

Model for Green Tourism Development Based on the Lumbung Mataraman Concept in the Special Region of Yogyakarta

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Abstract

benefits for local communities. This study examines the development of eco-friendly tourism through the Lumbung Mataraman initiative in the Special Region of Yogyakarta, which encompasses three regencies Gunungkidul, Bantul, and Kulon Progo as well as one government agency, the Yogyakarta Provincial Department of Agriculture and Food Security. The research focuses on a vital issue: how village-level food security programmes can be incorporated into sustainable tourism practices that take into account local environments. The objective is to examine the concept of food self-sufficiency at the village level through the use of home gardens for agriculture, livestock, and aquaculture based on local wisdom, as well as the conservation of vegetation native to the DIY Province. The data was analyzed using a qualitative research design, with NVivo supporting the process in conjunction with interviews and focus group discussions with all stakeholders in Lumbung Mataraman. The research suggests that each region has unique potential, encompassing agro-tourism, waste management projects, and local economic businesses. Constraints such as underdeveloped infrastructure, limited human resource capacity, and restricted agricultural diversity continue to exist. The research findings indicate that Lumbung Mataraman initiative provides a distinctive framework for the development of green tourism by integrating food production, environmental management, local cultural assets, and community participation into an integrated rural development strategy. These findings have practical implications for policymakers and local stakeholders seeking to enhance rural development through an integrated approach to food security and tourism.

Keywords: Green Tourism, Lumbung Mataraman, Food Security, Sustainable Tourism.

JEL classifications: Q56, Q18, R58, Z32, O18

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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 (Yuniarti et al., 2022; Amerta, 2019; Votsi et al., 2014). Green tourism often integrated with ecotourism and sustainable tourism is anchored in the Triple Bottom Line framework, which posits that tourism development must balance three core pillars: economic viability, environmental conservation, and socio-cultural integrity. 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 communities (Ariyani et al., 2023). Environmental conservation, social responsibility, and economic benefits for local communities are prioritised in green tourism initiatives (Ijatuyi et al., 2025). 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). 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.

The provincial government of DIY has launched the Lumbung Mataraman initiative as an integrated rural development program that combines food security with tourism. Although its objectives align with holistic approaches such as agrotourism clusters, ecological village models, and integrated food tourism systems, Lumbung Mataraman adopts a community-based framework. Rather than focusing solely on tourism activities or agricultural production, this program integrates crop cultivation, fisheries, livestock farming, local culinary experiences, cultural heritage, and community participation into a single, integrated development system. This integrated approach not only strengthens local food security but also creates educational and recreational tourism experiences that generate economic opportunities while supporting environmental sustainability and preserving local traditions. (Mungkhun et al., 2021). The initiative comes from concentrates on enabling local communities and utilizing local resources to foster sustainable and equitable economic growth.

In 2022, two pilot sites were established in Semin, Gunungkidul Regency, and Sendangsari, Kulon Progo Regency, with support from the Dana Keistimewaan a special regional funding mechanism created to protect Yogyakarta's autonomy and cultural heritage (Jati, 2022). The initiative was expanded to five more locations in Bantul and Kulon Progo regencies in 2023, chosen for their well-prepared institutions and high levels of community involvement in rural innovation. The Department of Agriculture and Food Security of the

Special Region of Yogyakarta stated that there are currently 55 Lumbung Mataraman sites spread across various villages throughout the DIY region, and that these will be further expanded in the future to meet the community's food needs. One example is the village of Wukirsari, where a 5,000 m² Lumbung Mataraman site serves as a hub for livestock, aquaculture, and crop farming. This initiative represents one of the strategic steps the DIY Provincial Government can take to advance local food security (Harian Jogja 2025; Portal Pemerintah DIY 2026).

Gunungkidul, one of the participating regencies, has made notable progress, capitalizing on its rich cultural heritage, traditional arts and crafts, diverse culinary traditions, and organic farming methods (Atmaji & Qodir, 2021). While progress has been made, several challenges persist in fully implementing the green tourism model. The challenges include inadequate infrastructure and transportation access, insufficient connections to renewable energy systems, underdeveloped digital tourism platforms, and the necessity for innovation in promoting cultural and creative industries (Cornellia et al., 2025). Sleman Regency was left out of this study because it had recently started putting the Lumbung Mataraman framework into action. Despite Sleman's well-established reputation for tourism infrastructure and agricultural productivity, the integration of these sectors into a comprehensive food-security-tourism model is still in its early stages of development. The lack of institutional initiatives or pilot projects aligned with the Lumbung Mataraman approach justified its exclusion from this analysis.

This **study aims** to explanation about green tourism which is based on the Lumbung Mataraman initiative and investigates the essential factors enabling the integration of green tourism with food security and rural development in the regencies of Gunungkidul, Bantul, and Kulon Progo, where the Lumbung Mataraman model has achieved notable success, providing insights for future expansion. The effective implementation of the Lumbung Mataraman framework has the potential to yield widespread economic benefits for local communities while fostering sustainable tourism practices. The **concept of green tourism** places greater emphasis on environmentally responsible tourism practices, including resource conservation, ecosystem protection, and the promotion of low-impact tourism activities. In this study, the theoretical framework of green tourism was adopted as the primary perspective because the development of Lumbung Mataraman is fundamentally based on environmentally friendly agricultural activities, natural resource conservation, and community-based environmental management, while also contributing to broader sustainable tourism goals.

Conceptualizations of rural tourism largely analyze agrotourism, community-based tourism, ecotourism, or sustainable rural development as separate spheres of analysis (Yanan et.al, 2024). As a result, the depth of understanding regarding how integrated agricultural systems, food security, institutional governance, environmental management, and tourism development are interconnected remains limited within the conceptual framework. The primary theoretical contribution of this study lies not in rural tourism theory, but in expanding the existing literature on green tourism through conceptual integration. This research is proposed study conceptualizes green tourism as an integrated

rural development system in which sustainable agriculture, food security, local institutions, community participation, and cultural preservation operate as mutually reinforcing components.

A literature review was undertaken to underpin the theoretical basis of green tourism in this investigation. Priyadi and Wijayani (2022) demonstrated that the implementation of healthy tourism villages, initiated post-Covid-19 pandemic, successfully revitalised the previously disrupted tourism sector. The healthy tourism village model in Pulewulung has been enhanced through initiatives like environmental disinfection in tourist areas, strict adherence to hygiene standards, the production of handwashing soap, and key improvements in institutional governance, human resource management, and infrastructure, resulting in improved quality of life and the long-term sustainability of tourism village development. Similarly, Abdullah et al. (2023) explored the application of an "IoT-based farm robot" to enhance resource utilisation and overall productivity in aquaculture resilience in Yogyakarta. This approach minimizes dependence on manual labor by incorporating robotics, automation, and precision methods into fish farming. Adopting circular economy principles also encourages sustainable practices, reduces waste, and enhances resource utilisation efficiency.

The conceptual framework provides solutions that empower local communities to tackle modern challenges, such as the pandemic based on the circular economy, all while promoting sustainable aquaculture and its resilience. Despite this promising trend, many tourism villages still encounter persistent barriers, such as inadequate infrastructure, limited human resource capabilities, and insufficient understanding among local communities and stakeholders regarding the implementation of tourism principles. These conditions reveal an important gap in the literature concerning how technological innovation and sustainable management practices can be effectively integrated to enhance the development and long-term resilience of green tourism.

The novelty of this research lies in the integration of food security, integrated farming systems, local cultural values, and community-based tourism into a single conceptual framework that supports both environmental sustainability and rural economic resilience. This model expands the literature on green tourism by demonstrating that integrated farming systems can serve as a foundation for tourism development, environmental sustainability, and local food security.

2. RESEARCH METHOD

2.1 Qualitative Analysis

This study uses a qualitative research approach to examine the experiences of research participants, including their behaviors, views, motivations, and actions in a comprehensive way. Data were gathered through descriptive accounts expressed in words and language, situated within particular natural settings, and corroborated by diverse scientific techniques (Lim, 2025). The research primarily took place at the Lumbung Mataraman sites in Gunungkidul, Kulon Progo, and Bantul regencies, and also at the Yogyakarta Provincial Agriculture and Food Security Agency, in order to investigate the actual circumstances of the

Lumbung Mataraman initiative and to pinpoint and document its potential within the green tourism framework. The stages of data analysis in this study are shown in Figure 1 below.

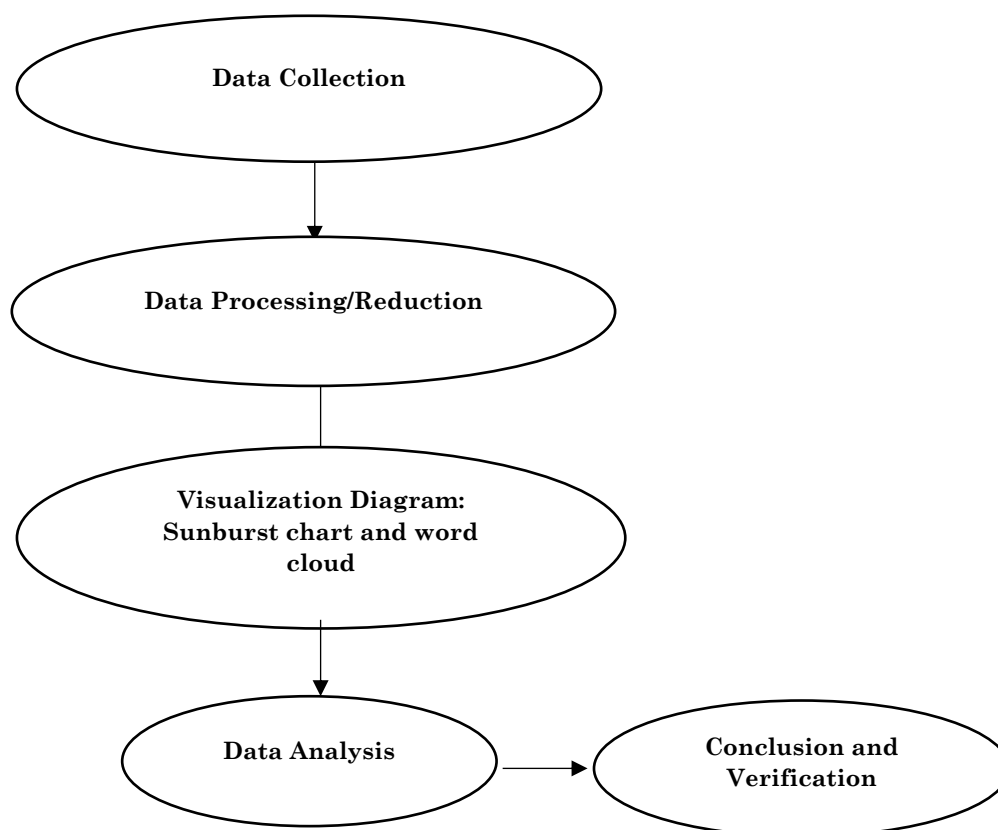


Figure 1. Stage of Data Analysis with Nvivo 12

2.2 Data Sources and Respondent

The primary data were collected via observations and in-depth interviews with informants. The qualitative data were employed to evaluate the current status of the Lumbung Mataraman initiative in Gunungkidul, Bantul, and Kulon Progo regencies as well as the Yogyakarta Provincial Agriculture and Food Security Agency within the context of a green tourism model. The study involved three categories of informants: key informants, primary informants, and supporting informants (Nashrullah et al., 2023). This study employs purposive sampling to determine the number of informants deemed most suitable based on the criteria selected for the research (Ahmad & Wilkins, 2024; Memon et al., 2025). Informant criteria selection and categorization show in table 1.

1. Informants who hold strategic or operational roles in village governance or the management of the Lumbung Mataraman Program.
2. Informants who are actively involved in activities related to green tourism, integrated agriculture, environmental management, or community-based economic development.

3. Informants who possess in-depth and practical knowledge regarding governance mechanisms, stakeholder dynamics, and opportunities and challenges.

Table 1 The Informant Categorization

No	Informant Category	Informant	Position	Name of Regency
1	Key Informant	Key Informant 1	Farmer	Bendung,
		Key Informant 2	Farmer and the first head of Srikandi Kelompok Wanita Tani Bendung	Gunungkidul, DIY
		Key Informant 3	Head of Kelompok Wanita Tani Srikandi Bendung	
		Key Informant 4	Bendung Head of Village	
		Key Informant 5	Head of Bendung Gabungan Kelompok Tani	
2	Main Informant	Main Informant 1	State Civil Apparatus	Guwosari, Bantul, DIY
		Main Informant 2	Head of TPS3R Go-Sari	
		Main Informant 3	Village Secretary	Gulurejo,
		Main Informant 4	Gulurejo Head of Village	Kulonprogo, DIY
		Main Informant 5	Head of Gulurejo Gabungan Kelompok Tani	
3	Supporting Informant	Supporting Informant	Head of Food Security of Yogyakarta Province	Yogyakarta Provincial Agriculture and Food Security Agency

2.3 Data Validity and Triangulation Procedure

This study implemented triangulation as an empirical validation procedure rather than a normative description, which used source triangulation and methodological triangulation. Triangulation was conducted throughout the data collection and analysis stages to cross-check consistency and reduce interpretive bias. In qualitative research, verifying the accuracy of collected data is crucial for developing trust in the outcomes, as a lack of thorough validation compromises the scientific reliability of the results (Ahmed, 2024).

Source triangulation was used to compare information obtained from various categories of informants, including village officials, program managers, and community

representatives in the four study sites. Data related to governance arrangements, eco-friendly tourism activities, and food security practices were analyzed from these various informants to identify convergent and divergent perspectives within and across the case studies. This process was essential for verifying key themes and ensuring multiple interpretive perspectives.

Methodological triangulation was used to cross-check interview data with direct field observations and relevant program documents. For example, statements regarding tourism activities, waste management practices, and agricultural production were compared with field observations and official records to ensure consistency with empirical realities. This triangulation was conducted both during and after the field research to refine the emerging themes and strengthen the rigor of the analysis. The result of this triangulation process was the identification of recurring patterns and codes across all data sources, which formed the basis for the thematic categories used in subsequent analysis.

2.4 Data Analysis

The data analysis was conducted using NVivo 12 as the data processing software to analysis encompass all qualitative data, including audio recordings, interviews, interview transcripts, field notes, photographs, survey data tables, specific website content, databases, and videos (Abidin et al., 2023; Limna, 2023). The stages of the analysis are depicted in Figure 1 as follows. This research commences with the reading, examination, and analysis of data, employing the Miles and Huberman data analysis model, which encompasses the following stages:

Data Collection, the initial phase of qualitative research entails collecting data from a variety of sources, such as interviews, observations, and documentation, which were conducted in Gunungkidul Regency, Kulonprogo Regency, Bantul Regency, and Yogyakarta Agriculture and Food Security Agency. The data collected during fieldwork are then compiled into a thorough and detailed report.

Data Reduction, the data reduction phase focused on data pertaining to the socioeconomic conditions of Lumbung Mataraman, entailing a thematic analysis process for each relevant theme. At this stage, the collected data was processed and systematically selected to enhance its organisation. Utilizing NVivo 12 software enabled a more systematic reduction of data, allowing for the assignment of codes based on particular themes or categories, the analysis of inter-data connections via visualisation tools, and the detection of patterns and trends within the qualitative data.

Visualization Diagram, the reduced data was then presented in a structured format, such as tables, graphs, or diagrams, to enable further analysis. The data presentation was facilitated by utilizing NVivo 12, with the incorporation of visual formats including sunburst charts, word clouds, and matrix coding queries. Data presentation usually involves concise descriptions, charts, and diagrams illustrating the relationships between categories, accompanied by narrative text.

Drawing Conclusions or Verification, validating evidence was mainly an analytical task that entailed interpreting the data given and analysis yielded results that facilitated the achievement of the core research objectives.

2.5 Coding Process

During the data reduction phase, interview transcripts, observation notes, and documents were systematically coded to identify relevant concepts related to green tourism. Data analysis is used **reflexive thematic analysis**, facilitated by NVivo software, to analyse qualitative data collected through interviews, field observations, and documentary evidence. The reason to adopt thematic analysis was driven by the research objective, which was to identify, interpret, and synthesise recurring patterns related to the development of the Green Tourism Development Model based on the Lumbung Mataraman initiative, rather than to generate an entirely new theory from empirical data. The presentation allows researchers to examine the dynamics of the Mataraman granary at the study site from economic, social, and environmental perspectives.

3. RESULTS AND DISCUSSIONS

3.1 Overview of Lumbung Mataraman

Lumbung Mataraman model is a village development strategy that centers on local food security, aiming to boost economic independence through stabilizing food supplies, optimising village resources, and enhancing community welfare (Saraswati & Pratiwi, 2024). Also takes a holistic approach that considers the village's entire potential, encompassing its natural assets, such as agricultural and livestock output, plus its social context and human resource skills. Implementation of lumbung mataraman in advances through a series of strategic steps, incorporating formalised land use planning, upgrading village institutions' capabilities, farmer education, and developing programs that combine the food, economic, and educational tourism sectors (Danugroho et al., 2025). This model initiative represents a broader, integrated framework for rural development through the integration of food security, integrated agriculture, environmental conservation, preservation of local culture, educational tourism, and community empowerment. **The positions of Lumbung Mataraman** is an adaptive model that expands existing approaches to rural tourism by incorporating agricultural resilience and local governance into the development of green tourism. **Unlike existing global models**, which generally emphasize only a single dimension in rural tourism development, Lumbung Mataraman represents a community-based empowerment integrated with multisectoral aspect such as local food security, agricultural practices, sustainable tourism, environmental management, local culture, and tourism within a framework of sustainable village development.

3.2 Discussion

3.2.1. Green Tourism Model Based on Lumbung Mataraman in Gunungkidul Regency

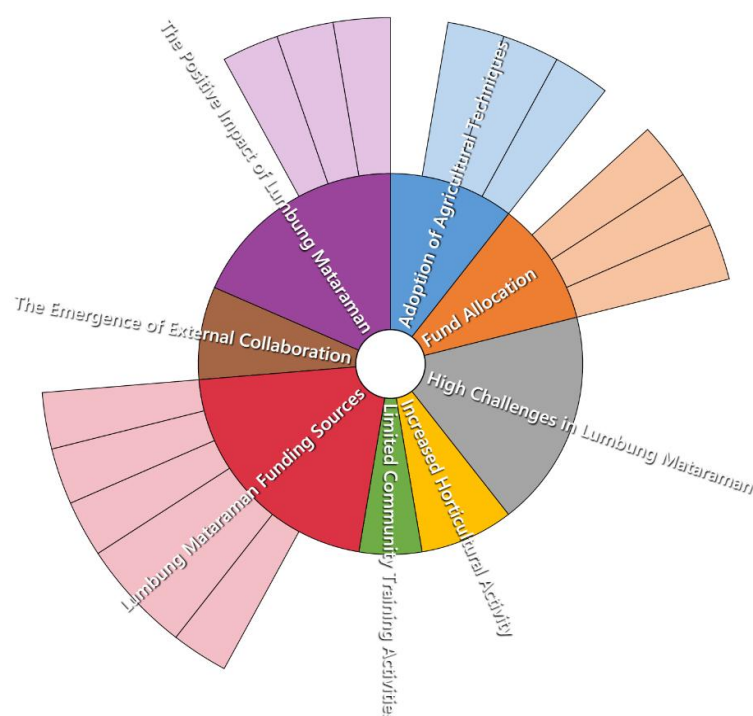


Figure 2. Sunburst Chart Lumbung Mataraman in Gunungkidul

Source: Data processed with Nvivo 12

A sunburst chart, is designed to visually represent the proportion of coding references attributed to specific themes, which are displayed as nodes or codes. A visualisation method effectively displays the biggest contributing elements within a complex hierarchical structure (Zhang & Gardiner, 2023). The illustration above depicts the thematic structure of the green tourism development initiatives linked to Lumbung Mataraman in Gunungkidul Regency. Each segment represents a primary topic or subtopic, with its size influenced by the frequency and intensity of discussion within the qualitative data.

Visitors who litter are amongst the obstacles. Although inorganic plants are relatively uncommon, they provide a beneficial alternative by reducing the quantity of organic chemicals in fertilizers. Organic fertilizers are processed materials, whereas goat manure remains a raw material. Therefore, the residue from plants that are chopped for animal feed (In-depth interview, 10 May 2025).

The Lumbung Mataraman development was found to be influenced by various factors, including management challenges, goat herding practices, and efforts to enhance community and tourist benefits, according to the interview results. Management at Lumbung Mataraman in Gunungkidul Regency employs goats as a form of educational tourism, as

noted by a previous study (Hermawan et al., 2024). The three key themes identified - 'Challenges of Lumbung Mataraman', 'Management of Goats', and 'Positive Impact of Lumbung Mataraman' - indicate that green tourism growth in the regency relies significantly on these three areas. The themes 'Source of Funds', 'Leading Commodities', and 'Technology Adoption' accounted for a significant portion of the data, with each encompassing several sub-themes. These issues are significant as they highlight the obstacles that green tourism development in Gunungkidul Regency faces, a key player in Yogyakarta Province's tourism sector. Specifically, managing financial resources, improving agricultural efficiency, and integrating technology to boost Lumbung Mataraman activities are crucial (Sugiharti et al., 2023).

a) Potential

The concept and local ecosystem of green tourism in the village are developed through integration of food barns, farming communities, and recreational activities. The integrated model prioritizes social interaction and the efficient use of local resources to foster a sustainable circular economy within the village. Funding for the programme comes from a variety of sources, including the Privilege Fund, the Cooperative Office, the Tourism Office, the Women and Children Empowerment Office, and the cash reserves held by Farmer Groups (Lubis et al., 2025). Financial resources are being allocated to support facility upgrades, capacity-building initiatives, and the overall development of the local tourism sector.

Tourism activities centered on agriculture and education, including training in digital technology, workshops on liquid fertiliser and fermentation, and educational visits to biosaka, hydroponic, and petrogenon sites, are also implemented to promote agricultural diversification and enhance the learning experiences of visitors (Sousa et al., 2024; Thakur & Arora, 2025). The primary commodities of the Lumbung Mataraman consist of shallots, cocoa, and ginger, alongside livestock activities including goat farming. These are supplemented by various processed products managed and marketed by local village small and medium-sized enterprises, thereby strengthening the village's economic resilience and sustainability.

b) Problems and Challenges

The weak regulatory framework governing ownership has a poor legal basis, leading to barriers that hinder community-based agricultural activities. Additionally, the shortage of trained personnel presents another challenge; management teams overseeing livestock enclosures and tourism activities need training in management, tourism services, and promotional tactics (Bodescu et al., 2024). The limited competitiveness of local products is also evident, with many goods facing challenges in both price and quality compared to market alternatives. Efforts to educate visitors about the cultural and economic importance of livestock pens and agricultural practices have not been fully maximized. There is a discrepancy between the tourism activities and the general public's knowledge of community-based farming practices in the local area.

The gradual development is implemented through community training, upgrading barn management facilities, stimulating the local economy, and establishing educational areas and agricultural product displays (Wijijayanti et al., 2025). Policymakers require incremental budget and programme planning as part of this process. Working together with relevant institutions, farmer groups and MSME actors can also help implement by cross-sectoral cooperation, which includes partnerships for education and promotion (Maryono et al., 2024), and technical assistance, as well as funding. Community participation is crucial, engaging GAPOKTAN, millennial farmers, and women farmer groups, as well as profit-sharing schemes and integrated agricultural, livestock, and waste management systems.



Source: Data processed with Nvivo 12

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tourism development in Lumbung Mataraman is primarily driven by effective waste management, financial support, community participation, and suitable technological integration.

3.2.2. Green Tourism Model Based on Lumbung Mataraman in Bantul Regency



Figure 4. Sunburst Chart Lumbung Mataraman in Bantul

Source: Data processed with Nvivo 12

A sunburst chart or hierarchy map is intended to visually display the proportion of coding references that are attributed to particular themes, which are depicted as nodes or codes. The visualisation technique clearly shows the biggest contributing sections within a complex hierarchical structure (Zhang & Gardiner, 2023). The figure provided demonstrates the thematic structure of green tourism development initiatives centred on Lumbung Mataraman in Bantul Regency. Key observations can be discerned from the sunburst chart. The dominant themes 'Fundraising Entrance Point' and 'Forms of BUMKAL Economic Activities' highlighted the vital role of financing and financial stability for the successful execution of the green tourism programme. The BUMKAL Business Unit consists of multiple sub-units, including waste management, kiosks, and barns, demonstrating the significant role of village institutions in providing economic functions and public services. Although they are smaller

in size, nodes promoting 'community participation' demonstrate community engagement via bazaars, MSMEs, and other social events related to green tourism. The overall hierarchy diagram illustrates how the green tourism development strategy in this region, which is based on Lumbung Mataraman, incorporates multi-sector integration such as financing, business, environment, and participation despite encountering structural and technical obstacles.

a) Potential

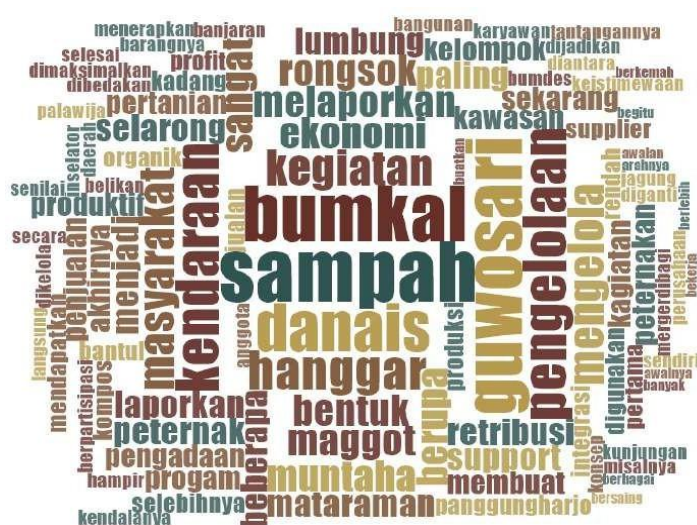
Guwosari Village's strategic location, where three Lumbung Mataraman areas are integrated, holds substantial development potential. The complex features designated areas for education, culinary experiences, historical exploration, and cultural activities, functioning as a comprehensive educational tourism experience. BUMKAL was established to coordinate rural economic activities; its business branches comprise a waste management department, a kiosk and *banjaran* division, a livestock management division, a maggot and scrap sales operation, educational excursions, charges, and waste removal. In addition, the primary agricultural products comprise rice, corn, and other types of cereal crops. Further potential can be found in traditional market activities and in a holistic agricultural approach that incorporates education with economic goals.

b) Problems and Challenges

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). Furthermore, MSME products are deemed uncompetitive due to issues with price and quality, which are exacerbated by insufficiently trained personnel.

c) Development Strategy

The development strategies employed include fundraising, collaboration with external partners, and community engagement. The six-year fundraising process for Lumbung Mataraman consisted of distinct stages, each spanning a single year: the first year focused on capital investment, the second year on the development of a maggot house, the third year on waste management, the fourth year on building a compost production facility, the fifth year on constructing a TPS3R hangar, and the sixth year on forming partnerships with the environmental agency. The project fostered community involvement and engagement by implementing a profit-sharing scheme, collaborative drum production, and an environmentally sustainable symbiotic concept (agriculture ↔ livestock ↔ waste).



Source: Data processed with Nvivo 12

At present, the largest income is generated from waste, but the profit stems from the Lumbung Mataraman. It appears there is currently no activity, but the moment a camping trip or gathering event takes place, instant profit will be generated. If the annual waste revenue exceeds 500 million, it will still be offset by substantial expenses for labour and other costs. At the TPS, we also develop a KUB for chicken and maggot cultivation. We also coincidentally received a food security programme from the central government, which accounts for 20% of the village fund, and is managed by BUMKAL for food security, agriculture, and livestock businesses this year. Subject to divine will, the plan is for implementation to reach 350 million, assuming the overall total reaches 1.7 billion (In-depth interview, 19 May 2025).

It is evident from interview that waste management is a key programme within Lumbung Mataraman. This is consistent with the NVivo word cloud visualisation, where the terms 'waste', 'BUMKal', 'management', and 'vehicle' stand out as the most prominent. The main points of discussion include waste management, BUMKal operations, and logistics problems. The specific location of the development is indicated by the terms 'Guwosari' and 'Mataraman', which is the central point of focus in the programme. The term 'danais' is also mentioned frequently, specifically in relation to 'Dana Keistimewaan'. The special autonomy funds for the Yogyakarta Special Region are crucial in guaranteeing the long-term sustainability of the Lumbung Mataraman-based green tourism development project in

Bantul Regency, as stated by DPRD Daerah Istimewa Yogyakarta in 2024. The direction of green tourism development in this area appears to be primarily driven by effective waste management, financial assistance, and the bolstering of village economic organisations.

3.2.3. Green Tourism Model Based on Lumbung Mataraman in Kulonprogo Regency

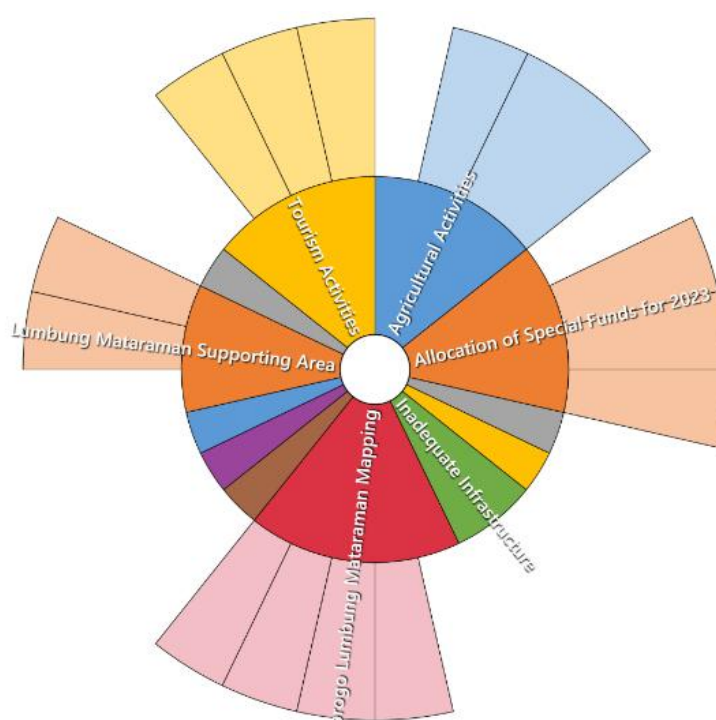


Figure 6. Sunburst Chart Lumbung Mataraman in Kulonprogo

Source: Data processed with Nvivo 12

A sunburst chart, or hierarchy map, is designed to visually represent the proportion of coding references based on themes acting as nodes or codes. The visualisation technique effectively highlights the biggest contributing components within a complex hierarchical structure (Zhang & Gardiner, 2023). The figure above illustrates the thematic structure for green tourism development based on Lumbung Mataraman in Kulonprogo Regency. The sunburst chart discloses several significant findings that influence this development.

In Bendung, the initial Lumbung Mataraman can be found, and another is situated in Sendang Sari, Kapanewon Pengasih, in Kulonprogo. In 2024, there is one located in Purwosari, Kapanewon Girimulyo. Then, there is another one in Kebonharjo in Kapanewon Samigaluh. For this year, one is in the process of being built in Giripeni, Wates (In-depth interview, 21 May 2025).

The expansion of Lumbung Mataraman locations in Kulonprogo Regency, which are now set up at four different sites: Sendang Sari, Purwosari, Kebonharjo, and Giripeni.

Selecting the correct site is a crucial component in the development plan for Lumbung Mataraman-based eco-tourism initiatives. 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. The diversification of local food products is crucial for achieving regional food sovereignty (Oliver et al., 2022).

From its inception, GAPOKTAN was the conceptual pioneer of this initiative. In the beginning of 2020, a group of roughly 20 people, separate from the main farming group, began cultivating longan and grapes in June of that year, with each participant contributing an average of approximately 4 million rupiah. In 2023, we subsequently received the Danais for the Lumbung Mataraman, a one-hectare area managed by a farmer group. We had initially planned to secure backing from village funds for 2025, but a central government policy shift on food security came into effect. We intend to construct a farmhouse hut to function as the headquarters for the group. Besides cultivating grapes and longan, we also practice goat farming. Our initial goat population was comprised of 20 animals, but unfortunately, due to adaptation difficulties, some of them perished. The PPL (Penyuluh Pertanian Lapangan) documented the deaths (In-depth interview, May 21 2025).

Interviews suggest that tourism initiatives associated with the expansion of Lumbung Mataraman in Kulonprogo Regency include longan picking, goat farming, and grape cultivation training. Currently, tourism activities appear to be mainly concentrated in the agricultural and livestock sectors, with relatively small contributions from other sectors. However, the broader Lumbung Mataraman initiative is also supported by nature tourism and local batik centres. Other categories, such as infrastructure and self-help, as illustrated in the sunburst chart, are relevant to green tourism development, although their impact is not as substantial. The green tourism development strategy for Lumbung Mataraman in this area is illustrated by an overall sunburst chart and involves combining various sectors, including financing, business, environment, and participation, despite encountering structural and technical challenges.

a) Potential

The potential of Lumbung Mataraman in Kulonprogo Regency encompasses community group participation, financial support, and tourism diversification. 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; Zhu & Wang, 2024). The development of Lumbung Mataraman receives support from various sources, such as the DIY Special Fund, the regional budget, and community contributions. Infrastructure development assistance also includes conblocks, bucket boosters, livestock procurement, and fertilisers to strengthen the bases of the agricultural and tourism sectors. Tourism diversification also encompasses agrotourism, goat farming, educational grape cultivation, nature tourism, and batik centres.

b) Problems and Challenges

The location is hindered by insufficient access to infrastructure, and its physical infrastructure remains underdeveloped, with some facilities, such as a deer enclosure

meant to serve as an additional attraction for the BKSDA, not functioning. Additionally, the allocation of the Privilege Fund for Lumbung Mataraman's operation has been delayed, and support from the Village Fund has not been sufficiently optimal. These factors pose substantial barriers to the programme's operational and technical advancement. Adding to these difficulties, agricultural areas have poor soil fertility, and severe weather conditions have resulted in crop yield failures (Naorem et al., 2023).

c) Development Strategy

Strengthening efforts to empower local institutions will be crucial through cross-sector collaboration with entities like the Department of Agriculture, Tourism and BKSDA. Expanding tourism market segmentation will also necessitate diversifying tourism programs with educational and cultural approaches.



Figure 7. Word Cloud Lumbung Mataraman in Kulonprogo

Source: Data processed with Nvivo 12

The word cloud highlights the most commonly used terms obtained from interviews, FGDs, and other relevant documents related to the development of green tourism in Kulonprogo, as expressed by primary, main, and supplementary informants. The data collected through FGDs was obtained at the Gulurejo village office, where the village head, carik (village secretary), and other stakeholders involved in green tourism development were present. The relative frequency of occurrence is indicated by the font size (Limna, 2023).

The terms 'longan', 'Kapanewon', 'Lumbung Mataraman', and 'Group' have the highest frequency. The main areas of focus for discussion are attributed to agricultural activities, the location of Lumbung Mataraman development, and group management. The terms

'Kebonharjo', 'Gulurejo', 'Girimulyo', and 'Giripeni' represent the key development areas which are the focal points of the Lumbung Mataraman programme in Kulonprogo Regency. Previous research is supported by this word cloud, indicating that the direction of green tourism development in Kulonprogo Regency is mainly driven by agricultural activities and the development of specific locations.

3.2.4. Green Tourism Model Based on Lumbung Mataraman Scope of DIY Province

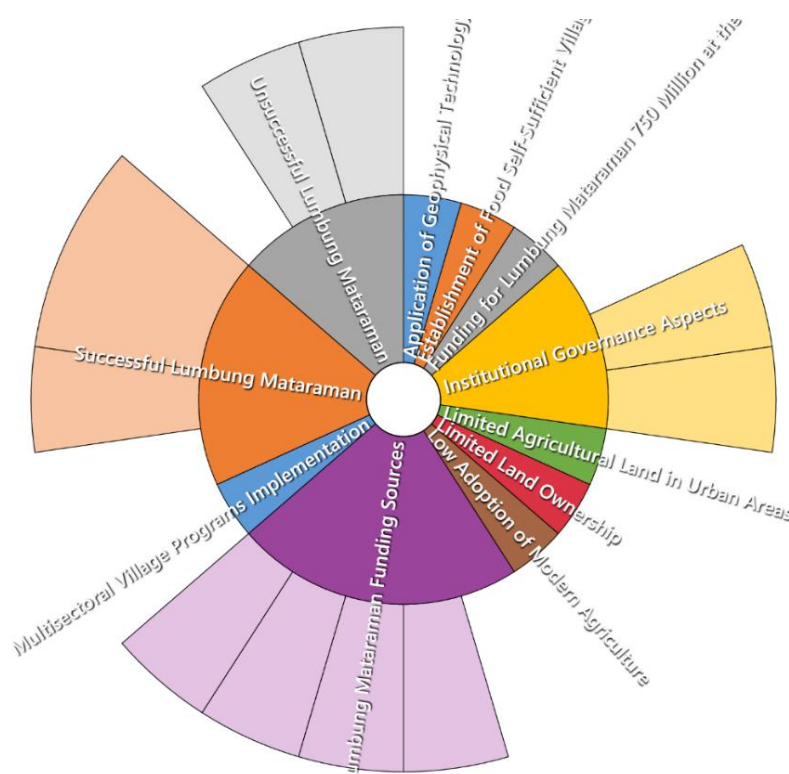


Figure 8. Sunburst Chart Lumbung Mataraman in DIY Province

Source: Data processed with Nvivo 12

Sunburst chart, or hierarchy map, is designed to visually represent the proportion of coding references attributed to specific themes, which are depicted as nodes or codes. This visualisation method distinctly depicts the biggest contributing components within a complex hierarchical structure (Zhang & Gardiner, 2023).

Lumbung Mataraman was launched in 2007 as a response to several food security issues. Interventions were made in areas with food insecurity and poverty, including providing regulations and facilitating efforts. The aim was to achieve food security and self-sufficiency in agricultural production. The project has received financial backing from the Privilege Fund since 2017. The initial focus was on meeting food requirements at the family and group levels. Over time, this evolved into suggestions for creating a Lumbung

Mataraman area at the village level. Subsequently, one area would be established as a pilot, enabling replication by surrounding villages (In-depth interview, 2 June 2025)

The Lumbung Mataraman initiative commenced in 2007, with the goal of resolving food security concerns and implementing relevant legislation across all regencies and cities within the Special Region of Yogyakarta Province. The sunburst chart also draws attention to extra categories including multi-sectoral village programmes, low knowledge of modern agricultural practices, and the application of geoelectricity, which are relevant to the development of green tourism, though with a relatively minor impact.

a) Potential

Opportunities for regional expansion of Lumbung Mataraman at the village level are increasing with substantial financial backing. More and more villages are setting up food cooperatives as local bodies to help ensure the programme's long-term viability. A multi-sectoral approach is adopted, combining agricultural activities, water management, village economic empowerment, geostrategic support from the Ministry of Defence, and water source mapping to enhance basic agricultural infrastructure. The development has the potential to gradually boost the chances of green tourism. This development also relies on external funding support, encompassing Village Funds, Ministry of Villages Funds, and funds from tional tourism. Key to the project's success has been collaboration between villages, communities, and external partners, despite several technical challenges and issues with local product competitiveness. The programme's long-term viability hinges on bolstering human resources, enhancing facility productivity, and securing dependable, multi-level financial support. Significant potential exists for green tourism development, which is largely underpinned by the historical significance of Selarong Cave and educational tourism elements arising from the Kalurahan government's IT system initiatives. This potential enables these elements to be incorporated into a comprehensive tourist package.

b) Problems and Challenges

Initiatives in areas like Lumbung Mataraman Sleman have been deemed unsuccessful due to technical and production issues. Agricultural failures can be attributed to low soil productivity and the limited use of modern farming technology. Low productivity in plantations, such as grape cultivation in Kulonprogo, has been caused by several factors, thereby underscoring the necessity for enhancements in agricultural practices and regulation. Insufficient local governance, subpar village leadership, and grant-based funding that often stagnates are inadequate to support the long-term sustainability of programmes (Herrera, 2019).

c) Development Strategy

The strategy involves fostering collaboration between villages, local authorities, government ministries, and educational establishments to enhance advisory support, stimulate innovation, and secure funding. The development strategy aims to combine agricultural villages and tourist villages into a unified package of food-focused eco-tourism activities.



Source: Data processed with Nvivo 12

4. CONCLUSIONS

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This study reveals that the effectiveness of the Lumbung Mataraman model varies across regions due to differences in governance capacity, resource availability, and local socioeconomic conditions. In Gunungkidul Regency, the Lumbung Mataraman model has shown promising prospects for sustainable village development, although its expansion remains constrained by limited infrastructure, inadequate human resources, limited financial capacity, and the relatively remote locations of some tourist attractions. Meanwhile, in Bantul Regency, the concept of the Lumbung Mataraman illustrates how integrated agriculture, environmental management, and educational activities can be combined to create broader social, ecological, and economic value. Meanwhile, in Kulonprogo Regency, strengthening the competitiveness of local MSMEs through product innovation, post-harvest processing, digital promotion, and off-season agrotourism activities has emerged as a key strategy for sustaining community income and increasing the value of local agricultural commodities.

Overall, this study shows that the successful development of green tourism does not depend solely on tourism-related factors and environmental conditions. Rather, sustainable outcomes depend on effective institutional coordination, sustained investment in community capacity building, and development policies that are responsive to local characteristics. Therefore, future initiatives should strengthen eco-friendly infrastructure, expand support for green entrepreneurship, reinforce the role of village governance institutions, and promote agricultural diversification to enhance food security, conserve local biodiversity, and improve the long-term competitiveness of rural and sustainable tourism destinations.

Implications for green tourism development include, **(i)** Strengthening the diversification of food commodities beyond rice through the cultivation of tubers and other crops adapted to local conditions that enhance food security; **(ii)** Integrating sustainable agriculture with tourism, local cultural assets, and community entrepreneurship that create a more resilient rural economy, and **(iii)** Supporting village institutions through capacity building, digital literacy, and local marketing initiatives further strengthens community participation and competitiveness of tourist destinations.

The limitation of this research is any sites are still in the process of developing their integrated farming systems and institutional arrangements, making them less suitable for comprehensive academic investigation. For this reason, the present study was conducted at Lumbung Mataraman Semin Bendung, which has established a more mature model of integrated agriculture supported by well-organized governance and active community involvement. Consequently, the findings primarily reflect the characteristics of this particular case and should not be interpreted as representing all Lumbung Mataraman initiatives.

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