Agricultural development and its socio-economic implications for the community in Duampanuae, Sinjai regency

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Abstract

This study aims to analyze the diffusion of agricultural technology and its impact on the social change of the farming community in Duampanuae. Utilizing a descriptive method with a qualitative approach, data were gathered through observation, in-depth interviews with 6 key informants, and documentation. The results indicate that agricultural mechanization in Duampanuae occurred progressively: initiated in 1990 through the commercialization of tractor and thresher services, followed by government fertilizer subsidies in 2002, and the introduction of motorcycle taxis for paddy transport in 2012. The adoption of this technology triggered significant social transformations, including a shift from traditional to modern practices, reconfiguration of farm laborers' working conditions, and increased production yields. Furthermore, this modernization restructured local belief systems and altered the dynamics of family relationships among farmers. This study concludes that technological adoption not only enhances agrarian efficiency but also reconstructs the socio-cultural structures of the farming community

Abstrak

Penelitian ini bertujuan untuk menganalisis proses difusi teknologi pertanian serta dampaknya terhadap perubahan sosial masyarakat petani di Duampanuae. Menggunakan metode deskriptif dengan pendekatan kualitatif, data dihimpun melalui observasi, wawancara mendalam terhadap 6 orang informan kunci, dan studi dokumentasi. Hasil penelitian menunjukkan bahwa mekanisasi pertanian di Duampanuae berlangsung secara bertahap: diawali pada tahun 1990 melalui komersialisasi jasa traktor dan thresher, disusul intervensi bantuan pupuk pemerintah pada tahun 2002, dan pemanfaatan motor taksi gabah pada tahun 2012. Masuknya teknologi ini memicu transformasi sosial yang signifikan, meliputi pergeseran dari aktivitas tradisional ke modern, rekonfigurasi kondisi kerja buruh tani, dan peningkatan hasil produksi. Lebih jauh, modernisasi ini merestrukturisasi sistem kepercayaan lokal serta mengubah dinamika hubungan kekeluargaan di kalangan petani. Penelitian ini menyimpulkan bahwa adopsi teknologi tidak hanya meningkatkan efisiensi agraria, tetapi juga merekonstruksi tatanan sosial-budaya komunitas petani.

Keywords

social change, farmers, agricultural mechanization

1. Introduction

Indonesia is an agrarian nation characterized by immense biodiversity, supported by vast, fertile land resources and a climate conducive to agricultural activities. The agricultural sector serves as a mainstay for the population; given the country's agrarian nature, a large proportion of Indonesians work as farmers (Ibrahim, 2019). Duampanuae, a village in the Bulupoddo District of Sinjai Regency, is one such area where the majority of residents work as farmers, aided by the village's lowland location and soil conditions favorable for cultivating crops such as rice, cacao, and others. Agriculture plays a vital role in human life, forming the foundation for the provision of clothing, food, and shelter; rice, in particular, remains a staple food commodity for the Indonesian people (Ahmadin, 2013b).

In the current millennial era, rapid technological advancements have permeated the agricultural sector, extending even into rural areas. The introduction of modern technology to rural communities has impacted local lifestyles. Farmers formerly relied on traditional tools such as hoes and sickles to cultivate their fields, handling everything from plowing to harvesting. Today, however, farmers increasingly prefer modern machinery, such as tractors for plowing and threshers for separating grain from stalks, alongside various other tools that replace manual labor (Fathnur et al., 2023). In Duampanuae, the advent of modern technology has driven significant changes and shifts in the farmers' agricultural systems and practices. Such transformations within a cultural element inevitably impact the underlying value systems associated with it (Syani, 1995). The introduction of modern technology in Duampanuae has led to a decline in *gotong royong* (mutual cooperation) among farmers and their families; since modern technology reduces the need for manual labor, the traditional cooperative system is increasingly being replaced by a rental-based system.

Rice farming in Duampanuae is deeply rooted in knowledge patterns passed down through generations. Cultivation is not undertaken haphazardly; rather, it involves various rituals that reflect community customs and established social norms. For instance, when determining the optimal time to plant, farmers in Duampanuae observe a tradition known as *bilang esso* a practice involving the collective observation of the lunar cycle and subsequent deliberation among farmers to agree on the best planting schedule a custom inherited from their forebears.

The introduction of agricultural technology in Duampanuae made it easier for farmers to work their fields. Around the 1990s, the arrival of plowing machines known generally as "tractors" but referred to locally in Duampanuae as *talattoro* significantly reduced plowing time; a one-hectare plot could be completed in just two to three days. However, not all farmers owned these machines due to their high cost. Farmers had to rent the tractor and hire an operator, meaning they no longer personally participated in the plowing process, instead simply observing as others worked their land. This contrasted sharply with the 1980s, when plowing took one to two weeks; farmers back then relied on simple tools like hoes and animal power specifically buffalo and cattle often working collaboratively with family and relatives, a practice that fostered strong solidarity among the farming community.

Agricultural technological advancements in Duampanuae extended beyond plowing machines to include rice harvesting equipment known as threshers locally called *masina ronto* which served to separate the rice grains from the stalks. Previously, farmers in Duampanuae had relied on simple tools and entirely manual labor for this task. Interestingly, the amount of human labor required for harvesting remained largely the same even after the introduction of threshers. During the harvest season, farmers hired farm laborers who formed groups of 16 to 25 people known as *pa'donto* to harvest the crop. As agricultural technology continued to evolve, the community was introduced in 2016 to the Combine Harvester, a machine capable of both harvesting and threshing the rice. This machine is capable of harvesting all the rice in Duampanuae

within a single month. While increasingly sophisticated technological advancements greatly assist farmers in their agricultural production, many farm laborers have lost their jobs as human labor is no longer required. By 2016, the *pa'donto* tradition had vanished. This illustrates how modern technology brings both positive and negative impacts on the community in terms of social and economic change; the positive effects are evident in the efficiency of time, labor, and costs, whereas the negative consequences include reduced social interaction among community members and the disappearance of traditional rice plowing tools.

Given these issues, the author considers it crucial to conduct research on the impacts of agricultural technology in Duampanuae. This study aims to provide insights for future research regarding social changes driven by agricultural technological advancements within farming communities, expand the body of knowledge in the social sciences, and serve as an effort to introduce local culture to the nation's next generation.

2. Method

The author employs a qualitative research approach in this study. Data collection is carried out through field research research activities conducted directly in the field. A method is defined as a procedural approach to understanding the subject matter of a specific discipline (Koentjaraningrat, 1991). Qualitative research yields descriptive data in the form of spoken words, written text, and the behaviors of the individuals being observed. It emphasizes the socially constructed nature of reality, the close relationship between the researcher and the subjects, and the situational pressures that shape the research process (Ahmadin, 2013a). Qualitative researchers prioritize the value-laden nature of the research and seek answers to questions regarding how social experiences emerge and how meaning is derived from them (Rahman, 2022).

The qualitative approach was selected because it facilitates interaction between the researcher and the subjects, generating descriptive data both oral and written that leads to a deep and comprehensive explanation through systematic analysis (Suhartono, 2000). This article aims to describe the prevailing reality: the social impact of agricultural technology on rice farmers in Duampanuae, Bulupoddo District, Sinjai Regency.

This study was conducted in Duampanuae, Bulupoddo District, Sinjai Regency. This location was chosen primarily because the majority of the local population works as farmers. By conducting research in this area, the author hopes to gather accurate data and achieve objective research findings relevant to the study's subject matter.

3. Results and Discussion

3.1. Agricultural Mechanization in Duampanuae

The farming community in Duampanuae has long engaged in agriculture. Initially, farmers relied on traditional tools to cultivate their land; from plowing the fields to harvesting the rice, they primarily used manual labor and very simple implements. Before the advent of modern agricultural technology, they were known as traditional farmers because of this reliance on basic tools such as sickles for cutting the rice and a slatted wooden structure known locally as *abbatineng* (Gebotan in Indonesian) for threshing the grain. HBD described the situation as follows:

> Back then, we farmed using whatever tools were available for every stage, from plowing to harvest. When plowing, we were usually assisted by buffaloes, though some farmers used only hoes. Using just a hoe made the work incredibly slow and difficult to manage alone; you needed help—usually from family members or fellow farmers in the neighborhood. The first machines to arrive here were the *talattoro* (tractor) and the

> *masina ronto* (thresher). They appeared around the 1990s. They were introduced when farmers rented them from outside the village. When this modern technology—the tractor and thresher—first arrived, few local farmers knew how to operate them; initially, only one person used them. It wasn't until 1995 that many farmers started using tractors and threshers, as they saw the excellent results. Using a tractor was beneficial because it sped up the plowing process; a one-hectare field could be finished in just two or three days." (Interview: June 14, 2026)

Based on the interview with the aforementioned informant, farmers in Duampanuae initially cultivated their land using traditional tools and buffaloes. Modern technology specifically tractors and threshers was introduced to Duampanuae around 1990 by farmers from outside the area who offered tractor and thresher rental services. At that time, only a few individuals knew how to operate the equipment. By 1995, however, many farmers in Duampanuae had begun using tractors and threshers; after witnessing the results achieved through modern technology, they started employing these machines to cultivate their rice fields. Furthermore, an informant named NS stated:

> Back around the year 2000, after the harvest, other farmhands and I used to transport unhusked rice using bicycles—but not just ordinary ones. These bikes had been modified and reinforced with extra iron to handle the heavy loads of harvested grain; they were known as "bicycle taxis." It wasn't until around 2012 that a successor appeared: the "motorcycle taxi." Over time, the use of bicycle taxis dwindled until they vanished completely. People preferred motorcycle taxis because they were easier to operate—no pedaling required—and their engines allowed for much faster transport of the grain from the fields to the collection point. However, when motorcycle taxis first emerged, only a few people owned them; they were created by modifying standard underbone motorcycles, a process that took quite a bit of time and effort. Many people simply couldn't afford to buy a used bike and convert it. Nowadays, though, motorcycle taxis are widely used. (Interview: June 16, 2026)

Based on the interview with the informant mentioned above, modified underbone motorcycles known as "motor taxis"—began appearing in Duampanuae around 2012 for the purpose of transporting unhusked rice. Initially, few people owned these motor taxis because existing motorcycles had to undergo modification; the conversion process was time-consuming, and some individuals lacked the funds to undertake it. However, the number of motor taxis in Duampanuae increased over the years.

In addition to mechanical technology, farmers in Duampanuae also employ technologies related to rice cultivation and crop care, as described by an informant named ZK:

> Farmers here in Duampanuae have been using fertilizers and pesticides for about 17 years some even for close to 20 years; the government originally provided them to the farmers here. The benefit is that the rice plants become more vigorous after using fertilizer, and the harvest yields are higher. It is quite different from the time before people used fertilizer in the fields (Interview: June 14, 2022).

Based on the interviews regarding rice cultivation, farmers in Duampanuae utilize agricultural technology specifically fertilizers to ensure their crops grow vigorously and healthily. Farmers in Duampanuae began using fertilizers in 2002. Furthermore, an interview with an informant named Rudding revealed the following:

> The *masina ronto* is still in use here and hasn't been replaced by combine harvesters; although the latter are used elsewhere, the local terrain characterized by small plots and high bundsmakes operating combine harvesters difficult (Interview, June 14, 2026).

Duampanuae currently employs combine harvesters for rice harvesting. Prior to adopting this machinery, farmers initially used threshers to separate the rice grains from the stalks. They began using this modern technology in 2016; as noted by a Duampanuae farmer, the technology accelerates the work process and reduces the time required for harvesting. In

addition to machinery for field cultivation, there is also equipment used to dehusk the rice grains. According to an interview with an informant named Sabah:

> In the past, after the harvest, the unhusked rice (*gabah*) was dried and then pounded using a mortar and pestle until the grain separated from the husk. However, once machines became available to separate the grain from the husk, that traditional pounding method was abandoned. Initially, the machine was located in the neighboring village, but in 2016, smaller mobile rice-milling units appeared. These could be transported by pickup truck around the village, so many farmers began using these small-scale milling services instead of transporting their harvest to a large warehouse for processing (Interview, June 16, 2022).

Initially, farmers used a traditional tool known as a *lesung* (mortar) to separate the rice grain from its husk. As times changed, rice milling units emerged. A rice milling unit is a machine used to process paddy into rice. In the past, following the harvest, farmers produced rice by pounding paddy that had been sun-dried beforehand; they would work together communally to pound the grain using the *lesung*. In 2016, smaller-scale rice milling machines appeared that could be transported via pickup truck. Farmers wishing to mill their rice no longer needed to transport their grain to a warehouse; instead, they could simply wait at home for the service.

Based on interviews with the aforementioned informants, it can be concluded that modern agricultural technology was first introduced in Duampanuae in 1990. This began with the replacement of traditional tools—such as hoes and sickles used for plowing and harvesting with motorized tractors and mechanical threshers (replacing the manual *gebotan* used to separate rice grains from the stalks). In 2002, crop maintenance technologies specifically pesticides and fertilizers were introduced and distributed to Duampanuae farmers by the government. Subsequently, in 2012, motorized transport (motorcycle taxis) emerged to haul harvests from the fields; prior to this, farm laborers had used bicycle-based transport to carry unhusked rice. By 2016, small-scale rice-husking machines transportable via pickup trucks—became available; these differed from the earlier, massive rice-milling machines that had to be housed in permanent warehouses. With the advent of these smaller machines, some farmers no longer needed to transport their harvests to warehouses for milling. Before the introduction of rice-milling machinery, farmers relied on traditional wooden mortars (*lesung*) to pound the rice until the grain separated from the husk.

According to the materialist theory proposed by (Ogburn, 1986), social change is driven by public dissatisfaction with prevailing social conditions that impact individuals. Meanwhile, Rostow posited that development is a process moving along a linear trajectory progressing from an underdeveloped society to an advanced one (Fakih, 2002). Regardless of its variations, this process essentially unfolds in the same manner, irrespective of time or place. Initially, farmers in Duampanuae used simple tools to cultivate their land; however, as times changed, they began adopting modern agricultural technology after observing the superior results yielded by such equipment.

3.2. Production Output from the Use of Agricultural Technology

Before the adoption of agricultural technology, the farming system in the Duampanuae community relied on traditional methods systems that did not fully optimize available inputs. One example of such a traditional system is shifting cultivation. Traditional farming is often unpredictable and no longer aligns with the rising demand for land driven by population growth (Haryanto, 2009). It is typically geared toward subsistence meeting the farmers' own living needs rather than economic gain; consequently, profit margins are low, and in some cases, rice production yields no profit at all (Hutajulu, 2023). In this study, the researcher conducted interviews with farmers to determine the impact of agricultural technology on production output. An interview with an informant named Rappe revealed the following:

> Before using agricultural technology to manage the rice fields, the harvest was only sufficient for consumption until the next harvest season. The situation changed after adopting agricultural technology; harvests increased, allowing the produce to be both sold and consumed." (Interview, June 14, 2026)

Additionally, an interview with informant Zulkifli indicated:

> When agricultural technology is used, farmers' harvest yields increase, which automatically leads to an improvement in their economic well-being." (Interview, June 14, 2022)

Based on the interviews with these two informants, it can be concluded that the implementation of agricultural technology has led to economic changes within the Duampanuae community. This shift is evident in the transition from traditional to modern farming tools; agricultural technology has not only boosted unhusked rice production but also increased the income of the farming community.

This aligns with Rostow's modernization theory specifically the take-off stage, one of five developmental phases—during which new agricultural techniques emerge. Farming transforms into a commercial enterprise aimed at generating profit rather than merely serving subsistence needs. Increasing agricultural productivity is crucial to the "take-off" phase, as the modernization of society requires substantial agricultural output to ensure the costs of this transformation remain manageable. This aligns with the aforementioned theory and the findings from the study conducted on the farming community of Duampanuae following the adoption of new technology Farmers have experienced an increase in income from unhusked rice production, thereby boosting their economic well-being. Previously, their harvests barely sufficed for family consumption until the next harvest season; however, the adoption of agricultural technology has now led to increased production capable of meeting both their daily and long-term needs. This situation aligns with the theory of change proposed by William F. Ogburn, which emphasizes that the driver of social change is a material element—specifically, the technology utilized by the farmers in Duampanuae. This view is further supported by Suryono, who identifies three schools of thought regarding the causes of social change; one of these the materialist (Marxian) school aligns with Ogburn's theory. This school posits that social change is driven by material forces, making it a tangible factor capable of catalyzing breakthroughs in production activities, economic endeavors, and human production technologies (Arifin, 2013).

The introduction of agricultural technology in Duampanuae Village has had implications for family relationships. For traditional farmers, the family plays a paramount role; family involvement is integral to the farming enterprise, with work spanning from the planting season to the harvest carried out collectively involving everyone from the nuclear family to the extended family. There is a strong sense of solidarity and mutual assistance among farmers, creating a dynamic of interdependence within farming groups regarding field cultivation; for instance, when harvest time arrives and a field owner requires significant manpower, they typically call upon family members to assist. Furthermore, utilizing family labor eliminates the need to incur additional costs by hiring outside workers. To understand the practices of farmers in Duampanuae, the researcher interviewed an informant named H. Baharuddin:

"In the past, son, almost all rice farming activities were carried out by the family; they would help out from the initial sowing of seeds right through to the harvest. But that doesn't happen anymore because there is machinery available that doesn't require a large workforce, so there is no longer a need to call upon many family members or neighbors. Now, we simply hire people to operate machines like threshers, tractors, and motorized transport. People choose to use machinery because it saves time, costs less, and yields better results. However, there are still farming activities where we call on family and neighbors, such as sowing seeds and planting rice in the fields. For the actual harvesting and processing of the crop, we no

longer need to call on family and neighbors." Based on interviews with the aforementioned informants, the introduction of modern technology in Duampanuae has led to a decline in the practice of mutual cooperation (*gotong royong*) among farming families. This shift occurred because agricultural technologies such as tractors for plowing do not require extensive human labor; tasks that were once performed collaboratively by family members are now often handled through rental arrangements. Farmers have adopted this approach to save time on land preparation and because tractor-based plowing yields superior results compared to manual labor. However, not all rice farming activities rely on hired labor; certain tasks specifically the sowing and planting of rice continue to be carried out through family cooperation to this day.

4. Conclusion

Initially, farmers in Duampanuae cultivated their land using traditional tools and animal labor. Around 1990, farmers from outside the area began offering tractor and thresher rental services. By 1995, many Duampanuae farmers had adopted these machines; having witnessed the results of modern technology, they began using them to cultivate their rice fields. Around 2000, "bicycle taxis" were used to transport harvested grain from the fields. Then, around 2012, a new innovation emerged: underbone motorcycles modified to carry grain known as motorcycle taxis which made transporting the harvest much easier for farmers than using bicycle taxis. Subsequently, in 2002, agricultural technology in the form of fertilizers was introduced to Duampanuae, yielding highly beneficial results for farmers by improving crop quality and protecting against pest infestations. Finally, in 2016, farmers transitioned from using standard threshers to separate the grain from the stalks to using more advanced combine harvesters.

The adoption of modern technology has transformed the way people work shifting from traditional collaborative methods and has altered their individual and group interactions, including their mindsets, behaviors, and modes of engagement. Regarding agricultural output, the use of modern technology has improved the economic standing of farmers in Duampanuae; previously, their income was barely sufficient to cover consumption needs until the next harvest, whereas now, the revenue generated from their production covers both daily necessities and long-term needs.

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