Green Economy and Public Policy in a Coffee Based Integrated Farming System: A Pathway to Sustainable Rural Development in Banjarsari Village, Magelang Regency

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Abstract

The transition toward a green economy places rural areas at the center of sustainable development, yet most smallholder economies still depend on selling raw commodities at low prices. This study examines how a coffee based Integrated Farming System (IFS) can serve as a green economy strategy while identifying the public policy support required to sustain it, using Banjarsari Village in Magelang Regency, Central Java, as a case. A qualitatively dominant mixed approach was applied, combining a survey of forty-nine respondents, in depth interviews with thirty purposively selected informants, field observation, and a focus group discussion analysed thematically with the aid of ATLAS.ti. The findings show that the village holds substantial agroecological capital in the form of organic robusta coffee grown within an agroforestry landscape and a sizeable Java goat population, but its economy remains vulnerable because coffee is harvested only once a year and is largely traded as green bean, leaving farmers with weak bargaining power. An IFS that couples' coffee agroforestry, goat husbandry, community based downstream processing, and agro educational tourism is proposed as a circular, low waste model that diversifies household income, conserves sloping land, and strengthens local institutions. The analysis further reveals that the model becomes durable only when it is anchored in coordinated public policy, including village regulation of priority commodities, a jurisdictional development roadmap, cooperative strengthening, and a university led living laboratory. The study contributes a replicable pathway that links green economy principles, public policy design, and the Sustainable Development Goals at the village scale.

Keywords: *green economy; integrated farming system; public policy; sustainable rural development; coffee agroforestry*

INTRODUCTION

The idea of a green economy calls for economic growth to advance in step with the conservation of natural resources and a fairer distribution of benefits. In developing countries, rural areas sit at the heart of this agenda because they are where agricultural commodities are produced and, at the same time, where poverty and environmental pressure tend to concentrate. A recurring problem arises when smallholders act only as suppliers of raw material, so the largest share of value is captured further down the chain by intermediaries and processors rather than by the farmers themselves (Vicol et al., 2018). This pattern weakens farmers' bargaining position, deepens income vulnerability, and slows the accumulation of capital at the village level.

Coffee illustrates this problem vividly. Neilson (2013) argues that the Indonesian coffee value chain is undergoing structural change that carries both opportunities and policy challenges for a national green

economy, including the declining reliability of coffee farming as a rural livelihood and the growth of domestic processing. Persistent structural constraints such as limited access to finance, weak market linkages, and low productivity are compounded by the sensitivity of coffee to climate variability, which threatens both yield and quality (Pham et al., 2019). As long as income rests on a single commodity harvested in a single season, price shocks or crop failure translate directly into household hardship.

Several responses have been proposed to untangle this situation. Downstream processing, or value addition, is widely held to raise the selling price of coffee and to strengthen local product identity, and the valorization of coffee by products such as pulp and husk into compost, feed, or bioactive compounds can further reduce environmental burden while creating new income streams (Lee et al., 2023). Agroforestry promises the optimisation of land together with ecological conservation, and the Integrated Farming System (IFS) unites crops, livestock, and processing within a mutually reinforcing cycle that offers year-round income and greater resilience for smallholders (Bhagat et al., 2024; Raghavendra et al., 2024). Agro tourism grounded in community empowerment has likewise emerged as a route to diversify the rural economy, although its success depends heavily on supportive government policy and cross sector collaboration (Buchari et al., 2024). These approaches, however, are often examined separately and are rarely framed within an explicit green economy lens or linked to the public policy that is a precondition for their durability.

This study seeks to close that gap by positioning a coffee based Integrated Farming System as a village scale green economy strategy and by examining the policy support required to sustain it. Three questions guide the inquiry. First, what are the actual conditions and development potential of agriculture and tourism in Banjarsari Village. Second, which problems hinder that development. Third, what form of Integrated Farming System suits the village, and what policy framework underpins it. The novelty of the study lies in weaving together three domains that usually stand apart, namely the principles of green economy, the design of public policy, and the attainment of the Sustainable Development Goals, into a single narrative grounded in field evidence.

LITERATURE REVIEW

Green Economy and Sustainable Rural Development

A green economy is understood as a development model that improves human well being and social equity while reducing environmental risk and ecological scarcity. In rural settings this principle encourages the efficient use of local resources, the closing of material cycles through the recycling of waste, and the creation of value without eroding the natural base that sustains it. Evidence from rural enterprises suggests that a regional innovation climate and entrepreneurs' cognition of green development are stronger drivers of sustainable small business performance than environmental protection measures taken in isolation (Zheng et al., 2025). Agriculture managed with a circular logic is one of the most tangible expressions of this idea because it lowers input costs while maintaining soil fertility over the long term.

Coffee Downstream Processing and Value Addition

Downstream processing refers to the sequence of further treatment that converts raw beans into higher value products, ranging from roasted beans and ground coffee to a variety of derivatives. This processing opens several benefits at once, namely a higher selling price that feeds directly into farmer income, the growth of local employment, a stronger bargaining position, and the

emergence of brands that open access to premium markets. In the Indonesian context, value chain interventions do not automatically benefit farmers, and their distributional effects depend on how upgrading is organised and who controls it (Vicol et al., 2018). Prior studies also show that the by products of coffee processing, including pulp and husk, can be converted into natural antioxidants, animal feed, or organic fertiliser, so that their use lessens environmental pressure while generating fresh income (Lee et al., 2023). Improvements in quality, market diversification, and brand strengthening have been shown to raise product value appreciably (Ummarta et al., 2024; Zakariya & Nirawati, 2024).

Agroforestry as a Land Optimisation Model

Agroforestry is a land use system that combines trees or shrubs with seasonal crops and livestock on the same plot. Compared with monoculture, it offers ecological advantages in the form of soil and water conservation, improved fertility, and the maintenance of biodiversity, while economically it opens room for diversification so that the failure of one commodity can be offset by another (Ahuja & Choubey, 2015; Gosling et al., 2021). Mathematical models have been developed to optimise the selection of species and land use scenarios for maximum economic return (Lucatero et al., 2022), while remote sensing techniques help assess land suitability for its application (Haile, 2024). On coffee farms, tree shade helps preserve microclimatic moisture and curb erosion on sloping land.

Integrated Farming System

The Integrated Farming System is a holistic approach that links the various components of a farm enterprise into a single, mutually beneficial system so that resource use is optimised, waste is reduced, and sustainability is achieved (Bahadur et al., 2024; Bhagat et al., 2024). Within a coffee framework, the crop becomes the core of the system, supported by agroforestry shade that maintains the soil and suppresses pests naturally, while goat husbandry plays a dual role as a source of organic fertiliser, a means of weed control, and an attraction for visitors (Bhati et al., 2024). Manure is processed into compost for the plantation, and farm by products are used as feed, forming a closed cycle that lowers cost and minimises waste (Walia & Kaur, 2023). Empirical assessments confirm that IFS raises productivity, profitability, and employment while improving soil health and diversifying diets, making it a resilient strategy for smallholders (Raghavendra et al., 2024; Ramana et al., 2025).

Public Policy and Community Based Tourism

The durability of a farming model rests not only on its technical design but also on the quality of the governance that supports it. Studies of agrotourism villages show that success requires an integrated approach built on sound governance, active community participation, innovation, and cross sector collaboration, with government policy and budgetary support playing a decisive role in unlocking local potential (Buchari et al., 2024). Regulation at the village level likewise proves important in ensuring the participatory and equitable management of natural resources (Watts et al., 2019), while the coordination of policy across levels of government on a single territory, often described as a jurisdictional approach, underpins the scaling up of sustainable commodity governance (Macdonald et al., 2024).

RESEARCH METHODOLOGY

This study applied a qualitatively dominant mixed approach with a participatory character. The design was chosen because the principal aim was to understand the socioeconomic conditions of the village in

depth while formulating an applicable development model. Quantitative data were used to describe the profile of respondents and their perceptions across several dimensions of development, whereas qualitative data explored the meanings, experiences, and aspirations of the stakeholders.

The research was located in Banjarsari Village, Grabag Subdistrict, Magelang Regency, selected because it possesses leading local products in the form of organic coffee, Java goats, and nascent agro tourism. Data collection spanned ninety days from the issuance of the work order. Primary data were obtained through four complementary techniques. A questionnaire survey captured residents' perceptions of the economic, marketing, social and institutional, environmental, and downstream dimensions. In depth interviews involved thirty informants selected purposively, including coffee farmers, village officials, business actors, community figures, and relevant agencies. Field observation assessed the condition of plantations, processing facilities, and tourism potential. A focus group discussion brought together representatives of farmers, women farmer groups, youth, cooperatives, and government to elicit collective views and innovative ideas.

Qualitative analysis proceeded through transcription, data reduction, data display, and conclusion drawing, and was then reinforced by thematic analysis using ATLAS.ti software to map patterns and the interlinkages among aspects. Quantitative data were processed with descriptive statistics in SPSS 27 to obtain a picture of the distribution and tendency of respondents' perceptions. Triangulation across sources and techniques was applied to safeguard the validity of the findings.

RESULTS AND DISCUSSION

Respondent Profile and Perceptions of Development Dimensions

The survey involved forty-nine respondents whose age distribution signalled a dominance of the productive cohort. The group aged twenty to twenty-nine was the largest, followed by those aged forty to forty-nine, while elderly residents appeared in small numbers yet still carried a long experience of farming. This blend of generations forms a valuable social asset for the continuity of the farm enterprise.

Table 1. Age distribution of respondents

Age Range (years)	Number of Respondents
20 to 29	13
30 to 39	8
40 to 49	11
50 to 59	8
60 to 69	8
Above 70	1

Source: primary data processed, 2025

By sex, most respondents were men at eighty six percent, while women accounted for fourteen percent. The predominance of men reflects their role as the principal cultivators, yet the involvement of women remains important, especially in post harvest handling, processing, and marketing, a pattern that resonates with evidence on the potential of women's empowerment in Indonesian agritourism to advance rural livelihoods. By occupation, almost all respondents were farmers, with only a small share engaged in

entrepreneurship. When viewed by role, ninety percent were farmers, followed by cooperative members and entrepreneurs in small proportions. This composition confirms coffee farming as the economic foundation of the village while signalling room for diversification through stronger entrepreneurship and institutions.

Descriptive analysis of five perception dimensions showed that the economic, production, and financial dimension recorded the highest mean score. This indicates that residents place strong confidence in the potential of coffee and the integration of livestock as a principal economic source. The marketing and the social and institutional dimensions sat at a middle level, suggesting marketing that is beginning to develop through cooperatives but has not yet reached wider markets, and social participation that is growing but uneven. The environmental dimension was relatively stable, while the downstream dimension remained at a moderate level owing to limited capital, technology, and mentoring.

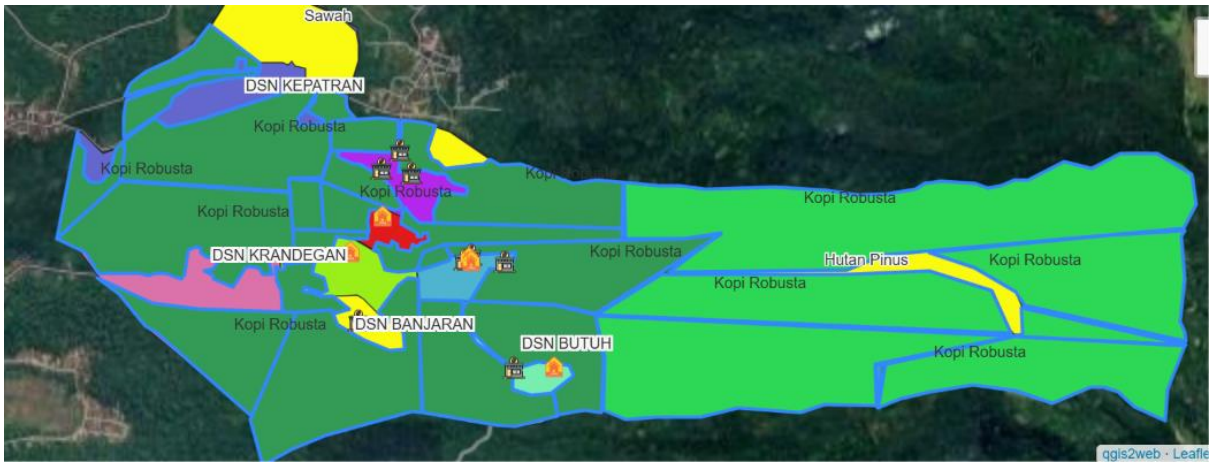
Table 2. Summary of descriptive statistics of respondent perceptions

Perception Dimension	Mean	Median
Economic, production, and finance	42.35	42
Marketing and supply chain	35.65	35
Social and institutional	36.12	36
Environment	24.20	25
Coffee downstream processing	31.33	31

Source: primary data processed with SPSS 27, 2025

Actual Conditions and Potential of the Village

Banjarsari Village lies in the northern part of Grabag Subdistrict with an area of about 267 hectares at an elevation of 500 to 1,200 metres above sea level. Robusta coffee plantations occupy roughly 105.9 hectares and provide the livelihood of most of the 868 households spread across twenty-two neighbourhood units and eleven community units. According to the survey, village coffee production is sizeable, yet part of the harvest is still traded as green bean, so the price farmers receive is relatively low and seasonal. This condition mirrors the wider Indonesian pattern in which the farmgate value chain leaves smallholders with thin and unstable returns (Vicol et al., 2018).



Source: https://desabanjarsari.id/

Figure 4. Location map and coffee potential of Banjarsari Village

Beyond coffee, the village holds a considerable livestock population, recorded at 221 farmers keeping about 1,129 Java goats, with the highest concentration in Banjaran Hamlet. This population can supply the organic fertiliser that links crop farming with animal husbandry. Coffee processing has been initiated through a single small enterprise, while the tourism sector is beginning to grow through a coffee tourism venture. These circumstances show that the village's agroecological capital is already in place but has not yet been woven into a single mutually supporting system.

Production institutions are represented by three farmer groups with varying levels of productivity. The group with the smallest holding in fact recorded the highest productivity, whereas the group with the largest holding produced less per unit of land. This gap reveals room for improvement through better cultivation practices and more uniform post harvest management.

Table 3. Profile of coffee farmer groups in Banjarsari Village

Farmer Group	Land Area (ha)	Green Bean Production (kg)	Hamlet
Lembah Butuh	6.22	6,800	Butuh
Gemah Ripah	42.80	5,500	Mejing
Sidomukti	22.09	3,000	Salakan

Source: primary data processed, 2025

Problems in Developing Agriculture and Tourism

Village development planning forums revealed a number of priority problems across two main fields. In agriculture, limited farm infrastructure, scarce capital, and mentoring that has not been sustained recur as obstacles. In tourism, limited human resources, weak promotion and branding, and incomplete facilities restrain the pace of development. The village government has responded through the construction of irrigation channels, the provision of seedlings, the coaching of farmer groups, and the initiation of agro tourism, yet these achievements have not fully resolved the root problems.

The history of assistance received by the village shows consistent government attention, ranging from barista equipment and processing machinery to livestock aid, a processing unit building, coffee seedlings, and a climate change adaptation programme. Even so, the use of these assets has not been optimal because of weak institutional coordination and limited management capacity. Poverty data reinforce the urgency of intervention, with 179 recipients of social assistance recorded across the hamlets.

Mapping with ATLAS.ti clarified the interlinkages among the problems. Production depends heavily on climate, downstream activity is still dominated by raw products with limited diversification, and marketing faces the dominance of middlemen that keeps prices volatile. Institutionally, farmer groups have formed but their coordination is weak, while the interest of the younger generation in farming is low, so regeneration is hampered.

At the same time, the agroforestry system, the potential of cooperatives, digital marketing, equipment assistance, and coffee education were identified as supporting factors. The synthesis of this mapping points to a single conclusion, namely the need to integrate downstream processing, digital marketing, and coffee tourism into a single Integrated Farming System

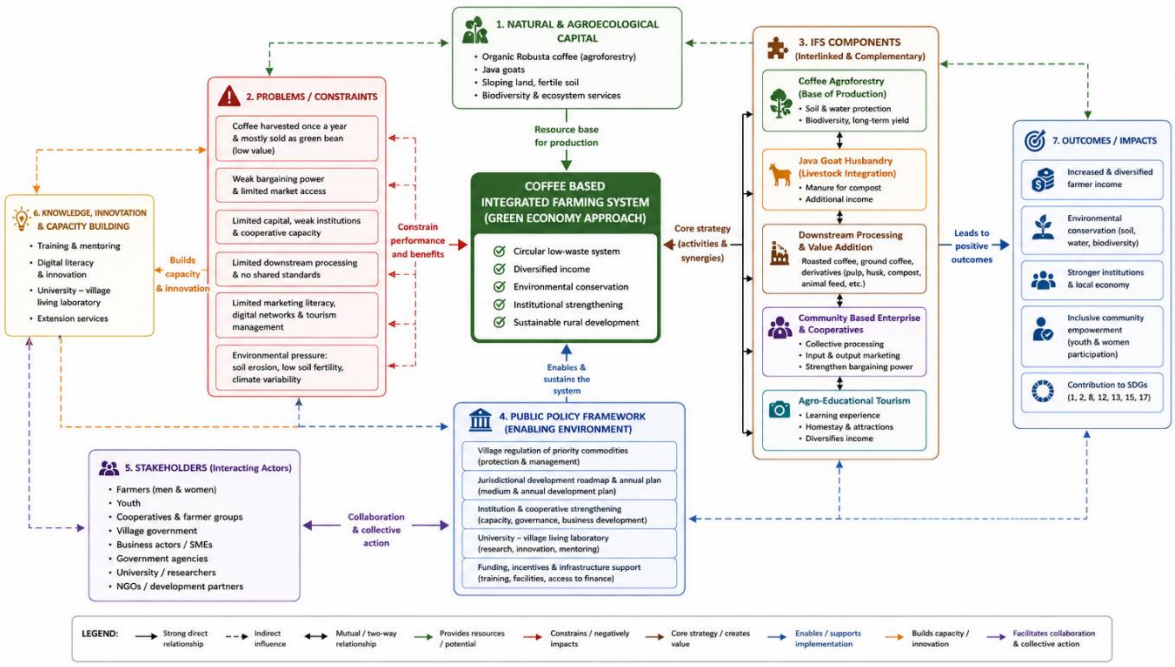


Figure 5. Map of interlinkages among aspects from the ATLAS.ti analysis

Findings of the Focus Group Discussion

The focus group discussion with relevant agencies and residents produced six interlinked aspects of findings. On government support, the Upland programme comprising a processing unit, a solar dryer, and a communal warehouse is running, yet coordination among agencies and village regulation still needs strengthening. On the synergy of farming and livestock, the use of manure for the plantation has taken place naturally as an early form of an integrated crop livestock system consistent with circular economy principles, an arrangement that improves resource efficiency and reduces dependence on chemical fertiliser (Walia & Kaur, 2023).

On institutions and financing, a cooperative has formed and manages part of the programme's assets, but financial management and the mechanism for returning capital remain weak. On downstream processing, the making of ground coffee is beginning to grow yet is sporadic and not organised within a shared institution that guarantees product standards, even though value chain upgrading and stronger producer organisations are precisely what improve smallholder returns (Vicol et al., 2018). On digitalisation, training in online marketing has begun despite constraints of literacy and

network, and community empowerment through agrotourism is known to deliver economic, social, and environmental value when reinforced by supportive policy (Buchari et al., 2024). On collaboration, the partnership among government, academia, and community is running with the university playing an active role, and coordinated public policy across levels of government strengthens the governance of such local commodities (Macdonald et al., 2024).

Table 4. Summary of findings and strategic recommendations from the focus group discussion

Aspect	Key Finding	Strategic Recommendation
Government support	Upland programme running, weak inter agency coordination	Village regulation on priority commodities and an agroforestry roadmap
Farming and livestock synergy	Manure used naturally	Training and certification of organic fertiliser as a village product
Institutions and financing	Cooperative formed, weak financial management	Digital financial management and an application based cooperative system
Downstream products	Sporadic processing, no shared standard	A shared processing centre and trademark, halal, and permit certification
Digital marketing	Limited literacy and network	A village digital team and integration of tourism and enterprise portals
Multi stakeholder collaboration	Partnership running but not institutionalised	A formal collaboration forum and designation as a living laboratory

Source: focus group discussion results processed, 2025

The Banjarsari Integrated Farming System Model

Building on these findings, the study formulates an Integrated Farming System model that links six components in a closed cycle. The robusta coffee plantation forms the base of production, managed within an agroforestry landscape so that the soil stays fertile and sloping land is shielded from erosion. Java goat husbandry is integrated by using farm by products as feed and producing manure that is processed into fertiliser for the coffee. A processing unit together with a cooperative and small enterprises manages downstream activity, from roasted beans and packaged ground coffee to other derivative products. The involvement of youth and women through cooperatives, farmer groups, and a village owned enterprise becomes the engine of marketing and product innovation. Agro educational tourism closes the sequence by offering a learning experience to visitors while opening a new source of income.

This integration forms a circular flow. Farm by products become animal feed, manure turns into compost for the plantation, and both agricultural and livestock products are processed into a variety of downstream commodities marketed through the cooperative and tourism attractions. The income that accumulates is reinvested to improve the quality of the system. The sequence lowers cost because the waste of one component becomes the input of another, and it strengthens the village economy against price shocks or the failure of a single crop. In this way, the model translates green economy principles into concrete practice at the village level (Zheng et al., 2025).

Implementation is designed to proceed in stages over three to five years. The first year

focuses on participatory planning, the formation of core institutions, and a pilot on farmer group land. The second year expands the scale of production and strengthens the cooperative and the village organic fertiliser processing unit. The third year becomes the period of full execution with a complete product line and the official launch of the agro tourism destination. The fourth and fifth years are directed toward further development, comprehensive evaluation, and the arrangement of sustainability so that the model no longer depends on project funding and is ready to be replicated in other villages.

Public Policy Framework for Sustainability

The analysis shows that a technical model will endure only when it is supported by coherent public policy. At the village level, the government needs to embed this programme within the medium term and annual development plans as a flagship, allocate village funds for training and supporting facilities, accelerate the establishment of a village owned enterprise, and issue a village regulation that designates priority commodities and protects farmland from conversion. This step accords with the finding that village regulation plays an important role in guaranteeing the participatory and equitable management of resources (Watts et al., 2019).

At the regency level, the regional government can designate Banjarsari Village as a pilot project for coffee based integrated farming through a decree of the regent, so that the direction of programmes and agency assistance becomes more focused. This alignment across agencies reflects the jurisdictional approach that links the policy of various levels of government on a single territory (Macdonald et al., 2024). Ease of business licensing, product certification, the formation of an inter village coffee cluster, and budget allocation for basic infrastructure complete the framework of support. The role of the university is affirmed through the development of the village as a living laboratory that facilitates continued research, mentoring, and knowledge transfer, an arrangement shown to be effective in agrotourism village development that combines local strengths with community empowerment (Buchari et al., 2024).

When all of these policy elements work in synergy, the Banjarsari Integrated Farming System model contributes directly to a number of Sustainable Development Goals, in particular the eradication of poverty, decent economic growth, responsible consumption and production, action on climate change, and the conservation of terrestrial ecosystems. In this manner, the idea of a green economy, the instruments of public policy, and the agenda of sustainable development meet within a single strategy rooted in local potential.

CONCLUSION

This study concludes that Banjarsari Village holds strong agroecological capital in the form of organic robusta coffee within an agroforestry landscape and a sizeable goat population, yet its economy remains vulnerable because coffee is harvested once a year and is largely sold as raw bean. The principal obstacles to development stem from limited capital, weak branding, institutional

coordination that is not yet solid, and the low interest of the younger generation, while the agroforestry system, cooperatives, digital marketing, and coffee education stand out as promising supporting factors.

In response, an Integrated Farming System that couples' coffee agroforestry, goat husbandry, community based downstream processing, the involvement of youth and women, and agro educational tourism is proposed as a circular, low waste green economy strategy. The model proves capable of diversifying income, conserving land, and strengthening local institutions, but its sustainability depends on coherent public policy from the village to the regency level and on the role of the university as a living laboratory. The study contributes a replicable pathway for linking green economy principles, public policy design, and the attainment of the Sustainable Development Goals at the village scale. Further research is recommended to test the impact of the model quantitatively and to assess its replicability in villages with similar characteristics.

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