

Study of the Physical, Environmental, and Economic Sustainability of Purwosari Agrotourism in Semarang City

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ABSTRACT

Agrotourism has been one of the most rapidly developing sectors in the last two decades and is predicted to continue growing in the future. The pandemic is claimed to have had no significant impact on the development and growth of the agrotourism sector. However, Agrotourism Purwosari, a leading agrotourism destination in Semarang City, has not yet optimized its potential. This is indicated by suboptimal management and various restrictions during the pandemic that have decreased its performance. These challenges have the potential to disrupt the sustainability of agrotourism. This study aims to examine the sustainability of agrotourism with a focus on Agrotourism Purwosari, which is managed by the Semarang City Agriculture Office. This research uses a mixed-methods approach, including descriptive statistical analysis to identify the characteristics of agrotourism, and scoring analysis to assess sustainability efforts through a questionnaire distributed to all managers. Additionally, a qualitative descriptive analysis was conducted through in-depth interviews with four key actors. Based on the analysis, it is found that Agrotourism Purwosari is classified as Moderately Sustainable (3.37), with social and cultural sustainability being quite dominant, but still weak in business performance sustainability.

Keywords: agrotourism; sustainability; physical; environmental; economic.

INTRODUCTION

Agrotourism is one of the fastest-growing types of tourism over the past two decades and is predicted to continue expanding in the future (Lan & Chau, 2020). This growth is supported by the rapid development and contributions of the agrotourism sector in several countries worldwide. For instance, in the United States, revenue from the agrotourism sector increased by 600 million dollars between 2002 and 2012. Additionally, agrotourism revenue grew by 20% in India in 2019, and China's agrotourism sector generated 400 billion RMB in 2019 (Rauniyar et al., 2021). Tourism not only boosts foreign exchange earnings but also creates job opportunities, thereby stimulating economic growth (Lee & Chang, 2008).

Agrotourism involves hospitality activities conducted by agricultural business owners, where these activities remain connected to and complement the main agricultural activities (Sonnino, 2004). Arroyo et al. (2013) also stated that agrotourism comprises activities related to agriculture or plantations carried out on farms or plantations for recreational or educational purposes. Although agrotourism was once considered a tourism activity confined to non-urban areas, it has now expanded significantly to suburban areas (Gomes et al., 2019; Liu et al., 2018). Furthermore, agrotourism can be managed not only by farmers or private entities but also by the government, which has a vested interest in developing this sector (Kubickova & Campbell, 2020).

Historically, the tourism industry has been one of the economic sectors capable of rapidly recovering after disasters, epidemics, or pandemics, such as the post-outbreak periods of Ebola, Middle East Respiratory Syndrome (MERS), and Severe Acute Respiratory Syndrome (SARS) (Deep et al., 2020). Agrotourism, in particular, is a type of tourism that has shown resilience and is predicted to grow again post-COVID-19, especially nature-based tourism destinations believed to have low risk during the pandemic and capable of ensuring physical distancing while traveling. This trend has been observed in countries like Poland, Italy, California, and Australia, where agrotourism destinations are preferred by visitors, especially local tourists (Chin & Pehin, 2021).

Several strategies have been employed by agrotourism businesses to survive and adapt during the pandemic. These include diversifying income sources, adapting business models by utilizing technology and information, and expanding business networks through extensive online platforms (Brune et al., 2021). Additionally, agrotourism operators, particularly in Southeast Asia, have diversified livelihoods, regenerated ecosystems, revitalized agricultural and plantation cultures, and increased local visitor engagement as efforts to endure during the pandemic (Adams et al., 2021). These various adaptations have enhanced the resilience of agrotourism during the pandemic and have directly impacted its sustainability (Kristiana et al., 2021).

In general, sustainable tourism must effectively manage natural resources, adopt local wisdom, particularly local cultural values, ensure the operational sustainability of tourism businesses, and enhance the welfare of local communities (UNEP & WTO, 2005). Sustainable tourism can be achieved through the management and enhancement of synergies between the environment, economy, socio-cultural aspects, governance, human resources, and science and technology (T. H. Lee et al., 2021). Specifically, sustainable agrotourism can be achieved through sustainable business performance, sustainable business communities, sustainable socio-cultural conditions, environmental sustainability, and the ability to diversify agricultural and plantation products (Tseng et al., 2019).

Nature tourism is one of the development themes of Semarang City's tourism according to the Tourism Development Master Plan for 2015 – 2025. Agrotourism is one type of nature-based tourism developed to support this plan. Semarang City has various types of agrotourism managed by communities, private entities (individuals and companies), and the government. This study will focus on government-managed agrotourism, based on the fact that tourism is a highly complex sector involving many stakeholders and affecting multiple sectors. The government is one of the entities with the capacity and legitimacy to facilitate and coordinate various stakeholders to manage tourism destinations. However, previous literature indicates that the top-down government-community approach to tourism planning and management is not effective in the long term (Kubickova & Campbell, 2020). This is considered an interesting aspect for research within the context of Semarang City.

Semarang City currently has three government-managed agrotourism sites: Cepoko, Purwosari, and Wates. This study focuses on Agrotourism Purwosari as the research location, based on several factors including the year of establishment, tourism development policy directives, and spatial planning guidelines. Agrotourism Purwosari, owned by the Department of Agriculture, was the first to be established in 2017. It is located in Mijen District, which is designated as a Strategic Tourism Area for the development of nature-based tourism, particularly agriculture-based, according to the Tourism Development Master Plan for 2015 – 2025. Additionally, Mijen District is directed to be an agricultural tourism area (Agrotourism) in accordance with Semarang City Regional Regulation Number 5 of 2021 concerning the Spatial Planning of Semarang City for 2011-2031.

Since its establishment in 2017, Agrotourism Purwosari has faced several management-related issues. These include a lack of both the quality and quantity of the workforce, especially professional staff, limited facilities, a restricted variety of products offered, and suboptimal promotion. These problems potentially undermine the sustainability of agrotourism (Kinasih et al., 2020; Sembiring et al., 2020). The pandemic has also impacted agrotourism through various restrictions and closures that have reduced its performance, thereby threatening its sustainability. This situation affected the tourism sector's local revenue in 2020, amounting to 141,171,505,279 rupiah, a 54.8% decrease from 2019's 312,195,496,037 rupiah (BPS Kota Semarang, 2021).

How to enhance the performance of Purwosari Agrotourism to support the sustainability of agrotourism is the research question that underpins this study. Research on this theme is necessary as an effort to accelerate the recovery of the tourism sector, particularly agrotourism, after the pandemic ends.

RESEARCH METHODS

There are two stages of analysis in this study: (1) Identification of Agrotourism Characteristics, and (2) Sustainability Analysis of Purwosari Agrotourism. The identification of agrotourism characteristics is conducted through descriptive statistical analysis. Several key references guide this stage, including primary articles related to agrotourism (Barbieri, 2020; Chase et al., 2018; Ciolac, 2016; Rauniyar et al., 2021). The descriptive statistical analysis presents data related to the characteristics of agrotourism in the form of tables, graphs, and images to provide a comprehensive and concise overview of the research objects' conditions. The characteristics identified are:

Table 1. List of Agrotourism Characteristics operational indicators

Variable	Sub Variable	Operational Indicators
Agrotourism Characteristics	Profile of Agrotourism Managers	Number of managers
		Origin of managers
	Agrotourism Income Profile	Educational background of managers
		Length of service in agrotourism
		Duties and roles of managers
	Agrotourism Visitor Profile	Income from agrotourism activities
		Income from the sale of farm produce
	Agricultural and Plantation Commodities	Total income
		Number of visitors
		Origin of visitors
Frequency of visits		
Types of agricultural and plantation commodities		
Agrotourism Elements	Quantity of agricultural and plantation commodities	
	Area of agricultural and plantation commodities	
	Condition of agricultural and plantation commodities	
	Agrotourism Attractions	
		Agrotourism Facilities
		Agrotourism Accessibility
		Agrotourism Services

(2) The sustainability analysis of Purwosari Agrotourism is conducted using a quantitative method with scoring analysis. This analysis stage refers to several articles (Barbieri, 2013; Choi & Sirakaya, 2006; De Rosa et al., 2019; Naidoo & Sharpley, 2016; Pratt et al., 2018; Roberts & Tribe, 2008; Tanguay et al., 2013; Tseng et al., 2018; Wu et al., 2019). Specifically, the sustainability assessment of Purwosari Agrotourism employs scoring analysis and sustainability score intervals according to Purwaningsih et al. (2020). The assessment of each indicator of agrotourism sustainability is conducted by categorizing conditions into 5 categories represented by scores ranging from 1 to 5.

Table 2. List of Agrotourism Sustainability operational indicators

Variable	Sub Variable	Operational Indicators
Agrotourism Sustainability	Environmental Sustainability	Protection activities for agricultural and plantation commodities
		Use and conservation of environmentally friendly energy
		Waste management activities (Reduce, Reuse, Recycle)
		Technology utilization
	Social and Cultural Sustainability	Availability of supporting facilities
		Allocation of farming and gardening activities as tourist activities

Variable	Sub Variable	Operational Indicators
	Community Economic Sustainability	Allocation of agricultural and plantation education activities based on local knowledge Contribution of agrotourism to local social and cultural activities Percentage of local farmers involved in agrotourism management Percentage of agrotourism workers who are local residents (farmers and non-farmers)
	Business Performance Sustainability	Contribution of agrotourism to the income of local residents working in agrotourism (farmers and non-farmers) Number of MSMEs around agrotourism Number of domestic tourists Number of Business Partners Availability of agrotourism development plans Business product diversification Average income from the tourism sector Average income from the sale of farm produce Total agrotourism profit

Next, it is necessary to calculate the intervals based on the scoring results obtained. The classification in this study uses 4 levels: unsustainable, less sustainable, moderately sustainable, and highly sustainable (Purwaningsih et al., 2020). Based on this, interval calculations are performed using the lowest and highest values, as well as the classification levels used.

Table 3. List of Agrotourism Sustainability Category

No	Sustainability Index Value	Sustainability Category
1	00.00-25.00 / 0-1,25	Unsustainable
2	25.01-50.00 / 1,26-2,5	Less Sustainable
3	50.01-75.00 / 2,6-3,75	Moderately Sustainable
4	75.01-100 / 3,76-5	Highly Sustainable

This analysis uses primary data obtained through the distribution of questionnaires to agrotourism managers. The aim is to provide an overview of agrotourism sustainability from the perspective of the managers.

RESULT AND DISCUSSION

Agrotourism Characteristics

Agro Purwosari is an asset owned by the Semarang City Government in the form of a plantation developed since 2017. Agro Purwosari has 4 garden areas/blocks (A, B, C, and D) covering an area of 8 hectares. Agro Purwosari is located at Jl. Kedungjangan RT 5 RW 3, Purwosari Village, Mijen District, Semarang City. See (Figure 1).



Figure 1. Purwosari Agrotourism

Agro Purwosari was initially developed as an agricultural and plantation education site for Semarang City. However, over time, Agro Purwosari has attracted tourists, presenting an opportunity for development as an agrotourism destination. Currently, there is an initiative to develop Agro Purwosari as part of the Semarang Technopark. According to information from the Semarang City Investment and Integrated Services Agency, Agro Purwosari is a priority location for the development of the Semarang TechnoPark. The current process is still in the development initiation stage.

The management of Agro Purwosari is currently handled by the Semarang City Agriculture Department. The management of Agrotourism Purwosari involves 16 garden keepers/department employees and farmers. There are 11 garden keepers assigned by the Agriculture Department, while the other 5 are local farmers. The local farmers have been involved since 2017 in managing Garden C of Agro Purwosari, covering an area of 0.8 hectares. These local farmers are part of the Sumber Rejeki Farmer Group, which has been established since 2014. Private parties have not been involved in the management.

Table 4. Stakeholder Profile

Stakeholder Type	Description	Quantity
Government	Agricultural Plantation Service Unit (UPTD) of the Semarang City Agriculture Department	There are 11 managers at Agro Purwosari
Private Sector	-	-
Local Community	Local Farmers from Sumber Rejeki Farmer Group (Purwosari)	There are 5 farmers at Agro Purwosari
Others	-	-

The Sumber Rejeki Farmer Group has been established since 2014 with 37 members, but only 5 of them are involved in managing Agro Purwosari. The total number of farmers in Purwosari Village is 2670. Apart from farmers, local community members involved include a group of 5 female farmers who manage the farmers' market. There are several limitations regarding the involvement

of farmers that have been implemented by the Agriculture Department since the beginning of the development. All farmers at Agro Purwosari are residents of RW 3, Purwosari Village, Mijen District. The garden keepers/department employees are not only from the same village but also from outside Purwosari Village, such as Ungaran and Boja. The education levels of the garden keepers and farmers vary, ranging from elementary school to diploma level (D3).

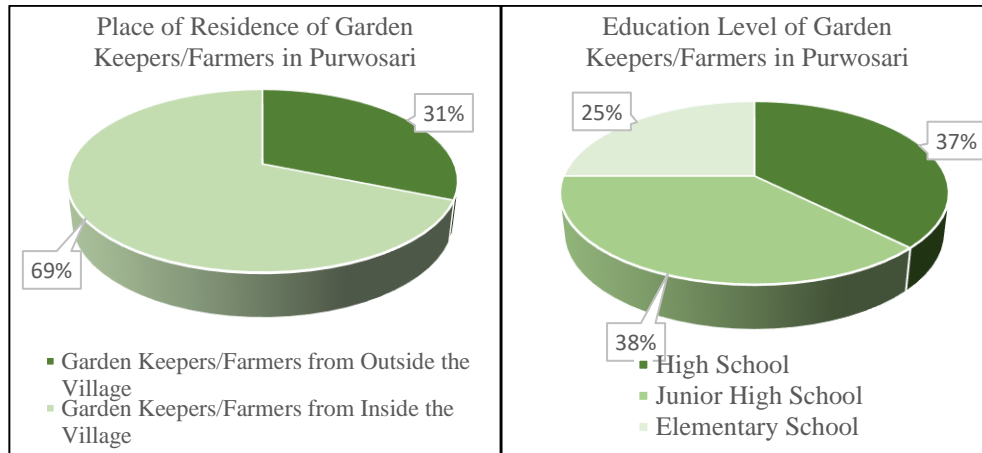


Figure 1. Garden Keepers/Farmers Profile of Purwosari Agrotourism

There are 5 types of income sources that can be accessed by Agrotourism, including Agricultural/Plantation Cultivation Education, Direct Sale of Garden Products, Entertainment, Outdoor Recreation, and Hospitality. The main source of income for Agro Purwosari is the sale of garden products. Meanwhile, agricultural/plantation cultivation education and outdoor recreation do not apply fees if an official visit letter is submitted to the Agriculture Department, but they are charged if the visit is through a travel agency.

The Agricultural Plantation Service Unit (UPTD) implements a profit-sharing system of 30:70 with farmers in the sale of garden products. Farmers can sell their garden products directly at the fruit market or leave them with the agrotourism management. Additionally, the Agriculture Department sells garden products online on the website https://sijambumerah.dispertan.semarangkota.go.id/produk_kebun for people who want to buy them. Outdoor recreational activities at Agro Purwosari are carried out through fruit-picking. This activity does not have a fixed cost, but participants are required to purchase the picked fruits and provide tips to the farmers involved.

Table 5. Agrotourism Income Sources

Income Sources	Income	Description
Agricultural/Permaculture Education	Not charged (Requesting visit permits from the department) Charged (Through Tourist EO)	Only charged for media/practice tools replacement at 5,000 rupiah/person/practice Various tour packages are available
Direct Sales of Garden Products	Direct sales by farmers and management	Product prices can be accessed on the Department of Agriculture's website
Entertainment	Available, but not charged	Agro Purwosari has been the location of several events with relatively easy permits
Outdoor Recreation	Available, but not charged	Visitors can experience fruit picking, only charged for the fruit picked

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Income Sources	Income	Description
Hospitality and Accommodation	-	-

Before the pandemic, Agro Purwosari was visited by 50-80 people per day on regular days and 100-200 people per day on weekends. After the pandemic, the number of visitors decreased to 30-50 people per day on regular days and 80-100 people per day on weekends.

The majority of visitors to Agro Purwosari come from within Semarang, especially from the surrounding areas. Visitors from outside Semarang come from districts and cities around Semarang such as Kendal and Demak. However, there are also visitors from outside Central Java Province such as Jakarta, Bekasi, Cirebon, and even from outside the island such as Lampung and Bali.

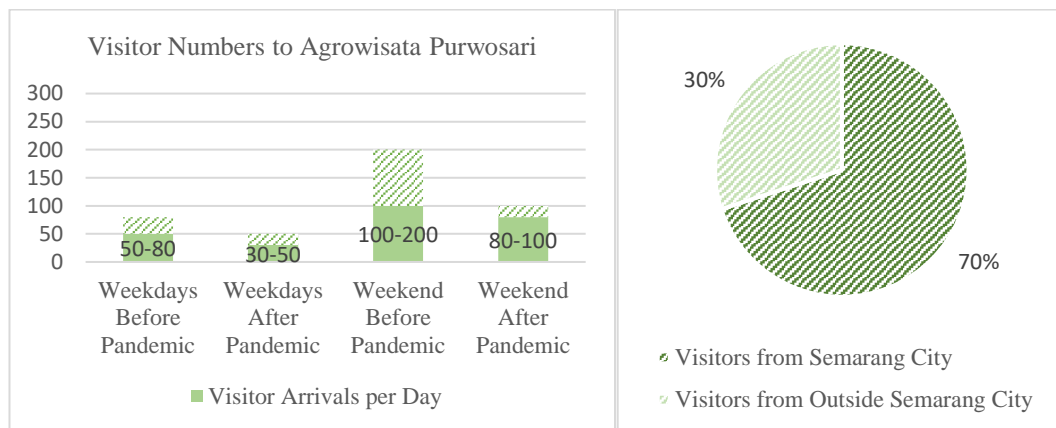


Figure 3. Vistors Profile of Purwosari Agrotourism

Agro Purwosari has 12 types of commodities with a total of 1847 trees. The most abundant commodity is Guava with 967 trees, accounting for 51% of the total number of trees. The next most abundant commodity is Orange with 566 trees, accounting for 30% of the total number of trees. Other commodities include Durian, Longan, Soursop, Breadfruit, Mango, and Bitter bean.

Agro Purwosari has three existing tourist attractions: plant cultivation education, fruit picking tours, and direct sales of garden produce. Plant cultivation education is an educational attraction that can be accessed by visitors every day during opening hours with prior notification and confirmation to the management or through the travel agency (paid). Fruit picking tours are a hospitality service attraction that can be accessed by visitors every day during opening hours with notification and confirmation to the farmers and management. Meanwhile, product sales can be accessed by visitors at the product market within the Agro complex managed by farmers, women's farming groups, and garden keepers.

Table 6. List of Tourism Attraction

Tourism Attraction	Availability	Description
Agricultural/Permaculture Education	Available	There are demo/practice activities for plant cultivation that visitors can access by submitting an official request to the Department of Agriculture.
Direct Sales of Garden Products	Available	There is a farmers' market for selling garden produce
Entertainment	Available	There are annual routine events such as the Semarang

		Agro Expo that utilize Agro Purwosari.
Outdoor Recreation	Available	There is fruit picking activity
Hospitality and Accommodation	-	-

In addition to the regular tourist attractions provided by Agro, there are several tourism events/festivals that use the Agro area as the location for activities. Agro Purwosari was the location of the Semarang Agro Expo (SAE) in 2020 organized by the Department of Agriculture, Semarang Horticulture Expo (SHE) in 2021 by the Department of Agriculture, and Semarang City Farming (SCF) in 2022 by the Department of Agriculture. Agro Purwosari can also be used to support community activities such as religious gatherings, social gatherings, art performances, and regular meetings.

There are several supporting facilities at Agro Purwosari, both tourism facilities and public and social facilities. The tourism supporting facilities available at Agro Purwosari include a hall, a pavilion, a greenhouse, a gazebo, a children's playground, and a farmers' market. Meanwhile, the public and social facilities available are an office, a place of worship, parking facilities, and bathrooms.



Figure 4. Purwosari Agrotourism Facilities

Agro Purwosari are located on the side of a collector road between districts that is easily accessible. The main access to Agro Purwosari is an asphalt road with a width of 7-5 meters, but the road condition is less good at some points within a radius of 1 km around the location.

There are additional service components that can be found at Agro Purwosari, such as institutions and tour agents. In terms of institutions, there are farmer groups and women farmer groups involved in tourism activities at Agro Purwosari. However, tourism institutions such as Tourism Awareness Groups (Pokdarwis) have not yet been formed at each Agro location. As for tour agent components,

there is a tourism event organizer at Agro named Sekolah Berkebun Ceria (SBC) that has been operating since 2020/2021, offering tour packages at Agro Purwosari.

According to Philip et al. (2010), there are five typologies of agritourism: Non-working farm agritourism (Agritourism that does not utilize agricultural land); Working farm, passive contact agritourism (Agritourism that utilizes agricultural land but tourist interaction with agricultural activities is passive); Working farm, indirect contact agritourism (Agritourism that utilizes agricultural land but tourist interaction with agricultural activities is indirect); Working farm, direct contact, staged agritourism (Agritourism that utilizes agricultural land, direct contact with agricultural activities but does not involve direct farming experience); and Working farm, direct contact, authentic agritourism (Agritourism that utilizes agricultural land, direct contact with agricultural activities, and involves direct farming experience). Based on this classification, Agro Purwosari can be classified as *Working farm, direct contact, staged agritourism, utilizing agricultural land with direct contact with agricultural activities but without direct farming experience*.

Agrotourism Sustainability

In this study, four sustainability aspects are used as sub-variables within the broader variable of agritourism sustainability. These sub-variables include the sustainability of business performance, economic sustainability, socio-cultural sustainability, and physical and environmental sustainability.

Business performance sustainability

Business performance sustainability is one of the sub-variables contributing to agritourism sustainability. Sustainable agritourism business performance is indicated by several metrics, including an increase in the number of tourists, an increase in average revenue from tourist visits, an increase in average revenue from the sale of agricultural/garden products, and an increase in the total profits of agritourism operations (Tseng et al., 2018; Barbieri, 2013; Tanguay et al., 2013). Additionally, this study includes other indicators of agritourism business performance, such as business partnership ownership, product diversification, and the availability of agritourism development plans (De Rosa et al., 2019; Pratt et al., 2018)

Table 7. Business performance sustainability

Question	Answer					Score/Value
	1	2	3	4	5	
How has the number of tourist visits to the agrotourism developed?	-	10	6	-	-	2,38
How has the development of agrotourism partnerships progressed?	-	10	6	-	-	2,34
How is the availability of agrotourism development plans?	9	7	-	-	-	1,56
What is the average income from the tourism sector?	-	16	-	-	-	2,00
What is the average income from the sale of farm produce?	-	9	7	-	-	2,43
What is the total profit of agrotourism?	-	10	6	-	-	2,38
How is the development of processed product diversification?	-	-	16	-	-	3,00
Business Performance Sustainability						2,30

Business performance sustainability (2.30) presents a challenge in the development of Purwosari Agritourism. All indicators show that the sustainability of the agritourism business is still lacking. The greatest challenge is the availability of agritourism development plans, which scored 1.56. Another significant challenge is the average revenue from the tourism sector, which scored 2.00. The best-performing indicator in agritourism sustainability is product diversification or development of processed products, which scored 2.50.

Agro Purwosari does not yet have a tourism development plan. However, some respondents indicated that the development plan for Purwosari Agritourism is currently in the initiation phase. The development plan for Agro Purwosari is part of the Semarang Technopark development plan. As a government-owned asset, the development of Purwosari Agritourism is the responsibility of the government as the stakeholder. Furthermore, the information available to the managers is relatively limited.

Agritourism revenue has tended to fluctuate and decline during the years 2020-2022. Several factors contribute to this, including production fluctuations, limited income sources, and the pandemic. Production of garden crops in Purwosari remains inconsistent due to technological limitations, weather conditions, and pest potential, resulting in fluctuating income from fruit sales. Agro Purwosari has also been unable to optimize other income sources from available attractions such as fruit picking and gardening activities due to a limited number of managers, lack of tourism knowledge, and the primary educational orientation of Agro Purwosari. The human resources or managers at Agro Purwosari do not yet have established capacities and skills related to tourism. The most significant factor causing revenue fluctuations and declines is the pandemic, which led to restrictions and closures, halting operations.

The pandemic has also been the most influential factor in the decline in the number of tourists. Visitor numbers dropped by nearly 50% compared to pre-pandemic levels. In addition to the restrictions and closures of the garden, the unstable economic conditions during the pandemic resulted in the public's purchasing power not fully recovering, even after the pandemic.

Another challenge is the lack of permanent business partners for agritourism (2.34). So far, Agro Cepoko Purwosari has not had any permanent business partners. Partnerships have typically been incidental and thematic, such as collaborations with universities, private companies (in the form of CSR), and community organizations/institutions. Currently, Semarang Berkebun Ceria (SBC) as an educational tourism agent/tour organizer is the only permanent business partner for Agro Cepoko and Purwosari. The managers of the agro also face difficulties in accessing potential partnerships. One reason is the agro's location, which is relatively far from industries, companies, and state-owned enterprises (BUMN/BUMD). Another factor is the ownership and management status of the agritourism, which is owned by the Semarang City Government, thus requiring several legal and formal steps to secure partners.

Product diversification or the development of processed products is the highest-scoring indicator in the agritourism business sustainability sub-variable, with a score of 3.00. Several efforts have been made to diversify products, including the production of dodol, chips, and herbal drinks, utilizing products from Agro Cepoko and Purwosari. However, all existing processed products are food items, and there are no other forms of processed products. Limitations in equipment, raw materials, knowledge, and costs are some of the factors restricting product diversification.

Economic sustainability

Economic sustainability is one of the sub-variables of agritourism sustainability in this study. Sustainable community economics includes the number/percentage of local farmers involved in agritourism, local employment absorption, increased income for local workers, and the growth of small businesses around the area (Roberts & Tribe, 2008; Barbieri, 2013; Naidoo & Sharpley, 2016).

Table 8. Economic sustainability

Question	Answer					Score/Value
	1	2	3	4	5	
What percentage of local farmers (on a village scale) are involved in agrotourism?	16	-	-	-	-	1,00
What percentage of agrotourism workers are local residents (farmers and non-farmers)?	-	-	-	16	-	4,00

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Question	Answer					Score/Value
	1	2	3	4	5	
What is the contribution of income from agrotourism to the total income of the management (farmers and non-farmers)?	-	3	2	11	-	3,50
How has the increase in the number of MSMEs around the agrotourism area been?	-	-	8	8	-	3,50
Economic Sustainability						3,00

The Economic Sustainability of Agritourism is relatively sustainable (3.00). The greatest challenge in agritourism sustainability is the percentage of local farmers involved in agritourism management (1). Meanwhile, other indicators are relatively good, such as the contribution of agritourism income to the total income of the managers (3.50) and the increase in the number of micro, small, and medium enterprises (MSMEs) around agritourism sites (3.50). The highest indicator of economic sustainability in agritourism is the percentage of agritourism workers who are local residents (4.50).

The involvement of local farmers in agritourism management is the biggest challenge for Agro Purwosari (1.00). According to the profile of Agritourism Agro Purwosari, it involves 5 farmers from the Sumber Rejeki Farmer Group, which constitutes 13.51% of the group's members (5 out of 37 members). On a larger scale, at the village level, Agro Purwosari only engages 0.19% of local farmers in Purwosari Village (5 out of 2670).

There are several reasons for the low absorption of local labor in managing Agritourism, including limited land area and farmer involvement requirements. The development of Agro Purwosari initially aimed to increase the productivity of government assets, utilizing available government-owned land for establishing gardens. The government's Department of Agriculture only sought to optimize existing assets, without initial directives or initiatives for large-scale development during the early stages of garden development. Additionally, the garden development was also aimed at empowering farmers, particularly those classified as poor.

The contribution of income from agritourism to the managers received varied responses from the respondents. The majority (14 individuals) stated that income from agritourism contributes 61-80% of their total income. The remaining respondents (9 individuals each) indicated that agritourism income contributes 21-40% and 41-60% respectively to their income.

These differences are based on the varying statuses of agritourism managers. Those directly contracted by the Department of Agriculture (11 individuals) reported that agritourism income constitutes 61-80% of their total earnings. The others who reported differently are farmers who share the profits from agritourism income. Farming is also a secondary occupation for them, as their main occupations include laborers, sanitation workers, and entrepreneurs.

The development of Agro Purwosari has also stimulated the growth of micro, small, and medium enterprises (UMKM) in the surrounding area. The presence of a farmers' market is utilized by the Women Farmer Group (KWT) to sell agricultural produce and processed products. Additionally, there are mobile vendors who sell their goods in the agro area during weekends. Specifically at Agro Purwosari, there is also tourism located nearby (Nirwana Stable), which further stimulates the growth of UMKM. The differences in responses from the respondents are due to variations in the information and knowledge possessed by each respondent.

A fairly optimal condition at Agro Purwosari is the absorption of local labor. According to the agritourism manager profile, the majority of managers (10 individuals) are local residents within the village. This significant local labor absorption is due to the agritourism development orientation that focuses on empowering the local community. Local residents were prioritized to become managers from the early stages of development. This is further reinforced by policies for farmers, where those allowed to replace current farmers are primarily family members of the previous farmers.

Social and cultural sustainability

Social and cultural sustainability is one of the variables within agritourism sustainability. Social and cultural sustainability in agritourism includes the allocation of farming and gardening activities as tourist activities, the allocation of agricultural and horticultural education activities based on local knowledge, and the contribution of agritourism to local social and cultural activities (Roberts & Tribe, 2008; Barbieri, 2013; Choi & Sirakaya, 2006).

Table 9. Social and cultural sustainability

Question	Answer					Score/Value
	1	2	3	4	5	
How is the allocation of farming and gardening activities as tourism activities?	-	-	-	5	11	4,69
How is the allocation of agricultural and horticultural education activities based on local knowledge?	-	-	-	10	6	4,38
What is the contribution of agrotourism to the increase in farmers' capacity?	-	-	-	7	9	4,57
What is the contribution of agrotourism to local social and cultural activities?	-	-	-	8	8	4,50
Social and cultural sustainability						4,53

Social and cultural sustainability is the most dominant sub-variable in Agrowisata Purwosari (4.53). This is indicated by the allocation of farming and gardening activities as tourist activities and the contribution of agritourism to local social and cultural activities (4.69 and 4.50 respectively). Farming and gardening activities are also based on local knowledge (4.38). Agritourism also contributes to increasing the capacity of farmers (4.57).

Agro Purwosari has three main attractions: gardening/plant cultivation practices, fruit-picking tours, and direct sales of agricultural products. This aligns with the initial goal of developing Agro Purwosari as an educational platform for plant cultivation, specifically horticulture and agriculture. Farmers are also involved in these attractions to provide knowledge related to horticulture/agriculture based on their local knowledge. Differences in respondent answers occur due to variations in farmer involvement in tourism activities. Most farmers work part-time and are rarely involved in tourism activities, which also affects respondent answers.

Agro Purwosari has had a significantly positive impact on enhancing the capacity of farmers. There are regular training sessions organized by the Department of Agriculture to improve the quality of farmers, involving the Women Farmer Group. Additionally, training sessions are occasionally organized by other entities such as universities and NGOs. The variation in responses is influenced by the different statuses of managers. According to the manager profile, there are managers who are contract employees and farmers. Contract employees are more likely to participate in the regular training sessions organized by the Department, as it is part of their obligations. On the other hand, farmers have more flexibility in attending these regular training sessions, without being bound by specific rules and obligations. Farmers are more involved and participate in training sessions organized by external parties as well.

Agro Purwosari has several facilities such as a hall and gazebos. The availability of these facilities is utilized by the local community to support activities such as meetings, religious gatherings, and even weddings. The relatively easy licensing process makes these facilities accessible to the public. The ease of access to these facilities has become one of the bases for positive community responses to agritourism development. This aligns with the development directives for Agro Cepoko and Purwosari by the Semarang City Government to also support local community activities.

Physical and environmental sustainability

Physical and environmental sustainability is one of the components of agritourism sustainability. Physical and environmental sustainability includes activities such as protecting agricultural and horticultural commodities, increasing the use of environmentally friendly energy and conservation,

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waste and waste management activities (3R), technology use, and the availability of supporting facilities (Roberts & Tribe, 2008; Barbieri, 2013; Choi & Sirakaya, 2006; Wu et al., 2019).

Table 10. Physical and environmental sustainability

Question	Answer					Score/Value
	1	2	3	4	5	
How is the protection of agricultural and plantation commodities in agrotourism?	-	-	-	16	-	4,00
How is the use and conservation of environmentally friendly energy?	-	-	9	7	-	3,44
How is the management of waste and waste (3R)?	-	-	7	9	-	3,56
How is the use of technology in agrotourism?	-	-	6	10	-	3,62
How is the availability of supporting facilities for agrotourism?	-	-	6	10	-	3,62
Physical and environmental sustainability						3,65

The physical and environmental sustainability of Agrowisata Purwosari is considered fairly sustainable (3.65). One aspect that is already quite established is the protection of commodities (4.00). However, the other four aspects can still be improved.

To support the operational needs of Agro Purwosari's gardens, there is adequate provision of water and electricity. Water is supplied through the local water utility (PDAM) and electricity from the national grid (PLN). Several efforts have been made to enhance energy efficiency to support the physical and environmental sustainability of Agro Purwosari, including the construction of greenhouses, the implementation of hydroponic systems, and the use of compost fertilizers.

Efforts to improve energy efficiency are still focused on technology use and waste management activities. The presence of greenhouses at Agro Purwosari is one such effort to save energy. The greenhouses are equipped with hydroponic systems and serve to protect commodities, particularly from weather conditions and potential pests that could disrupt plant productivity. These facilities contribute to energy conservation efforts.

Agro Purwosari also processes compost fertilizer to support plant fertility. Waste such as rotten fruits and other organic materials are processed by the managers into compost fertilizer, utilizing available resources. Facilities for compost processing are also available at Agro Purwosari.

The availability of supporting facilities can be further enhanced for Agro Cepoko and Purwosari. Facilities that need improvement include those supporting agriculture and horticulture, as well as tourism. Existing public and social facilities within Agro, such as bathrooms, places of worship, parking areas, and those outside Agro, such as health and security facilities, should be complemented with optimal tourism-supporting facilities like information centers, souvenir centers, and accommodations.

In general, Agrowisata Purwosari is categorized as moderately sustainable (3.37). Socio-cultural sustainability stands out as the most dominant aspect and has achieved a very high level of sustainability (4.53). However, the main challenge lies in the sustainability of the business, which still remains at a low level of sustainability (2.30). Meanwhile, the other two sub-variables, namely economic sustainability and physical-environmental sustainability of agritourism, are classified as moderately sustainable with scores of 3.09 and 3.65.

Table 11. Sustainability Profile of Purwosari Agrotourism

Sub Variable	Sustainability Index Value	Sustainability Category
Sustainability of Agrotourism Business Performance	2.30	Less Sustainable

Sub Variable	Sustainability Index Value	Sustainability Category
Economic Sustainability of Agrotourism	3.00	Moderately Sustainable
Socio-Cultural Sustainability of Agrotourism	4.53	Highly Sustainable
Environmental Sustainability of Agrotourism	3.65	Moderately Sustainable
Average Sustainability Score	3.37	Moderately Sustainable

Based on a comparison with the average sustainability score of agritourism (3.37), there are 2 sub-variables that still pose challenges: business performance sustainability and economic sustainability of agritourism. The favorable condition in socio-cultural aspects needs to be maintained as a driving force for agritourism. Challenges and strengths of current agritourism sustainability should be integrated into an effective development strategy to ensure its continuity.

CONCLUSION

Agro Purwosari have several characteristics of agrotourism, although they were not initially planned as such. Agro Purwosari were originally intended as fruit gardens for educational and community empowerment purposes. However, the development of Agro Purwosari as agrotourism destinations aligns with the spatial utilization plan in the Mijen Districts to be utilized as artificial tourism areas in the form of agrotourism. Agro Purwosari was utilized for various agricultural activities such as gardening practices, fruit picking, garden tours, and the sale of garden produce for tourism and educational purposes, attracting visitors and ultimately benefiting the farmers' economy. In addition to having several agrotourism characteristics, Agro Purwosari are also considered relatively sustainable with scores 3.37. Social and Cultural Sustainability being the most dominant aspect (4.53), while sustainable business performance is a challenge (2.30). Agro Purwosari has a more solid score in physical and environmental sustainability (3.65). Based on the analysis of the characteristics and sustainability profiles of Agro Cepoko and Agro Purwosari, it is evident that the development of agrotourism is not yet optimal, thus requiring appropriate and effective sustainability enhancement strategies. Integrating tourism events, products, attractions, and supporting facilities, developing product and attraction variations with partners, creating participatory and regenerative agrotourism development plans, increasing the involvement of other local governments in tourism development, enhancing tourism promotion, forming tourism awareness groups, improving human resource capacity in collaboration with partners, developing agricultural and horticultural technology with partners, and developing a tourism support transportation network are strategies for enhancing the sustainability of agrotourism formulated as a result of this research. These strategies are based on an elaboration of the strengths, weaknesses, opportunities, and challenges identified from the analysis of agrotourism characteristics and sustainability, proposed strategies from key informants, and literature reviews.

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