

# Jurnal Pendidikan Geografi: Kajian, Teori, dan Praktek dalam Bidang Pendidikan dan Ilmu Geografi

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Volume 25 | Number 1

Article 6

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2020

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### Recommended Citation

Eskasasnanda, I Dewa Putu and Wiradimadja, Agung (2020) "Mechanisation in tea plantation driving factors and its impact on sustainable environment," *Jurnal Pendidikan Geografi: Kajian, Teori, dan Praktek dalam Bidang Pendidikan dan Ilmu Geografi*: Vol. 25: No. 1, Article 6.

DOI

[10.17977/um017v25i12020p061](https://doi.org/10.17977/um017v25i12020p061)

Available at: <https://citeus.um.ac.id/jpg/vol25/iss1/6>

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## Mechanisation in tea plantation driving factors and its impact on sustainable

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### ARTICLES INFO

**Profil Articles:**

Sent: 19-10-2019

Approved: 6-12-2019

Published: 30-1-2020

**Key words:**

Plantation business; Tea plantation; mechanization

### ABSTRACT

Mechanization in tea plantation business is a phenomenon that is happening in Indonesia. The demand for tea products, the existence of land and tea plants that must be routinely maintained makes the managers of tea plantations have to find ways to manage tea plantations. Mechanization is a strategy taken by planters to cultivate land and maintain the amount of tea products when fewer workers are attracted to the tea plantation business. This paper will discuss the mechanization that occurs in the tea plantations of Serah Kencong, Blitar Regency. The focus of this paper is to explain the causes of mechanization in Serah kencong tea plantations, the views of tea pickers about the mechanization on these tea plantations, and the impact of mechanization on the lives of Serah Kencong planter communities and the natural environment.

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### INTRODUCTION

Agricultural activities are carried out to meet human needs. Agriculture can be interpreted as an activity utilizing natural resources such as land, water and sunlight to produce products in the form of raw material for food and drinks in order to maintain human survival. According Setianto & Susilowati (2014), one of the sub-sectors of agricultural activities is plantation and one of Indonesia's plantation commodities is tea (*camellia sinesis*). Tea plantation business in Indonesia is carried out to meet the needs of domestic and exported tea products. Tea plantation business, according to some researchers, has an important role because it can provide employment and generate foreign exchange to meet domestic demand, Ramdhani (2013). The tea plantation business can also have a positive impact on the environment. The existence of tea plantations can help maintain hydrological systems, prevent erosion, absorb CO<sub>2</sub> and produce O<sub>2</sub> and can be an alternative choice of recreational facilities or agrotourism, Nurunisa and Lukman (2012).

Tea is one of the popular beverage products besides coffee. Tea is consumed by the people of Indonesia and the world because it has a distinctive taste and aroma. Apart from being a refreshing drink, tea is also believed to have benefits for the body, Sari,

Endah and Retno (2016), therefore tea is often called a functional drink, Ramdhani (2013). According to Juneja (1999), suntheanine substances contained in green tea not only give a distinctive aroma but also provide a calming effect for humans. This effect is especially needed by urban residents who are exposed to various mental stresses.

Although tea products are very popular and the world's need for drinks made from tea continues to increase, but the amount of Indonesian tea production continues to decline. Pratama (2013) explained that Indonesian tea production declined from initially 153,000 tons in 2009 to 144,000 tons in 2013. This also affected the size of tea exports, which 92,000 tons in 2009, to only 69,000 tons in 2013 Pratama and Dwi (2015). It can be said that tea is a product that has experienced glory, but from year to year its position continues to decline. Indonesia, which was originally the world's second-ranked tea producer, dropped to sixth in the world in 2010, and seventh in 2013, Prabha (2015). Now, Indonesia is ranked seventh in the world of tea-producing countries after China, India, Kenya, Sri Lanka, Vietnam and Turkey.

According to Balitri (2013), the yield of tea production in Indonesia has declined in recent years because many tea farms owned by the people have been converted to grow other crops such as vegetables and rubber. According to Anggraini (2016), tea production has also continued to decline due to aging factories and tea processing machines.

The Serah Kencong tea factory produces black tea from the surrounding tea plantations. The Serah Kencong tea factory is built on state-owned land and is managed by a State-Owned Enterprise (BUMN), namely a Limited Liability Company, Perkebunan Nusantara XII (PTPN XII) Blitar's Serah Kencong Unit. When visiting this plantation area, it was discovered that the factory is now having difficulty maintaining their black tea production due to the decreasing number of young workers. Young workers from old tea planter descendants are reluctant to work on plantations because they choose to work in big cities. This forced the factory to use agricultural machinery to harvest tea plants. This article will discuss the impact of changing agricultural patterns on the Serah Kencong tea plantation. The use of agricultural machinery to harvest tea plants changed the attitude of the population in treating nature, they did not treat nature humanely.

## METHODS

The purpose of this research article is to understand about changes in the Serah Kencong tea plantations due to the adoption of modern tea harvesting machines by its population. This research was conducted by visiting the Serah Kencong tea plantation in Ngadirejo Village, Wlingi District, Blitar Regency. During the visit, observations were made on how Serah Kencong tea plantation workers operate the tea picking machine. Researchers look at the impact of the use of a tea harvester on natural life, flora, fauna and people's attitudes towards nature in Serah Kencong.

To find out the reasons and history of the use of modern agricultural machinery in the Serah Kencong plantation, researchers interviewed the plantation manager and the foreman in charge of supervising and directing the harvesting of tea with machines. The research method used is qualitative, after information from observations and textual data obtained from interviews, researchers conducted analysis and discussion using the related theoretical and literary framework. This research was conducted for 3 days in March 2019, which began on March 20 and ended on March 23, 2019.

## RESULTS AND DISCUSSION

### Theoretical Framework

Agriculture is a central activity in human life. Agricultural activities arise along with human efforts to meet their needs, namely producing food and beverages, Lichtenberg (2002). Krapu (2004) explains that the conversion of the natural environment into agricultural land and plantations along with the harvesting process can disturb wildlife due to the loss of wildlife's natural food. In a study in the state of Nebraska in the United States, the conversion of nature into corn farms resulted in the loss of native bird food and disrupted their migration patterns.

In general there are two forms of agriculture, first is traditional agriculture that depends on the availability of energy from nature and humans, second is modern agriculture based on fossil fuel energy. According to Rown (1988), traditional agriculture is agriculture that relies on nature, sunlight for photosynthesis of plants, livestock to produce fertilizer and plow power, and human power to plant and harvest crops. Meanwhile modern agriculture is based on the use of fossil fuels for power to cultivate land, produce fertilizer and irrigate crops.

Modern agriculture emerged to meet the needs of an increasing world population. There are many studies that examine the negative effects of modern agriculture on the natural environment. Ward et al (1988) said that modern agriculture can cause environmental problems, especially if technological progress is not accompanied by strict regulations regarding the use of these technologies. For example the use of mechanical power and chemicals to increase agricultural output will be dangerous without regulation because the majority of farmers do not know the safe dosage to not damage the environment. Without regulation, farmers tend to overuse pesticides so that they will pollute the natural environment and the loss of beneficial flora and fauna, Shi and Vicki (2012).

According to Makal et al (2014), the adoption of modern agricultural technology is largely due to the desire of producers to increase agricultural production. In West Bengal India, agricultural workers were phased out and gradually replaced by the use of agricultural machinery as a result of modern agriculture. Meanwhile Prabha et al (2015) said that agricultural work is now increasingly abandoned by farmers because it is no longer respected. Many parents, including farmers, do not want their children to choose agriculture as a career.

The dependence of modern agriculture on fossil-fuelled agricultural machinery is bad because it is very vulnerable to rising prices of fossil energy, Rown (1988). When agriculture becomes very dependent on fossil fuels, rising prices and availability of fuel will seriously affect agricultural profits. Farmers who are already dependent on agricultural machinery and fuel will also lose their ability to cultivate nature. They will consider the availability of fuel more necessary than natural and weather factors. This phenomenon was discovered by Makar et al (2014). That due to modern agriculture many farmers in India stated that yields would be better with the help of machine irrigation than with natural rain.

Of course without mechanization, agriculture can be a very tiring, torture and time-consuming (hard and back-breaking work) activity. Without mechanization young people will stop working in agriculture and choose other jobs, Prabha, (2015). Although today agriculture cannot be separated from the use of machinery but in the future must be thought about sustainable agriculture. This means that the use of machinery in agriculture is not only aimed at increasing production and reducing the workload of farmers but also

to reduce the negative impact on the environment, Setianto and Indah (2014). This is so that agricultural activities remain a clean industry. Industrial activities that continue to preserve nature because agricultural activities are actually very dependent on the quality and preservation of natural resources, Lichtenberg (2002).

### Research Result

In producing quality black tea, the Serah Kencong tea factory needs quality raw materials. The shoots of the tea plants must be picked every day for the factory, so it requires workers who want to live around the garden. The workers needed by the tea factory are factory operational workers, plant keepers, pick workers, plantation foremen, drivers, cleaning and security personnel.

According to information from the manager of the Serah Kencong tea plantation, the presence of workers around the tea plantations is very important because through them, the tea plantations can be regularly maintained and picked for factories. The workforce comes from the area around the plantation and to attract the interest of workers living and settling in the Serah Kencong plantation, PTPN XII built housing facilities along with the life support facilities needed by the population. Electricity, clean water, sports fields, health clinics, mosques, elementary schools and kindergartens were built around the plantations to attract and make workers and their families happy to settle in the Serah Kencong plantation.

Although the existence of workers is needed, unfortunately the number of workers who want to remain and work in the Serah Kencong tea plantation is now increasingly reduced. According to the manager of the plantation and foreman of the Serah Kencong tea plantation, many young people no longer want to follow in the footsteps of their parents becoming plantation workers because of modernization. In general, young residents of Serah Kencong will go to the city after they graduate from elementary school. Educational facilities in Serah Kencong which are only limited to elementary schools make young people must migrate and settle in the nearest town to continue their junior and senior high school education. After these young people were exposed to city life, they were no longer motivated to live in Serah Kencong. The remote Serah Kencong region, far from the city and hard to reach by mobile internet signals, makes young people always feel lonely and bored. The lack of entertainment makes young people interested in returning to the city to look for jobs that are considered more modern, respectable and can provide a better life. According to the foreman, it is reasonable that the youth of Serah Kencong no longer want to live in Serah Kencong because they have lived there since childhood and want new experiences.



Figure 1. Foreman showing how traditional tea worker picking leaves by hand





Figure 2. Male worker discharge harvested tea (left) and female worker sorting harvested tea leaves



Figure 3. A grasshopper is injured due hit by tea harvesting machine

Difficulties in getting workers make factories have to adopt modern methods of harvesting tea. The most effective step taken by the factory was the adoption of a gasoline-powered tea harvesting machine from Bandung, West Java. The use of a tea harvester is able to overcome the problem of labor shortages. According to the foreman, through the use of machinery, a team of 6 members can complete the manual tea harvesting work of 24 workers.

The use of a tea harvester, although it can solve the problem of labor shortages, has also led to a change in the way the people of Serah Kencong treat nature, especially tea plants. Previously when tea was picked by hand, workers would only pick the shoots of the tea plants they needed. The shoots of the tea plants that are taken are the best quality, P + 2 or shoots of tea with the addition of two leaves below. Tea pickers pick plants selectively and put them in a basket to be delivered to the factory. Shoots of tea plants that are too old or too small to be picked will be allowed to grow and be picked when they reach P + 2 quality.

When plantation workers use a machine, the buds of the tea plant are harvested by cutting them together. The machine is not able to select the desired tea plant shoots. The buds of the old, young, small or large tea plants are cut together and exhaled into the harvest collection bags. To meet the tea shoot quality standards desired by the factory, the yields in the bag will then be sorted by other workers to find the quality of the P + 2. Leaves that do not comply with quality standards, old tea shoots, small tea buds, and

weed leaves that are accidentally cut by a machine are just thrown away by workers around the sorting site.

Tea harvesting machines can harvest tea quickly in a wider area with fewer workers. The unfortunate thing, this machine works inhumanely, the machine cuts all the tea leaves at random. Through observation it is known that the tea harvester also cuts fauna that lives in tea plants. Caterpillars, cocoons, beetles and grasshoppers that live in tea plants will be destroyed if accidentally hit by a tea harvester. This fauna will certainly survive if the tea pickers still harvest the tea manually by hand.

Research findings in the Serah Kencong tea plantation show the impression that there has been a change in the way the Indonesian plantation community treats nature. If in the past they treated nature humanely because they could still observe nature closely and consider nature, especially tea plants, is a gift that helps human survival. Now it seems that workers tend to view nature as something that can be taken and exploited. Nature and tea plants are no longer considered sacred, as creatures that provide life but as objects that can be exploited to meet human needs. The loss of human wisdom in utilizing nature is due to modernization. Modernization makes agricultural products can spread far. The increasing need for tea products and the fewer workers make humans exploit nature. Tea is only considered as a product, not as a gift and service given by the natural environment to humans.

## **Discussion**

An interesting finding from research in the Serah Kencong tea plantation is that modernization in agriculture is not caused by the desire of factories to increase production but is due to the decreasing number of workers who want to pursue the plantation sector as a career. This is different from the case of other countries where workers are gradually replaced by the adoption of agricultural machinery, for example in West Bengal, Lichtenberg (2002).

Changes in the form of traditional plantations in Serah Kencong which depend on natural energy and human power, are replaced by modern agriculture based on the use of engines and fossil fuels, Rown (1988). The mechanization of agriculture in Serah Kencong occurs because work in agriculture is no longer respected by the community and is considered not to produce a living welfare. This is similar to what discussed by Prbha et al. That in India, agricultural work has also begun to be abandoned because it is no longer respected. Many parents, including farmers, do not want their children to choose agriculture as a career.

Even though they have different causes, the mechanization that occurs in Serah Kencong and other places in the world has the same goal, which is to meet the growing human needs for agricultural products. Mechanization in agriculture cannot be avoided because it agrees with what was stated by Prabha et al. Without mechanization, agriculture can be a very tiring, torture and time-consuming, hard and back-breaking work activity. Without mechanization there will be no young people who want to work in agriculture and choose other jobs, Prabha (2015).

Although it is unavoidable in this modern era, the mechanization of agriculture is a very vulnerable activity. Plantations that are very dependent on the engine will be very dependent on the availability of fuel. This make rising fuel prices seriously affect plantation businesses, Rown (1988) Farmers who are already very dependent on machinery will also lose their ability to understand nature. Farmers who have been dependent on modern technology will consider that the availability of fuel is more needed than natural and weather factors. It was found by Makar et al, that many farmers

in India consider that the availability of fuel is more important than natural factors because agricultural yields will be better with the help of machine irrigation than with the availability of natural rain, Makal (2014).

In this modern era the mechanization of questions cannot be avoided, but what must be further discussed is how in the future plantation businesses such as in Serah Kencong can become sustainable agriculture. So that the use of agricultural machinery does not eliminate the ability of humans to understand and love nature. So that agricultural activities in Serah Kencong remain a clean industrial activity. Industrial activities that continue to preserve nature because agricultural activities are actually very dependent on the quality and sustainability of natural resources Lichtenberg (2002).

### CONCLUSION

This study found the phenomenon that not all agricultural mechanization occurs because producers want to increase production and self-profit. In the case of Serah Kencong plantations, agricultural mechanization occurs because factories are increasingly difficult to find young workers to work in plantations. Mechanization can indeed solve the problem of lack of manpower, but it has the effect of losing the humane attitude of workers toward nature. When workers use machines, there is a possibility that they will begin to treat nature in an exploitative manner and lose the skill to understand nature. Workers treat nature not as a noble creature that helps humans solve survival problems but rather as objects that can be exploited. The thing that needs to be considered in the future in agricultural mechanization in Indonesia is the preservation of nature. How to make agricultural industry in Indonesia remain clean, not only capable of producing product that beneficial for humans but also sustainable for the natural environment.

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