capital, the level of development and use of technology in agricultural activities. Further development occurred in 1978, with the primary priority of the Indonesian government to pursue economic growth, which was also followed by village governments. They implemented a variety of policies in the field of development, among them was the implementation of agricultural modernization in rural areas. In an effort to increase rice production in Cilacap, the Green Revolution program in Cilacap, which began during the second Repelita, was implemented in April 1978 in Maos. The gradual modernization in the field of paddy farming, as proclaimed by the government, has been able to change the

pattern and condition of the farmers' community life.

The Cilacap Regency is divided into 10 agricultural extension work areas and 120 agricultural counseling work areas, spread across 19 districts and 222 villages. In this regard, the government has taken policy measures to increase production through Intensification, Extensification, and Diversification efforts. According to Cilacap Regional FiveYear Development Plan 1984/1985-1988/1989, the nurturing of production factors in seedling cultivation includes the introduction of new superior varieties, cooperation with seed businesses and associations in the form of seed banks. The adopted strategy to boost food production involves increasing the use of subsidized inputs, significant investments in infrastructure (irrigation, communication, research, and consolidation), and the implementation of base price policies. The receiving mechanism and distribution mechanism for technology and production resources are developed through farmer groups.

In implementing the Mass Guidance Program (Bimas), the government pays closer attention to the factors influencing the increase in food crop production. These factors include the use of new technology, more productive means of production, incentives created by the government to increase production (subsidies for production facilities, base prices, etc.), and factors beyond reach such as natural disasters. The Mass Intensification (Inmas) Inmas implemented in Cilacap consists of several types of intensification, namely Special Intensification and General Intensification. Special Intensification is a type of rice intensification carried out on irrigated fields that are irrigated year-round. The Five Efforts in Special Intensification are carried out collectively (through groups) on a plot of land spanning 5-25 hectares.

General Intensification is a type of rice intensification conducted outside of fully irrigated paddy fields. The Five Efforts in General Intensification are not carried out collectively (not through groups). Both Special and General Intensification consist of Regular Bimas, New Bimas, Regular Inmas, and New Inmas (Rieffel, 1969). Regular Bimas is implemented through the Five Efforts, and the type of rice planted is not a superior variety. The fertilizer dosage used in Regular Bimas is 100 kg of urea fertilizer and 35 kg of TSP per hectare from planting season to harvesting season. Farmers receive credit from the government for their farming efforts. New Bimas is implemented through the Five Efforts and the type of rice planted is a new superior variety. The fertilizer dosage used in New Bimas is 200 kg of urea fertilizer and 50 kg of TSP per hectare from planting season to harvesting season. Regular Inmas operates the same as Regular Bimas, but farmers do not receive credit from the government. New Inmas operates the same as New Bimas, but farmers do not receive credit from the government. In 1979, the Bimas target per hectare in Maos district was 1,050 hectares, of which 767 hectares were realized. In Majenang district, the Bimas target per hectare in 1979 was 1,450 hectares, but only 905 hectares were realized. In Sidareja region, the Bimas target per hectare was 400 hectares, with 276 hectares realized. In Adipala district, the Bimas target per hectare was 600 hectares, while only 312 hectares were realized. The Bimas program in 1979 failed due to a lack of farming information about the use of modern farming tools and limited agricultural extension officers in

the community. Meanwhile, in Dayeuhluhur district, the target per hectare was 600 hectares, but only 848 hectares were realized. This region was successful in 1979 due to an adequate irrigation system.

The set Bimas target per hectare in Maos district for the year 1980 was 1,250 hectares, however, the realized area was 2,340 hectares. In Adipala district, the Bimas target was 800 hectares per hectare, and the actual realized area was 1,724 hectares. The Bimas target in Sidareja district was 620 hectares, with 2,250 hectares being realized. The target for Dayeuhluhur district was 640 hectares per hectare, with the actual realized area being 1,724 hectares. In 1980, the Bimas program was deemed successful as the community began receiving information on how to farm using modern agricultural tools.

In its effort to implement agricultural modernization, the government applied the Five Efforts in Farming, which consist of the use of superior seeds, fertilization, irrigation, pest eradication, and farming techniques. In line with development in the agricultural sector, traditional paddy field processing techniques shifted to a modern system. In other words, old techniques were abandoned and replaced with new ones. Initially, the Cilacap community carried out paddy field processing using traditional methods, which included the use of simple tools such as hoes, sickles, scythes, crowbars, plows, and harrows.

The use of these tools depended on the type of soil. For soft, non-rocky soil, the tools used would differ from those used for hard, rocky soil. Broad soil cultivation still used harrows and plows, although hoes still dominated most of the work in agricultural fields. Plows were used to overturn the soil. The function of the plow was the same as the hoe, only that the plow was used on a larger scale. As technology advanced, the use of animal-powered plows was replaced with tractors. In the early stages of tractor technology adoption, not many residents in Cilacap used it, they still used traditional technology such as animal-powered plowing and hoes. However, after the government conducted extension services, the use of tractor technology began to expand.

A hand tractor, also known as a two-wheeled tractor, is a diesel or gasoline-powered tractor featuring two wheels (either rubber tires or additional steel cage wheels), a single axle, a primary clutch, and either with or without a steering clutch. Its primary function is to pull and/or power agricultural tools, and it also serves as a driving force. A hand tractor only has one wheel axle, hence it only has two wheels. The length of this tractor ranges from 1740 to 2290 mm, its width ranges from 710 to 880 mm, and its power ranges from 6 to 10 horsepower. The main function of a hand tractor is to cultivate the soil. However, this hand tractor actually has many functions, such as water pumping, processing tools, trailers, and so on.

Hand tractors can be classified based on fuel type and engine power size. The types of work that a two-wheeled tractor can perform are generally used on narrow land. Two-wheeled tractors are widely used by farmers in Indonesia because they can make sharp turns or follow narrow circular paths compared to mini tractors. Two-wheeled tractors or hand tractors can also cultivate loose soil with a certain level of

humidity, adjusted according to the tractor's strength. Therefore, these two-wheeled tractors can be operated on moist or wet and not overly dry land (Jamaludin, 2019, p. 16).

According to Sadimin, by using a hand tractor, farmers gain several benefits, namely, they can more easily manage the condition of the soil and time in cultivating an area of one hectare. If worked on by two people with a hoe, it would take more than 50 days. If a plow is used, pulled by two cows or buffaloes and controlled by a farmer, it will be done in roughly 23 days. Conversely, according to informant, Mr. Sadimin, a local farmer who have cultivated rice field since the age of New Order, if a tractor is used, the work will be completed within 4 days.

Rice cultivation is inextricably linked to irrigation. The main water sources for paddy fields come from springs, ponds, wells, and ditches. In managing their paddy fields, farmers inadvertently demonstrate their ability to arrange the land. Specifically, they shape the land to create areas that are essential for survival. These parts of the paddy field include the Galengan, Kothakan, and ditches. The implemented agricultural modernization program also refers to the development of irrigation facilities. This development is carried out by thoroughly improving the existing irrigation system, completing initiated irrigation projects, and assessing surveys, planning, and starting new irrigation projects. Technical irrigation is one of the systems built after the Green Revolution program.

Technical irrigation means that paddy fields receive irrigation through a technical irrigation system. This system is an irrigation network that includes separators between supply and drainage channels, allowing the provision and distribution of water to be fully regulated and easily measured. The technical irrigation system consists of a main canal in the form of secondary, tertiary, and distribution dams that are collectively built and maintained by the Irrigation Department or Government. If damage occurs to the irrigation channels, it usually becomes the responsibility of the irrigation development section. However, if community self-help is needed, the cost is jointly borne by the water users. The shift from the rainfed system to the irrigation system provides many benefits for farmers. The irrigation system positively affects the frequency of rice planting in paddy fields and rice production outcomes. Both have been steadily increasing since the introduction of the irrigation system. Furthermore, the irrigation system reduces the risk of famine.

The Bimas Program, aimed at increasing rice production in a relatively short time, requires the use of superior rice seeds to improve rice productivity. The types of rice planted in Cilacap before the introduction of superior seeds were Javanese rice, Rojolele, Glutinous rice, among others. The superior rice seeds introduced in Indonesia were New Peta rice (PB), namely PB 5 and PB 8(Mubyarto, 1983, p. 37). Farmers in Cilacap generally plant types of rice such as Pelita, IR, Ciherang, Inpari, Mapari, and Bengawan. The types of rice planted in dry fields are Gaga rice, and Cempa. The superior rice varieties planted are IR 16, IR 42, Cisadane, and IR 64. These superior rice varieties are more productive than local rice because they mature earlier and yield higher results. This has resulted in changes in the rice harvesting process in the fields.

Initially, rice in the fields was cut using ani-ani, but because it was considered time-consuming and energy-intensive, it was replaced with a sickle. The sickle currently used is small and effective, with its blade resembling a saw. In addition, there are several new types of rice with short stalks, making it difficult to use ani-ani for picking rice, hence replaced with a sickle.

According to the experience of Mr Antun Marsigit, The process of threshing rice was initially done traditionally by being rolled with both feet while standing. It was then winnowed using an *irig*[1] and cleaned using a *tampah* so that the rice was clean and separated from the stalks. The inefficiency of using such a threshing system led to its replacement with a *bagreg*,[2] which is used by hitting the rice stalk on the *bagreg* over a tent until the rice grains detach from the stalk or its chaff. However, the use of bagreg has now been replaced with a rice threshing machine or thresher. The thresher serves to thresh or release grain kernels from the stalk. The grain that is still attached to the stalk and still gathered from the filtering results is carried back by the bowl conveyor to the threshing part to be threshed again.

Once the rice is threshed, it is spread out or laid down to dry. If the weather is sunny, it can dry in 2 to 3 days. If the weather is cloudy or often rainy, the spread-out rice may take 5 to 7 days to dry. The rice is then put into sacks or rice bags when the weather is hot, which results in good quality rice. If the rice is not yet dry and is directly put into sacks or rice bags, the quality of the rice is generally lower.

The sun-dried rice is then ready to be processed into grain. Initially, the transformation of rice into grain was done traditionally by pounding it with a mortar (*lesung/lumpang*) and pestle.[3] The pounding tool, made from a wooden cylinder, is called an *alu*. The pounding of rice into grain is usually done in a *lesung*, then moved to a *lumpang*. Typically, the pounding process results in fragmented rice, leading to a lower selling price. The pounding method using a mortar and pestle is less efficient, so the government provided assistance in the form of hullers and rice milling machines. Rice milling machines play a vital role in enhancing the quality of rice. The rice milling process using a milling machine can produce between 5-40 kilograms of rice per hour, operated by two male workers. The advantage of the rice milling machine is that the rice does not break, it is clean of impurities, and the husk can be separated automatically.

Implementation of Agricultural Technology

The majority of rural residents cultivate agricultural land in both lowland and highland areas. Generally, farmers who reside in lowland areas tend to focus their

[1]Funnel made of bamboo with slightly wide hole.

[2]*Bagreg* is made of bamboo nailed to wood, shaped like a triangular prism with the bamboo at the front nailed at a slight angle. Some use old bicycle or motorcycle chains. The manufacturing is similar to using bamboo, but the bamboo is replaced with a chain.

[3] *Lesung* is a rice pounding tool made of wood, which has a wide groove and its length is 1.5 meters, some are 2 meters. Usually, at the end of the pestle, there is a mortar, a rice pounding tool made from bricks, but if combined with a pestle, the mortar can be made of wood. The hole size is approximately 40-60 cm.

farming efforts on paddy fields or home gardens (Nugroho, 2018, p. 54). Dry fields are primarily cultivated by those living in highlands or mountainous and hilly areas. In Cilacap Regency, agricultural land consists of paddy fields and dry fields. The majority of the local population, being farmers, originally depended on their lives as farm laborers, although some also have their own agricultural land. Paddy fields are one of the types of agricultural land that are subject to land conversion. In the context of national agricultural development, the paddy field system is a strategic land use typology. Typically, paddy fields are delineated by bunds and have water channels. In Cilacap Regency, there are two types of paddy fields: rainfed and irrigated paddy fields.

Rainfed paddy fields were implemented in 1979 in various sub-districts of Cilacap, including Cilacap Administrative City, Kedungreja, Kesugihan, Adipala, Binangun, Nusawungu, Kroya, Maos, Jeruk Legi, Kawunganten, Gandrungmangu, Sidareja, Karangpucung, Cimanggu, Majenang, Wanareja, and Dayeuhluhur. Rainfed paddy fields are cultivated twice a year. According to personal experience of Mr. Yunus who live in Rungkang Village, the seeding process takes about 25 days, as rice that is less than 25 days old is vulnerable to rice pests. The growing period from planting to harvest requires 3 to 4 months.

In 1979, irrigated rice fields were recorded in several sub-districts, including Cilacap Administrative City, including Kesugihan, Adipala, Binangun, Nusawungu, Kroya, Maos, and Majenang. In these technically irrigated fields, farmers can harvest rice crops 2-3 times. The benefits of using technical irrigation include more organized watering, and a more orderly distribution and supply of water. The use of irrigation channels does not incur costs, but farmers must take turns in water collection, and they must seek permission from the management of the water-using farmer association, or P3A.

Dry fields in Cilacap in 1979 were recorded in several sub-districts and administrative city, including Cilacap Administrative City, Kedungreja, Kesugihan, Adipala, Binangun, Nusawungu, Maos, Jeruk Legi, Kawunganten, Gandrungmangu, Sidareja, Karangpucung, Cimanggu, Majenang, Wanareja, and Dayeuhluhur. Dry land is used for flat, sloping or hilly areas, and some use the intercropping system. Intercropping is the planting of two or more types of crops on the same land and at the same time, with a certain planting distance arrangement. The principle to be considered in the intercropping planting pattern is that the crops to be intercropped should preferably have different ages or growth periods, and different needs for environmental factors such as plant nutrients, water, humidity, and light. The intercropping planting system can support the agricultural intensification program. This program aims to achieve optimal production results and maintain soil fertility and can be carried out in the intercropping planting system.

Societal changes occurring in rural communities include the emergence of agrarian differentiation and social disparities among farmers (Khudori, 2008, p. 206). Agrarian differentiation denotes a shift in social groups resulting from the introduction of new elements into the agricultural sector. This can be attributed to the

Green Revolution program, which does not fully benefit the entire rural community, implying that only a few farming households reap the benefits of this program. The wealthy farmers who profit from the Green Revolution program are those who are not self-reliant, in which they still depend on state subsidies or economic protection.

The implementation of agricultural modernization, being a part of the Green Revolution program in Indonesia, has had a significant influence on community life both socially and economically (Khudori, 2008, p. 206). However, agricultural modernization not only has positive effects but also brings negative implications, especially for rural communities. The positive impact from the application of agricultural modernization is reflected in the increased rice production in a relatively short period. On the other hand, the negative implications of agricultural modernization include emerging environmental damage and issues concerning farmers' rights.

Conclusion

Agricultural land in Cilacap generally produces several types of crops, particularly food crops, including rice, maize, cassava, sweet potatoes, among others. The rice planted in Cilacap comprises wetland rice and upland rice. The focus of Repelita's agricultural development led Soeharto to take the initiative to increase food crop production, especially rice. Simultaneously, an effort called the Green Revolution emerged in the agricultural world to boost rice production. The Green Revolution was motivated by rice scarcity in the markets of major cities throughout the Old Order era. The Indonesian government enthusiastically welcomed the discovery of new technology through the Green Revolution, aiming to increase rice production in Indonesia.

The Green Revolution is a term known to Indonesia since the 1960s. The Green Revolution in Java, in particular, was pioneered by the Bogor Institute of Agriculture (IPB) with agricultural extension services in 1963-1964. Superior rice seeds from the Philippines' IRRI were sent to Bogor in 1966. A contract was signed with the chemical company (CIBA) in 1967, realizing the unity between the biological revolution in the form of superior rice seed varieties and the chemical revolution in the form of artificial fertilizers and pesticides. The New Order government launched the Mass Guidance Program (Bimas), adopted from the Green Revolution program in 1968. The Green Revolution program began implementation in Indonesia from 1970. The program aimed to achieve food self-sufficiency, especially in rice.

The implementation of agricultural modernization, as part of the Green Revolution program in Indonesia, has had a significant influence on community life, both socially and economically. Agricultural modernization not only brings positive effects but also has negative implications, especially for rural communities. The positive impact from the application of agricultural modernization is reflected in the increased rice production in a relatively short period. The negative implications of agricultural modernization include emerging changes in rural communities.

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