

PESTEL analysis of green tourism development based on Lumbang Mataraman: Comparative study of Bantul and Kulon Progo regencies



Unggul Priyadi^{a,1,*}, Jannahar Saddam Ash Shidiqie^{a,2}, Alivia Rianti Putri^{a,3}

^aDepartment of Economics, Faculty of Economics and Business, Universitas Islam Indonesia, Indonesia
¹unggul.priyadi@uii.ac.id^{*}; ²jannahar.saddam@uii.ac.id; ³alivia20159@gmail.com

* corresponding author

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ABSTRACT

Green tourism initiatives tend to prioritize physical development and agricultural outputs, while insufficient attention is given to the integration of political coordination, economic value chain strengthening, social participation, technological innovation, environmental management, and legal-institutional arrangements. As a result, the development of Lumbang Mataraman-based green tourism remains fragmented and context-dependent, limiting its capacity to function as a comprehensive and sustainable development model. Addressing this gap, this study conducts a comparative analysis of green tourism development under the Lumbang Mataraman initiative in Bantul and Kulon Progo Regencies using the PESTEL framework. A qualitative comparative approach was employed through in-depth interviews, field observations, and document analysis, with all data coded and thematically analyzed using NVivo. The results reveal contrasting development patterns: Bantul demonstrates a governance-driven model marked by cross-sectoral integration and collaborative networks, while Kulon Progo exhibits a commodity-driven model dominated by plantation-based agrotourism with limited diversification. By extending the application of PESTEL to community-based green tourism linked to food security initiatives, this study offers a comparative conceptualization of differentiated development models that can inform more context-sensitive and adaptive regional tourism policies.

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1. Introduction

The development of green tourism in Indonesia has had a substantial impact on boosting local economies and improving regional food security (Amerta, 2019; Yuniarti et al., 2022). A range of agritourism development models have been formulated, each centred on distinct features like product-based agritourism, local wisdom-based approaches, area-specific initiatives, sustainable agritourism, and supporting local workers and (Ariyani et al., 2023). Environmental conservation, social responsibility, and economic benefits for local communities are prioritised in green tourism initiatives (Ijatuyi et al., 2025). Prior studies have highlighted various agritourism models, including product-oriented initiatives, approaches rooted in local wisdom, area-based development, and sustainability-driven tourism practices that emphasize environmental conservation and socio-economic benefits for local communities. Within this literature, green tourism is generally conceptualized as an environmentally responsible tourism model that seeks to balance visitor experience, ecological preservation, and community welfare, with rural agritourism frequently positioned as a strategic instrument for community empowerment through the utilization of local agricultural resources.

This model is defined by an environmentally friendly approach, with decision-making focused on minimising environmental impacts, offering memorable visitor experiences, and generating socio-economic benefits for local communities (Hassan et al., 2022; Ijatuyi et al., 2025). Rural agritourism is a significant type of green tourism, which leverages agricultural potential and engages rural communities, ultimately serving as a tool for community empowerment in line with tourism-driven development (Joshi & Dhar, 2020). Green tourism integrated with food security which is becoming a primary concern for both agricultural and national development strategies (Deng & Zeng, 2023; Miles et al., 2025). A community is said to have food security when they have ample access to nutritious food at a reasonable cost and it is safe to eat (Yusriadi & Cahaya, 2022). Achieving food security via tourism involves integrating the tourism and agricultural sectors to meet regional or national food security objectives while preserving environmental conservation and sustainable development criteria (Zheng et al., 2025). This approach leverages the potential of tourism and agriculture to increase food production, boost local economies, and achieve a sustainable equilibrium between tourism growth and food security.

Based on Special Region of Yogyakarta, the integration of tourism and food security is now being implemented through the Lumbung Mataraman initiative, a regional programme initiated by the provincial government. This innovative model is designed to enhance food self-sufficiency by integrating agriculture, fisheries, and livestock with tourism-based development (Mungkhun et al., 2021). In 2022, two Mataraman Granaries were built in Bantul and Kulon Progo using special funds. Then, in 2023, there are plans to build replicas in five other locations in Yogyakarta, which will also be funded by special funds. The development of Lumbung Mataraman in Bantul Regency faces challenges, namely obstacles in waste management, local products that are not competitive, inadequate human resource capacity, inadequate playground facilities, and underdeveloped public facilities. Similar challenges are also experienced by Lumbung Mataraman in Kulon Progo, where agricultural activities are only focused on longan and grapes without any diversification into other food crops. These challenges include inadequate infrastructure and transportation access, insufficient connections to renewable energy systems, underdeveloped digital tourism platforms, and the need for innovation in promoting the cultural and creative industries (Cornellia et al., 2025).

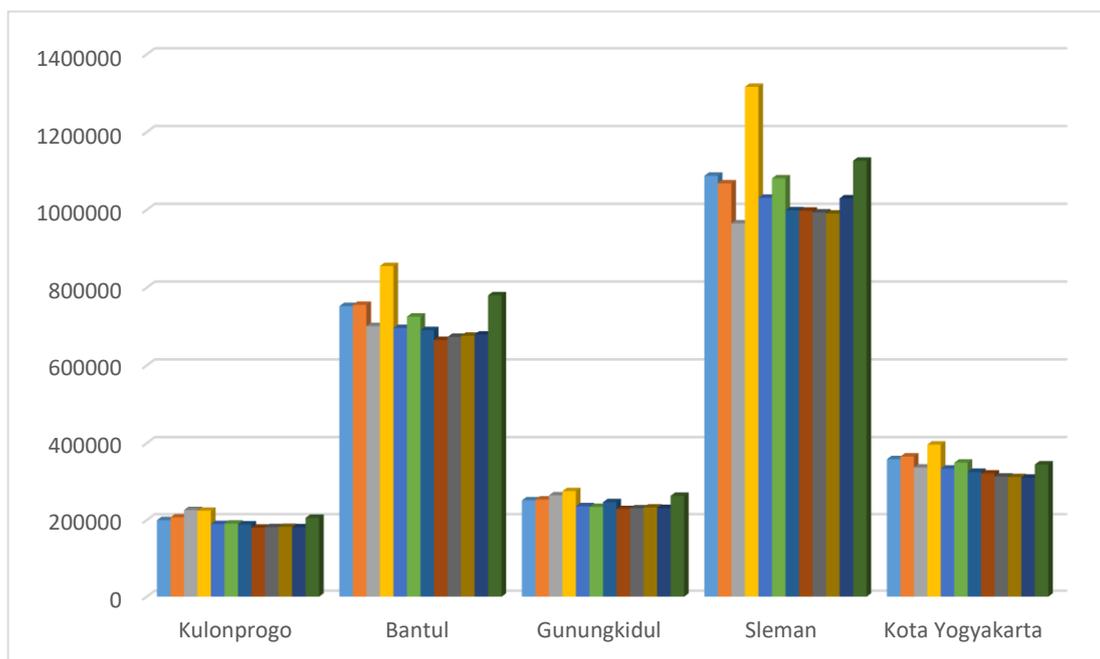


Figure 1. Number of Domestic Tourist Visits by Origin (Travel) in 2025 in the Province of Yogyakarta Special Region (BPS, 2025).

Figure 1 shows a comparison of the number of domestic tourists visiting the Province of DIY. It can be seen that compared to other districts, Kulon Progo recorded a very low number of tourists during 2025 than other regencies. This condition is believed to be due to the lack of tourist attractions in Kulon Progo and the lack of significant integration by the local government in developing green tourism in a massive and integrated manner. On the other hand, Bantul Regency, as a comparison location, recorded a fairly large number of tourists, although not as massive as Yogyakarta City and Sleman. Infrastructure, unsupportive management, and a lack of tourist attractions are the main

reasons why tourists prefer to visit other locations rather than Kulon Progo or Bantul. Therefore, the integration of a green tourism model is expected to serve as an innovation for both locations to increase the number of tourists on a large scale by offering environmentally-based tourism.

This limitation is evident in studies of community-based agritourism initiatives, where challenges such as weak institutional coordination, limited product diversification, technological constraints, and regulatory fragmentation are frequently mentioned as operational issues rather than being framed as researchable analytical problems. Consequently, there remains a clear empirical gap in understanding why identical or similar green tourism programs generate different development patterns across regions, and which contextual factors are most influential in shaping these variations. Addressing this gap, the present study offers a comparative analysis of green tourism development based on the Lumbang Mataraman initiative in Bantul and Kulon Progo Regencies. Rather than evaluating program performance from an advocacy perspective, this study adopts the PESTEL framework as an analytical lens to systematically examine how multi-dimensional contextual factors influence the governance structure, development orientation, and sustainability trajectory of community-based green tourism in each region. By employing qualitative data analysis using NVivo, this research contributes to the literature by advancing a comparative, context-sensitive conceptualization of green tourism linked to regional food security initiatives. The findings are expected to enrich theoretical discussions on place-based tourism development while providing evidence-based insights for policymakers to design adaptive and locally grounded green tourism strategies.

2. Literature Review

2.1. Green Tourism Contextualising

The contemporary global discourse on sustainable development is fundamentally predicated on the necessary symbiotic relationship between local economic resilience and ecological integrity. Within the rapidly growing economies of Southeast Asia, particularly Indonesia, the maturation of the green tourism sector has emerged as an indispensable, dual-purpose strategy for simultaneously augmenting local economies and rigorously fortifying regional food security frameworks (Amerta, 2019; Yuniarti et al., 2022). The established concept of green tourism fundamentally transcends mere superficial environmental compliance. It is characterized by an explicit commitment to environmental preservation, stringent social responsibility, and the delivery of tangible economic benefits to indigenous communities (Ijatuyi et al., 2025). This model mandates a structured decision-making process focused on minimising ecological footprints while simultaneously cultivating authentic, memorable visitor experiences and generating measurable socio-economic value (Hassan et al., 2022; Ijatuyi et al., 2025). Within this framework, rural agritourism represents a critical and highly relevant typology. It strategically utilizes local agricultural endowments and rural landscapes to foster robust community empowerment and directly align with broader tourism-driven development imperatives (Joshi & Dhar, 2020).

Geographically, Kulon Progo Regency has characteristics dominated by coastal zones, agricultural land, hilly areas, and rural settlements, which provide a strong foundation for environmentally and ecologically based tourism models. The development of this model includes conservation-oriented coastal tourism, agro-ecotourism villages, sustainable trekking routes, biodiversity-based attractions, and educational environmental tourism. Given that the Kulon Progo region has not received much attention for infrastructure expansion, the development of green tourism has become a key innovation in increasing tourist appeal through preventive policy design.

On the other hand, the development of green tourism is expected to encourage low-carbon infrastructure, responsible waste management systems, the integration of renewable energy, and strict environmental zoning regulations. By integrating these elements, Kulon Progo can avoid the environmental externalities often found in more mature tourism destinations. Therefore, green tourism is not merely a branding mechanism but a long-term regional development roadmap that aligns economic growth with integrated environmental management.

As a comparative location, Bantul has experienced significant tourism growth, especially in coastal and mountainous areas such as Parangtritis and Mangunan, which has encouraged local entrepreneurship, expanded small and medium-sized businesses, and strengthened the regional economy. However, increasingly intensive tourism activities have also caused environmental

pressures, including land use conversion, waste management challenges, and seasonal visitor density. This has made the green tourism model increasingly aggressive in promoting corrective and consolidative strategies aimed at reducing negative impacts and maintaining ecological sustainability in a sustainable tourism economy. Therefore, Bantul represents an example of sustainability management in a mature tourism environment, while Kulon Progo illustrates the potential for proactive green tourism design. This difference highlights the importance of adjusting sustainability strategies based on the development of each region.

2.2. Food Security

Food security, rigorously defined as the sustained, affordable access of a community to safe and nutritious food (Miles et al., 2025) is consistently rising to the forefront of national and regional development priorities. The innovative integration of tourism and agriculture is leveraged as a sophisticated mechanism to meet regional food security objectives, thus attempting to achieve a precarious yet vital equilibrium between accelerated economic growth and long-term environmental stewardship (Zheng et al., 2025). This intersection is crucial because tourism's demand for local produce can stimulate agricultural output, enhance supply chain stability, and provide premium market access for farmers, effectively turning tourism expenditure into a food security investment.

Referring to Bantul, rapid tourism growth has increased demand for local agricultural and fishery products, especially through culinary tourism along the coastal area. This dynamic provides income opportunities for farmers, fishermen, and food processors to earn weekly cash flow. However, increased demand can exceed local production capacity, potentially causing supply chain disruptions that drive dependence on external resources. On the other hand, Kulon Progo has a different structural configuration. Agriculture continues to play a central role in household livelihoods and tourism growth. This allows for more planned integration between tourism and the local food system. Through farm-to-table initiatives, agro-educational tourism, community food markets, and value-added agricultural processing, food security can be integrated into the concept of tourism. Therefore, food security in Bantul Regency functions more as a stabilization mechanism in the growing tourism economy, while food security in Kulon Progo Regency is a pillar for sustainable tourism development. This difference highlights the importance of aligning tourism expansion with agricultural capacity and long-term food system resilience for both regions.

2.3. The Lumbung Mataraman Initiative as an Integrated Model

In the Special Region of Yogyakarta (DIY), this vital theoretical convergence of sustainability, tourism, and food resilience is practically instantiated through the Lumbung Mataraman initiative. This regional programme, spearheaded by the provincial government, is explicitly conceived as an innovative mechanism to advance local food self-sufficiency (Kalurahan Mandiri Pangan) by systematically integrating agricultural production (including fisheries and livestock) with targeted, localised tourism development (Mungkhun et al., 2021). The initiative strategically focuses on enabling local communities and optimising the utilisation of indigenous resources to stimulate sustainable and equitable economic advancement (Sugiharti et al., 2023). Its implementation is deeply rooted in Javanese cultural philosophy, particularly the concept of *Memayu Hayuning Bawono* (preserving universal harmony), which underscores the model's commitment to holistic well-being (Priyadi & Wijayani, 2022; Priyadi, 2016; Wildan et al., 2021).

The integration of Lumbung Mataraman in Bantul Regency can be seen through village tourism programs that combine agricultural activities, traditional food production, and cultural experiences. The synergy between tourism and agriculture has strengthened local branding and expanded economic opportunities. However, along with the growth of an increasingly broad tourism market that reaches foreign tourists, there are challenges in shifting agricultural priorities towards commodity modernization without involving local commodities. Therefore, it is important to maintain a balance between modernization and the preservation of local commodities. Integrating traditional agricultural products, local food traditions, and community-based farming practices into tourism activities can help ensure that tourism development continues to support local identity, cultural heritage, and sustainable rural livelihoods.

On the other hand, the integration of Lumbung Mataraman Kulon Progo offers a strategic blueprint for harmonizing agricultural production and tourism development in an integrated manner, considering that green tourism development has not been carried out on a large scale by the local government. Grouping rice fields, fisheries systems, livestock management, and food processing

centers into multifunctional tourism centers can generate diverse income while maintaining agricultural land use. Visitors can observe and directly participate in farming, fish cultivation, livestock raising, and traditional food processing activities, creating interactive tourism experiences that also support local farmers and small-scale producers. In addition, the development of supporting facilities such as local markets, restaurants using local ingredients, and homestays can further strengthen the economic impact of this integrated model. Educational tourism programs focusing on sustainable agricultural techniques and local food traditions can strengthen this integration in a productive and sustainable manner. Such programs not only enhance visitors' awareness of environmental sustainability and local culture but also help preserve traditional knowledge and farming practices. In the long term, this integrated approach can support rural economic resilience, encourage community participation, and promote sustainable tourism development that balances economic growth with environmental and cultural preservation.

2.4. Collaboration Governance

Collaborative governance is commonly understood as a governance arrangement in which public decision-making and policy implementation are conducted through direct interaction among multiple stakeholders beyond the state, emphasizing deliberation, consensus-building, and shared responsibility. Rather than relying on hierarchical authority, this approach addresses complex public issues by facilitating negotiation among autonomous yet interdependent actors, enabling collective problem-solving and joint ownership of policy outcomes (Ansell & Gash, 2008). In this sense, collaborative governance is particularly relevant for development contexts characterized by cross-sectoral interdependence, such as green tourism and community-based food security initiatives.

By embedding collaborative governance within the PESTEL framework, this research examines how political commitment, economic incentives, social capital, technological support, environmental management, and legal arrangements jointly influence the effectiveness of collaboration in each region. The comparative perspective allows the study to move beyond program description by explaining why similar policy initiatives produce divergent green tourism development trajectories. Through this approach, the study contributes to the refinement of collaborative governance models that are sensitive to local institutional conditions and capable of supporting sustainable, food security-oriented green tourism development.

Tourism development in Bantul Regency is relatively advanced with cross-sector collaboration among stakeholders, including local government, tourism associations, entrepreneurs, community groups, and investors. The coordination and synergy of these stakeholders requires institutional mechanisms that can balance economic aspirations with existing environmental issues. Collaborative policies that can be emphasized include participatory planning forums, transparent enforcement of regulations, and cross-sector policy integration to maintain sustainability in a productive long-term tourism landscape.

On the other hand, Kulon Progo Regency faces unique governance challenges, including limited fiscal capacity and the need to stimulate investment in local tourism development. Essentially, collaborative governance serves as a proactive tool for consensus building and capacity building. Through the involvement of village administrations, farmer cooperatives, micro-enterprises, tourism groups, and environmental organizations in the early stages of planning, it is possible to create harmony between tourism and environmental sustainability.

3. Method

3.1. Qualitative Analysis

This study uses qualitative analysis methods that aim to understand the phenomena experienced by the research subjects, in terms of behavior, perceptions, motivations, actions, and others holistically, through descriptions in the form of words and language, in a specific natural context, and by utilizing various scientific methods (Moleong, 2017). A qualitative approach is employed to capture governance dynamics, stakeholder interactions, and contextual factors that shape green tourism and food security integration at the local level. The comparative design allows the study to systematically identify similarities and differences between the two regencies under the same policy framework, thereby addressing the research objective of explaining divergent development trajectories rather than merely describing program implementation.

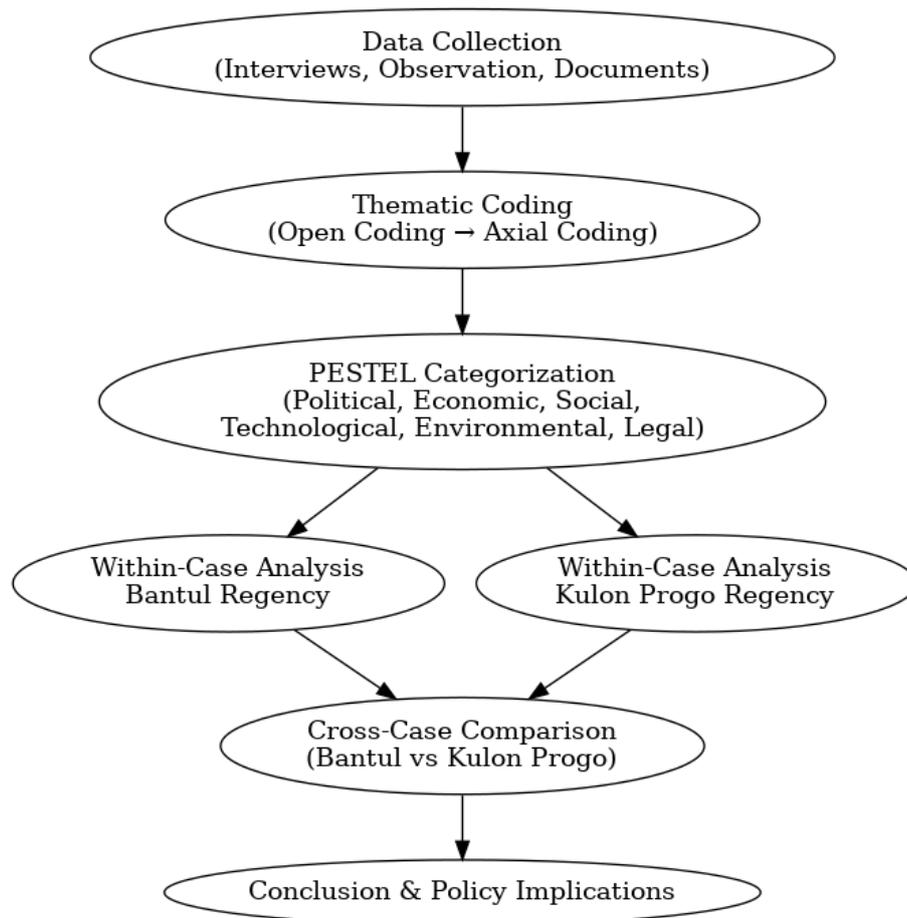


Figure 2. Stage of Data Analysis

Figure 2 shows the stage of data analysis, starting with the collection of data to differentiate of study between Bantul and Kulon Progo for cross-case comparison. The main location of this research was conducted at the Lumbung Mataraman Kulon Progo and Bantul to understand the actual conditions and to explore and map its potential. The data sources used were primary data obtained through observation and in-depth interviews with informants. The qualitative data obtained will be used to understand the actual conditions of Lumbung Mataraman in Bantul and Kulon Progo Regencies within the green tourism model.

3.2. Data Sources and Key Respondent

This study employs purposive sampling. Purposive sampling determines the number of informants deemed most suitable based on the criteria selected for the research (Ahmad & Wilkins, 2024). This technique was employed to deliberately identify individuals who possess critical knowledge and direct involvement in the implementation of green tourism and food security initiatives under the Lumbung Mataraman program. Given the comparative qualitative case study design adopted in this research, purposive sampling was considered the most appropriate approach to obtain analytically rich and context-specific data rather than broad numerical representation. Informant selection was based on several substantive criteria include:

1. Selected participants were required to occupy strategic or functional positions within village governance structures or program management related to Lumbung Mataraman.
2. Informants needed to be actively engaged in key domains relevant to the study, such as green tourism operations, agricultural and food production systems, environmental and waste management practices, or community-based economic activities.
3. Informants were expected to have sufficient experiential insight and decision-making capacity to articulate governance processes, collaborative arrangements, and implementation constraints across political, economic, social, environmental, and institutional dimensions. These criteria ensured that the data collected were directly aligned with the analytical focus of the study.

Table 1. The Respondent Categorization

| No | Informant | Position | Role of Informant | Regency |
|----|-----------------|---------------------------|--|------------------|
| 1 | Key Informant 1 | State Civil Apparatus | Information related to the governance of the Mataraman granary | Bantul, DIY |
| 2 | Key Informant 2 | Head of TPS3R Go-Sari | Information related to the waste management system | |
| 3 | Key Informant 3 | Village Clerk | Information related to green educational tourism and village potential development | Kulon Progo, DIY |
| 4 | Key Informant 4 | Head of Gulurejo Village | Information related to agriculture and animal husbandry | |
| 5 | Key Informant 5 | Head of Gulurejo GAPOKTAN | Information related to sustainable green tourism models | |

Source: author calculation

Table 1 shows the categorization for each respondent in Bantul and Kulon Progo. The study involved five informants drawn from two regencies. Although limited in number, these participants were intentionally chosen as key informants whose roles span multiple aspects of program planning, coordination, and execution. In qualitative comparative research, a smaller number of strategically positioned informants is methodologically justified when the objective is to achieve depth, coherence, and analytical rigor. Each informant contributed detailed and interconnected perspectives across several PESTEL dimensions, thereby enabling a structured and comprehensive comparative analysis between Bantul and Kulon Progo without compromising the validity of the findings.

3.3. Data Validity and Triangulation Procedure

To ensure the credibility and trustworthiness of the qualitative findings, this study implemented triangulation as an empirical validation procedure rather than a normative description. Triangulation was conducted throughout the data collection and analysis stages to cross-check consistency and reduce interpretive bias (Morgan, 2024). Source triangulation was applied by comparing information obtained from different categories of informants, including village officials, program managers, and community representatives in both Bantul and Kulon Progo Regencies. Data related to governance arrangements, green tourism activities, and food security practices were examined across these informants to identify convergent and divergent perspectives within and between cases. This process enabled the researcher to verify key themes and ensure that interpretations were not based on a single viewpoint.

Method triangulation was conducted by cross-referencing interview data with direct field observations and relevant program documents. For instance, statements regarding tourism activities, waste management practices, and agricultural production were compared with on-site observations and official records to confirm their empirical consistency. This triangulation was carried out during and after fieldwork to refine emerging themes and strengthen analytical rigor. The outcome of the

triangulation process was the identification of recurring and consistent patterns across data sources, which formed the basis for the thematic categories used in subsequent analysis.

3.4. Data Analysis Technique

This study employs the Miles and Huberman interactive data analysis model, complemented by cross-case synthesis to support the comparative research design (Elfira & Santosa, 2023; Naeem et al., 2024). Data analysis followed three iterative stages with NVivo: data reduction, data display, and conclusion drawing and verification. During the data reduction stage, interview transcripts, observation notes, and documents were systematically coded to identify relevant concepts related to green tourism development and food security. The coding process followed a thematic approach, in which emerging codes were organized into broader categories aligned with the PESTEL framework. This stage aimed to condense raw data into analytically meaningful units while preserving contextual depth.

In the data display stage, reduced data were organized into code comparison between Bantul and Kulon Progo. These displays enabled the researcher to examine similarities and differences across cases and across PESTEL dimensions in a structured manner. The final stage involved drawing conclusions and verifying findings by continuously revisiting the data and theoretical framework. Interpretations were refined through iterative comparison between empirical evidence and relevant concepts from green tourism, food security, and collaborative governance literature. Cross-case synthesis was employed to explain why and how differences in governance and contextual factors contributed to divergent green tourism development models in the two regencies.

3.5. Coding Process and Theme Development

The qualitative analysis followed a thematic coding procedure conducted in three interrelated stages: open, axial, and selective coding. During the open coding stage, interview transcripts, observation notes, and supporting documents were examined line by line to identify initial concepts emerging directly from the field data. These codes reflected empirical issues such as governance coordination, community participation, production practices, environmental management, and institutional constraints, without being constrained by predefined categories. In the axial coding stage, related codes were systematically grouped by identifying relationships among categories (Allsop et al., 2022).

3.6. PESTEL Analysis

PESTEL (Political, Economic, Socio-cultural, Technological, Legal, and Environmental) analysis aims to provide a method that makes it easier for researchers to obtain a comprehensive perspective of various aspects that can be used to compare the potential processes of each field, in order to then monitor macro and micro factors before making decisions (Trang et al., 2023). PESTEL analysis plays an important role in enhancing the sustainability of strategic development in the Lumbung Mataraman area and is used as a qualitative model by presenting an overview of each aspect to determine the direction of policy or strategic management of potential issues (Medne & Lapin, 2022; Uztürk, 2023).

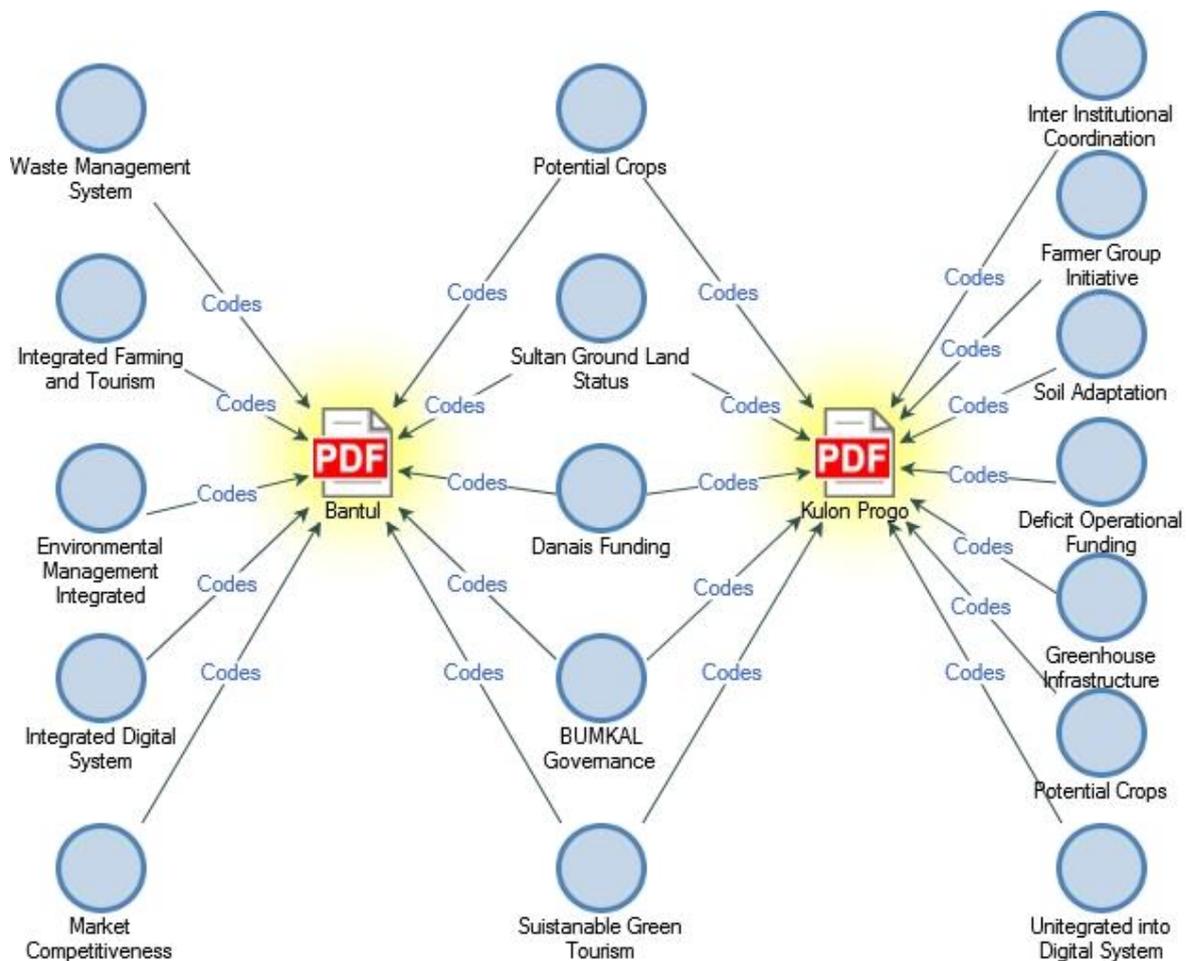
Table 2. PESTEL Analysis Criteria

| PESTEL Dimension | Analytical Indicators | Primary Data Sources |
|------------------|--|--|
| Political | Policy alignment, inter-village coordination, institutional support | State Civil Apparatus, Village Clerk |
| Economic | Commodity diversification, tourism value chains and local income circulation (cash flow) | Head of Gulurejo GAPOKTAN, Head of Gulurejo Village |
| Social | Community participation, collaboration mechanisms, social acceptance | Village Clerk, Head of Gulurejo GAPOKTAN, Head of Gulurejo Village |
| Technological | Use of agricultural technology, tourism-supporting tools | State Civil Apparatus, Village Clerk, Head of TPS3R Go Sari |
| Environmental | Waste management practices, ecological integration | Head of TPS3R Go Sari, Head of Gulurejo GAPOKTAN |
| Legal | Food security, tourism regulations and enforcement mechanisms | All Informants |

In this study, PESTEL analysis is employed not as a descriptive framework, but as an analytical tool to systematically compare the development of Lumbung Mataraman based green tourism in Bantul and Kulon Progo Regencies as in Table 2. The application of PESTEL is explicitly aligned with the research objective of identifying similarities and differences in governance structures, development orientations, and contextual constraints across the two localities. Each regency constitutes a unit of analysis, while the comparison is conducted across six PESTEL dimensions using empirically derived indicators. The analytical procedure begins with thematic coding of qualitative data obtained from interviews, observations, and documents. Initial codes emerging from the field were inductively generated and subsequently organized into thematic categories. These themes were then mapped onto the Political, Economic, Social, Technological, Environmental, and Legal dimensions based on their substantive relevance. This process ensured that PESTEL themes were grounded in empirical evidence rather than predefined assumptions. Cross-case comparison was conducted by examining how each PESTEL dimension manifested differently in Bantul and Kulon Progo.

4. Results and Discussion

Figure 3 explains the relationship between policy, economic, and social dimensions related to the development of sustainable green tourism, with a comparison between Bantul Regency and Kulon Progo Regency.



Note: data processed with Nvivo.

Figure 3. Comparison Codes Between Bantul and Kulon Progo

4.1. Political Dimension: Policy Consistency and Collaborative Governance Dynamics

The political dimension constitutes a critical institutional foundation for green tourism development within the Lumbung Mataraman framework. NVivo-based coding results (Figure 3) indicate that Bantul exhibits stronger policy consistency and governance coordination compared to Kulon Pro Go. Dominant political themes in Bantul are closely linked to the effective mobilization of

the Special Privilege Fund (Dana Keistimewaan) and the active role of village-owned enterprises (BUMKAL) in program execution. This dedicated autonomy fund is indispensable for ensuring the enduring continuity of the green tourism development initiative. The strategic direction appears predominantly steered by the mandate for effective waste management, securing financial aid, and empowering the village economic organizations, known as Badan Usaha Milik Kalurahan (BUMKAL). The development strategies employed include fundraising, collaboration with external partners, and community engagement. This governance pattern reflects the principles of collaborative governance, where public institutions and local stakeholders jointly negotiate objectives, allocate resources, and coordinate implementation through consensus-oriented mechanisms (Ansell & Gash, 2008).

Political support is a fundamental element in Kulon Progo, primarily through the allocation of the Special Privilege Fund and governmental policy direction same as Bantul Lumbung Mataraman. The Lumbung Mataraman project received the Danais especially known as Special Privilege Fund, managed by local farmer groups. Nonetheless, the initiative is also sensitive to policy volatility; a revision in the central government's food security policy disrupted initial plans to secure subsequent funding from Village Funds for 2025. NVivo references frequently highlight funding delays and policy adjustments following changes in national food security priorities. Such instability weakens institutional coordination and constrains long-term planning. This finding aligns with collaborative governance theory, which emphasizes that fluctuating policy environments can undermine trust, participation, and sustained collaboration among stakeholders (Emerson & Nabatchi, 2015). The comparative evidence suggests that political alignment across governance levels is essential for translating green tourism policies into effective local practices.

4.2. Economic Dimension: Diversified Circular Economy versus Commodity-Oriented Agritourism

Economic analysis reveals substantial divergence between the two regencies. In Bantul, NVivo coding dominance (Figure 3) under economic indicators reflects a diversified local economy supported by BUMKAL-managed enterprises, waste management services, tourism events, and MSME activities. The BUMKAL functions as the principal organizational entity responsible for orchestrating village-level economic activities, encompassing various business units such as waste management, retail kiosks, livestock, maggot/scrap sales, and educational tours. While income generation is currently dominated by the waste management sector, the overall profitability is structurally linked to the core activities of the Lumbung Mataraman. This configuration corresponds with green tourism literature emphasizing that sustainable tourism should generate economic value through integrated and circular systems rather than isolated activities (Hassan et al., 2022; Ijatuyi et al., 2025). By linking tourism with environmental services and community enterprises, Bantul reduces economic dependence on agriculture alone, thereby strengthening rural resilience. However, the economic facet faces notable hurdles especially products from Micro, Small, and Medium Enterprises (MSMEs) struggle with diminished competitiveness, stemming from issues with pricing, product quality, and a deficit of adequately trained staff. In addition, the primary agricultural products comprise rice, corn, and other types of cereal crops can be found in traditional market activities and in a holistic agricultural approach that incorporates education with economic goals.

Economic activities in Kulon Progo are heavily concentrated in the agricultural and livestock sectors, relying on a combination of external subsidies and communal self-funding. The prevailing activities are longan and grape cultivation, which signals a current lack of diversity in the agricultural commodity base. Longan and grape cultivation dominate agricultural activities, suggesting that the development of agricultural commodities is limited and needs diversification to produce a greater range of crops. NVivo findings indicate limited diversification into downstream tourism services or broader value chains. While such plantation-based agritourism contributes to local income, it remains vulnerable to climate variability and market fluctuations. This supports arguments in the literature that tourism-agriculture integration must extend beyond monoculture systems to enhance economic sustainability and food security (Zheng et al., 2025).

4.3. Social Dimension: Institutionalized Participation and Grassroots Social Capital

Social participation is a key component of community-based green tourism. In Bantul, NVivo coding patterns (Figure 3) shows that social participation is largely institutionalized through BUMKAL, which facilitates coordinated participation in tourism activities, educational programs, and environmental initiatives. This structured participation supports collective capacity building and is in

line with agrotourism studies that highlight the importance of organized community involvement in maintaining sustainable tourism development. However, in the social aspect, there is no community group that has emerged as a massive manager of Lumbung Mataraman. This is evidenced by the absence of community participation codes (Joshi & Dhar, 2020).

Kulon Progo presents a contrasting social configuration. social participation is predominantly driven by farmer groups (GAPOKTAN) and collective self-financing initiatives. NVivo findings demonstrate strong local ownership and social cohesion, which are key assets for rural empowerment. Community groups and local initiatives, such as GAPOKTAN, run independently through group contributions and different financing methods, which involve setting aside funds for high-quality items (Anggraeny et al., 2022). Tourism diversification covers agrotourism, goat farming, educational grape cultivation, nature excursions, and local batik centers. In addition, the diversification of local food products is crucial for achieving regional food sovereignty (Oliver et al., 2022). However, the limited integration of these social initiatives into broader tourism planning constrains their multiplier effects. This observation resonates with studies emphasizing that social capital must be strategically linked to tourism systems to maximize community benefits (Amerta, 2019; Yuniarti et al., 2022).

4.4. Technological Dimension: Infrastructure Support and Adaptive Capacity

Technological capacity functions as a strategic enabler of green tourism development. Bantul exhibits higher technological integration, particularly in waste processing facilities, agricultural support infrastructure, and digital connectivity. NVivo coding highlights (Figure 3) the role of technology in enhancing operational efficiency and environmental management. These findings are consistent with green tourism frameworks that emphasize the adoption of appropriate technologies to minimize environmental impacts while improving visitor experiences (Hassan et al., 2022; Ijatuyi et al., 2025). The technological dimension primarily relates to the physical infrastructure required to support the dominant waste management component. Key operational impediments include the deterioration of machinery and vehicles essential for waste processing and suboptimal irrigation systems for agricultural activities. The strategic development has included investments in technological infrastructure, such as constructing a compost production facility and a TPS3R hangar, signaling a commitment to upgrading waste processing capacity. However, formalized cooperative agreements with agencies like KOMINFO Free WiFi integrated multiple sectors into developing area in Lumbung Mataraman.

In Kulon Progo, technological limitations remain a significant constraint. Restricted access infrastructure, irrigation challenges, and vulnerability to climatic conditions hinder both agricultural productivity and tourism accessibility. The relatively low intensity of technological coding suggests that technology has not yet been fully embedded as a development driver. Based on the results of Nvivo coding, it is clear that there is currently no digital technology capable of supporting Lumbung Mataraman Kulon Progo. This reinforces existing literature that identifies technological readiness as a key determinant of rural tourism competitiveness (Alonso et al., 2024; Khasanah & Kurniawan, 2024; Xu & Zhao, 2024).

4.5. Environmental Dimension: Integrated Sustainability Practices and Ecological Constraints

Environmental sustainability is central to the concept of green tourism. In Bantul, NVivo findings (Figure 3) indicate a relatively integrated environmental system linking agriculture, livestock, and waste management. Practices such as waste reuse and environmental education demonstrate the practical application of sustainability principles rather than symbolic compliance. The management of waste is a primary programmatic pillar within the Lumbung Mataraman initiative. Operationally, the development is founded on an environmentally benign symbiotic paradigm also agriculture, livestock and waste, which underpins its sustainability principles. Staple agricultural commodities include rice, corn, and other cereal crops. However, the environmental context poses difficulties, notably the insufficient quality of the irrigation network and logistical constraints impacting the waste transfer station (TPS). Formalizing partnerships with the Environmental Agency was a specific component of the multi-year development plan, reinforcing the commitment to addressing ecological concerns. The main challenges and obstacles faced by Lumbung Mataraman in Bantul Regency primarily revolve around waste management and the low competitiveness of MSME products. Significant challenges in waste management are evident in the damage to machinery and vehicles, which disrupts operations, and suboptimal irrigation systems (Ferronato & Torretta, 2019). This aligns with green tourism studies that view environmental integration as a mechanism for balancing tourism growth with ecological conservation (Hassan et al., 2022).

Kulon Progo, however, faces pronounced environmental challenges. NVivo coding (Figure 3) frequently references soil limitations, climate exposure, and livestock adaptation issues. Environmental constraints represent a major barrier for this agriculture-centric model. The primary challenges include poor soil quality and unpredictable severe weather conditions, which have led to repeated crop failures (Naorem et al., 2023). Although environmental awareness exists, sustainability practices remain reactive and context-dependent. In addition, findings based on Nvivo coding show that there is agricultural support infrastructure such as greenhouses and grape trellises that serve to balance the environmental ecosystem in Lumbung Mataraman and can be used as agricultural educational tourism sites. These findings support research highlighting that environmental vulnerability can undermine agritourism and food security initiatives if not addressed through adaptive strategies (Miles et al., 2025; Zheng et al., 2025).

4.6. Legal Dimension: Regulatory Clarity and Institutional Effectiveness

Legal and regulatory frameworks shape the operational environment of green tourism initiatives as seen in Table 3. In Bantul, clearer institutional roles and formalized authority structures particularly through BUMKAL facilitate regulatory compliance and long-term planning. NVivo coding suggests that legal clarity enhances governance effectiveness by reducing administrative uncertainty (Emerson & Nabatchi, 2015).

Table 3. PESTEL Comparison of Green Tourism Development in Bantul and Kulon Progo

| PESTEL Indicator | Bantul Regency | Kulon Progo Regency | Comparative Interpretation |
|------------------|---|---|---|
| Political | Strong institutional support through Danais, structured BUMKAL governance and stable coordination with local government | Policy support is available but is marked by delays in funding and policy changes that affect the sustainability of the Lumbung Mataraman | Bantul shows mature governance capacity, while Kulon Progo requires stronger policy alignment and funding synchronization |
| Economic | Diversified local economy driven by waste management revenue, event-based tourism, and BUMKAL business units | Economy relies mainly on fruit-based agrotourism (longan and grape) with limited value-chain integration | Bantul reflects a circular economy model; Kulon Progo needs economic diversification and market expansion |
| Social | Community participation present but uneven; tourism activities more institution-led | Strong grassroots initiative through GAPOKTAN and high community ownership | Kulon Progo excels in social embeddedness, while Bantul needs deeper community-driven engagement |
| Technological | Advanced adoption of waste-processing machinery, digital access such as public Wi-Fi and supporting infrastructure | Limited technological capacity; infrastructure frequently damaged by environmental conditions | Technological readiness distinguishes Bantul; Kulon Progo requires basic agri-tourism technology investment |
| Environmental | Integrated zero-waste system and agriculture livestock symbiosis supporting sustainability | High environmental vulnerability due to soil infertility, climate exposure, and livestock adaptation issues | Bantul demonstrates applied green tourism principles; Kulon Progo needs climate-resilient environmental strategies |
| Legal | Clear legal framework supporting BUMKAL operations and Danais utilization | Administrative fragmentation and procedural uncertainty in funding mechanisms | Legal certainty strengthens Bantul’s model; Kulon Progo requires regulatory streamlining |

Source: data processed

Furthermore, Furthermore, the status of sultan ground land ownership in both Bantul and Kulon Progo proves that Lumbung Mataraman is a vehicle for local economic development. The legal framework depends on the use of Special Autonomy Funds and the official status of local community organizations in Kulon Progo. Lumbung Mataraman's acceptance of funds confirms its operation under a legally regulated regional funding mechanism. The initial and ongoing operational body is a formal community group, GAPOKTAN, but the project faces legal and administrative constraints and suboptimal financial support from the Village Fund (deficit fund). This provides a strategic focus on empowering local institutions and forming stronger cross-sector collaborations with government entities as a direct response to creating a more stable legal and institutional foundation for sustainable development. The comparative analysis demonstrates that similar regulatory frameworks can yield different outcomes depending on institutional capacity and implementation effectiveness, a point emphasized in governance and rural development literature (Amerta, 2019; Ansell & Gash, 2008).

5. Conclusion

This study shows that the development of green tourism based on the Lumbung Mataraman initiative follows different paths in Bantul and Kulon Progo districts, influenced by different configurations of Political, Economic, Social, Technological, Environmental, and Legal (PESTEL) factors. A comparative analysis confirms that the results of green tourism are not determined solely by program design, but by the capacity of governance, institutional coordination, community capacity, and sectoral integration at both the local and central levels. The development of green tourism in Bantul Regency reflects a governance-driven model, where cross-sectoral collaboration facilitates integration between agriculture, waste management, and educational tourism, demonstrating how political coordination and social participation strengthen environmental goals and economic diversification. In contrast, the development of green tourism in Kulon Progo Regency presents a model that tends to be driven by local commodities, where economic activities are concentrated on plantation-based agrotourism, demonstrating weaker integration between social, technological, and environmental dimensions, as well as higher vulnerability to sectoral dependence.

These findings address the research objectives by explaining why similar policy frameworks produce different development patterns in different regions. From a theoretical perspective, this study expands the literature on green tourism and food security by empirically demonstrating that PESTEL dimensions function as interacting governance mechanisms rather than independent factors. This reinforces the relevance of context-sensitive and location-based approaches in analyzing community-based tourism, economic, and environmental initiatives. Practically, comparative insights suggest that elements of Bantul's integrative governance model, particularly inter-village collaboration and environmental management practices, could serve as a reference for diversification strategies in Kulon Progo, while Kulon Progo's commodity specialization highlights the need to strengthen local supply chains in Bantul.

Based on these findings, policies that can be proposed based on this research include: a). strengthening political and institutional coordination between villages and the district level to ensure cross-sector integration, b). increasing economic diversification through locally-rooted value chains to reduce dependence on commodities, c). strengthening social participation and human resource capacity to support innovation, and d). aligning environmental management and legal frameworks with sustainable tourism development objectives. This study has limitations related to the number of informants and the local context of the research. The participation of five key informants in two districts may limit the breadth of perspectives that can be captured. This was done to focus on in-depth analysis for comparative studies rather than mere statistical generalizations. The selected informants held strategic positions that enabled them to provide comprehensive insights across various analytical dimensions. Furthermore, these findings are contextual and dynamic to the Lumbung Mataraman initiative and may not be directly generalizable to other regions without considering different institutional and socio-economic conditions.

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