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Green Footprint Through the Development of a Sustainability Reporting Concept for Karangpring Village

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Abstract

This study aims to examine the integration of field findings based on UI green city metric indicators and green accounting approaches in the development of village sustainability reporting. This study was conducted in Karangpring village, Jember district, which is a case study village with abundant natural resources and strong local sustainability initiatives. A qualitative case study method was used, employing data collection techniques such as in-depth interviews, field observations, and document analysis. The results of the study show that Karangpring village has implemented various sustainable practices in terms of spatial planning, water management, mobility, waste management, energy, and village governance. However, these efforts have not been fully documented in a structured, accounting-based reporting system. By applying a green accounting approach, this study developed a green village financial report format consisting of a green balance sheet, an environment-based budget realization report, and notes to the green financial statements. This reporting format aims to improve transparency and accountability, as well as support evidence-based environmental policy formulation at the village level. This study contributes to the development of integrated and applicable village sustainability reporting, and opens up opportunities for regulation and digitization of environmental reporting at the local government level.

Keywords: green accounting, sustainability reporting, sustainable villages, UI green city metric, green financial reporting, Karangpring village.

I. INTRODUCTION

The concept of village sustainable budgeting has been implemented in recent years as an effort to ensure more transparent, effective, and sustainable use of village budgets (Winola et al., 2024). This approach emphasizes budgeting processes that go beyond short-term needs by incorporating long-term social, economic, and environmental impacts (Kozarezenko, 2023). Based on Oktaviani et al. (2024) research on sustainable budgeting, Karangpring village in Jember regency has been identified as having strong potential to implement sustainable practices through effective budget management.

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The success of sustainable budgeting systems must be accompanied by accountable and transparent reporting mechanisms (Reynilda & Renal, 2025). This need has led to the development of the villagesSustainable reporting concept as a continuation of the budgeting approach. villagesSustainable reporting aims to provide a comprehensive account of village budget implementation while incorporating sustainability principles (Dewi et al., 2021). This reporting includes various dimensions such as financial transparency, achievement of sustainable development indicators, and the integration of social and environmental values into public accounting processes. Sustainable village reporting is designed to record, measure, and evaluate not only economic aspects but also environmental impacts, such as natural resource degradation and energy consumption as well as the ecological benefits of village programs, by adopting a green accounting framework (Sundarasen et al., 2024).

Village sustainable reporting also functions as an evaluation and improvement tool for village governments in designing better development policies (Sukoharsono, 2024). Effective reporting not only enhances accountability but also builds public trust in good village governance. To foster this trust, villages can develop development strategies that are more responsive to local needs while contributing to the achievement of the sustainable development goals (SDGs) at the local level (Kamila & Buchari, 2024). This concept adopts key principles of sustainability reporting, such as transparency, accountability, materiality, and stakeholder engagement (Rusu et al., 2024). However, it is specifically tailored to the village context, where issues such as natural resource governance, rural community welfare, local wisdom, and economic resilience serve as primary indicators. This reporting method requires a data driven and participatory approach, involving active community participation in both information collection and the determination of sustainability indicators relevant to the village's conditions (Moreau et al., 2023).

Technically, villagesSustainable reporting can be developed with reference to global reporting standards such as the global reporting initiative (GRI) or environmental, social, and governance (ESG) frameworks, but adapted to suit the specific needs of rural communities (Sukoharsono, 2024). These needs, as expressed through the reporting process, include data on agricultural sustainability, water conservation, waste management, and the preservation of village forests. The reports may also reflect the quality of education and healthcare services, levels of community participation in development, and the sustainability of local cultural practices. In the economic dimension, the report presents data on village economic resilience, job creation based on local resources, and the village's potential in the green economy (Lu & Qian, 2023).

The implementation of villagesSustainable reporting requires commitment from various stakeholders. Village governments act as the main facilitators in data collection and report preparation, while community members can contribute through feedback mechanisms and direct participation in surveys or discussion forums (Permatasari et al., 2021). Academic institutions and research organizations can assist with data analysis and the development of more contextual sustainability indicators (Cottafava et al., 2022). The presence of villagesSustainable reporting can also serve as a strategic tool to attract social investment and development funding from external parties, such as donors, NGOs, or private sector actors concerned with sustainable rural development (Permatasari et al., 2021). This study adapts the concept of sustainability reporting to the village context using a participatory approach and the principles of green accounting. In contrast to previous studies that have primarily focused on sustainability reporting in corporate or urban government settings, this research explores how villages, as the smallest

administrative units can develop a reporting system that accurately reflects their local social and ecological realities.

This research innovates by adapting and tailoring sustainability reporting frameworks specifically for the village level, the smallest administrative unit, while the previous studies primarily focused on sustainability reporting within corporate or urban government contexts. This study integrates local wisodm, community participation, and green accounting principles to develop a reporting system that accurately reflects the unique social, economic, and ecological realities of rural communities. By employing a participatory approach, it ensures that sustainability indicators are locally relevant and that the reporting process empowers village stakeholders. This novel adaptation adresses a significant gap in the literature, as mechanisms for sustainability reporting at the village level remain underexplored, particularly in terms of combining traditional knowledge with modern accounting frameworks to promote transparency, accountability, and sustainable rural development.

This study aims to fill the gap in the literature regarding sustainability reporting mechanisms at the village level, which remain limited to date. It emphasizes the integration of local wisdom, community participation, and the application of green accounting principles as key elements in the development of village sustainability reporting. The research adopts a qualitative method with a case study approach, focusing on Karangpring village in Jember regency. This village was selected based on its characteristics as a community that has initiated environmentally conscious management and economic empowerment based on local resources. The case study approach allows for an in-depth exploration of various factors that influence village sustainability, including policy, community practices, and the challenges encountered in implementing sustainability reporting systems. Therefore, this study further elaborates on the concept of villagesSustainable reporting, its potential benefits, and how its implementation can promote transparency, accountability, and environmentally grounded sustainability in rural development.

II. THEORETICAL PERSPECTIVE

2.1. Literature Review

2.1.1. Sustainable village

A sustainable village is a development concept aimed at improving the quality of life in rural communities by maintaining a balance among social, economic, and environmental dimensions (Wiesli et al., 2021). his form of development emphasizes the responsible use of natural resources, the adoption of environmentally friendly technologies, and the application of innovations that can accelerate the transition toward a green economy, one that prioritizes not only economic growth but also environmental preservation (Islam et al., 2024). Through this approach, villages strive not only to improve infrastructure and promote economic advancement, but also to ensure equitable access to opportunities for all members of the community, in line with the fundamental principles of building an inclusive and just society (Hidayat et al., 2024).

2.1.2. Social dimension

One of the key aspects of sustainable village development is the social dimension, which focuses on improving the quality of life of rural communities. This can be achieved through investments in the education and health sectors. Improved education and adequate healthcare facilities play a crucial role in enhancing the community's capacity to manage and seize available opportunities, both economically and in addressing other social challenges (Blank, 2015; Kanu et al., 2024). Education contributes not only to the

enhancement of individual skills but also to the development of a more critical and self-reliant society. Similarly, good health enables individuals to be more productive and helps reduce the social costs that could otherwise hinder the overall growth of the village (Dursun et al., 2018). Social development efforts must also take into account the cultural diversity and local values present in the village, in order to create solutions that are contextually appropriate and effective (Yan, 2024).

2.1.3. Economic dimension

In the economic dimension, a sustainable village seeks to reduce dependency on a single economic sector, such as traditional agriculture, which is often vulnerable to climate change and market fluctuations. Diversifying the village's sources of income is key to building stronger economic resilience. Sectors such as sustainable agriculture, handicrafts, and ecotourism offer alternative income opportunities for rural communities while supporting environmental sustainability (Kimkong et al., 2023; Saliman & Swee-Kiong, 2023). Through village ecotourism, villages with rich natural landscapes and biodiversity can develop tourism initiatives based on nature conservation. In this way, rural economies not only grow but also contribute to the preservation of the natural environment, which is a core asset for these sectors. Hence, the economic diversification helps reduce the vulnerability associated with reliance on a single sector, enhancing the village's capacity to withstand external shocks (Wilson et al., 2018; Zheng & Chou, 2024).

2.1.4. Environmental dimension

The environmental aspect of sustainable village development demands serious attention to the preservation of natural resources. A sustainable village focuses on efficient water management, the use of renewable energy, and the protection of land and forests as part of efforts to maintain ecosystem balance and prevent environmental degradation (Vannevel & Goethals, 2020; Rendrarpoetri et al., 2024). Natural resource management includes strategies such as efficient irrigation for agriculture, environmentally friendly wastewater treatment, and the use of renewable energy sources such as solar or wind power (Regmi et al., 2023). These practices not only reduce negative environmental impacts but also lessen the village's dependency on finite resources and lower long-term energy costs. By adopting green technologies and sustainable practices, villages can play a vital role in climate change mitigation (Majumdar, 2020; Bhattacharya & Sachdev, 2021).

2.1.5. Sustainable village reporting through UI green city metrics

UI green city metrics (UGCM) is a systematic measurement developed by Universitas Indonesia to assess the sustainability level of a city using six main categories: spatial planning and infrastructure, energy and climate change, waste and wastewater management, water governance, access and mobility, and governance (UI GreenMetric, 2024). Each category is measured using valid quantitative data, aiming to encourage urban areas to improve their sustainability performance. In the category of spatial planning and infrastructure, UGCM focuses on the utilization of green open space. The energy category emphasizes the use of renewable energy and energy efficiency. Waste and wastewater governance evaluates recycling levels and waste reduction, while water governance focuses on water resource conservation and wastewater management. Access and mobility highlight the reduction of emissions from motorized vehicles. Education and innovation related to environmental issues are also part of the measurement framework (UI GreenMetric, 2024).

Although developed for the urban context, the core principles of the UI green city metrics can be adapted and modified for use at a smaller scale, namely at the village level. This adaptation considers differences in scale, resources, and social characteristics found

in villages. Measurements in villages focus more on smaller units such as individual villages or hamlets. The aspect of green open space use in villages emphasizes farmland and village forest conservation. In terms of energy, the assessment focuses on the use of small-scale renewable energy sources such as household solar panels. Waste management encourages household-based practices, village-level waste banks, and composting. Water governance is centered on spring protection, village wells, and traditional irrigation systems. Access and mobility at the village scale can focus on improving transportation accessibility such as neighborhood roads and bicycle usage to reduce emissions. Education is also a key focus in villages, measured by the number of environmental education programs in village schools and community groups. Through this adaptation, UGCM offers a practical tool for measuring sustainability performance at the village level in a more realistic and locally relevant manner.

III. RESEARCH METHODOLOGY

This study employs a qualitative approach using a case study method , which is best suited to explore the complex (Mujio et al., 2023; Sciulli, 2011; and Tampaip et al., 2024), context specific development of the villages sustainable reporting (VSR) concept in Karangpring village, Jember regency. The qualitative case study allows for an in depth understanding of the perceptions, experiences, and practices of various village stakeholders regarding sustainability, which quantitative methods alone cannot capture. This approach facilitates a holistic examination of social, economic, and environmental dimensions within the unique local context, enabling the researcher to generate rich, detailed insights into how sustainability is integrated into village development planning and reporting.

Data were collected through in depth interviews with a purposive sample (Nadhiro & Choiriyah, 2024; Ruja et al., 2024) of 12 key village stakeholders. These informants included 3 village government officials, 3 community leaders, 3 farmers, and 3 local entrepreneurs. The selection criteria focused on individuals who are directly involved in or knowledgeable about the village development processes, ensuring that the data reflect diverse perspectives relevant to the VSR concept. Besides doing interviews, direct observations were also conducted on sustainable practices already implemented in the village, such as organic farming systems, clean water management based on natural springs, environmental conservation efforts, and the potential for bioenergy from livestock farming. These observations served to directly assess how village activities contribute to green accounting indicators, including natural resource usage, waste generation, energy efficiency, and ecological impacts.

Secondary data were also collected through document analysis (Hariniati et al., 2024; Layn, 2024; Soraya et al., 2024; and Wulandari et al., 2019), including the village medium term development plan (PJMDes), annual work plan (RKPDes), village financial reports, development program documents, and local policies related to sustainability and the environment. The collected data were analyzed using thematic analysis, whereby information from interviews and observations was categorized into key themes relevant to the VSR concept and green accounting principles. This method enabled the identification of patterns, challenges, and opportunities in the implementation of village sustianability reporting, as well as the extent to which environmental management is integrated into the village accounting and reporting system.

In order to strengthen the analytical framework, the research findings were aligned with the UI green city metric (UGCM) approach, adapted to the village context. This adaptation process involved three stages, including adjustment of UI green city metric

indicator to the village scale, identification of village activities based on the adjusted indicators, and development of a village sustainability report based on data and narrative reporting.

IV. RESULTS AND DISCUSSION

4.1. Adjustment of UI Green City Metric Indicators to the Village Scale

To adapt the UI green city metric, which originally designed for urban contexts, it is modified to better reflect village characteristics, capacities, and needs. These modifications involved simplifying indicators, incorporating local elements, and shifting focus from large scale infrastructure to community based and local resource approaches. The adjusted indicators cover six main categories, which include spatial planning and infrastructure, energy and climate change, waste and wastewater management, water governance, access and mobility, and governance. The resulting modified indicators are as follows:

Table 4.1
Spatial Planning and Infrastructure

No.	Category and Indicator (Village)	Description
1	Availability of village spatial planning documents (village spatial plan or village development work plan).	May include village area maps, land use zoning.
2	Percentage of village green open space to total village area.	Includes rice fields, gardens, fields, etc.
3	Existance of village forest or conservation land.	Managed by the community/customary groups or village government.
4	Percentage of vegetated area (such as gardens, green yards) to total are.	-
5	Green lanes along village roads or near public facilities	-
6	Water catchment areas (infiltration wells, biopores, village reservoirs, etc).	-
7	Public green open space per village population.	Ratio calculated per number of residents.
8	Inclusive public facilities (accessible to elderly, disabled, pregnant women, children).	Such as access roads, community health post facilities.
9	Basic health facilities (community health centers, health posts, mobile health services).	-
10	Village security facilities (neighborhood watch posts, street lighting, evacuation routes).	-
11	Social gathering spaces for village communities (village hall, field, multifunctional prayer place).	-
12	Local conservation programs (urban farming, village gardens, organic waste management).	-
13	Healthy and safe local trading facilities (village market, healthy stalls, MSMEs).	-
14	Use of information technology in village development planning and evaluation.	Such as digital village apps, online reporting

Source: UI green city metric guidelines (2024).

Table 4.2
Energy and Climate Change

No.	Category and Indicator (Village)	Description
1	Availability of village-level energy planning or integration of energy issues into village planning documents.	Village medium term development plan (RPJMDes).
2	Availability of village energy maps.	Map of solar, wind, bioenergy potentials, etc.
3	Village policy or appeals for the use of renewable energy.	Biogester program, household solar panels, biogas stoves.
4	Implementation of renewable energy use in households or village public facilities.	At least one location (such as Solar PV at village hall or school).
5	Number of active renewable energy sources in the village.	Number of biodigesters, solar panels, turbines, and such.
6	Electrification ratio (percentage of village households with electricity access).	-
7	Average household electricity consumption (kWh/year).	Can be estimated from electricity bills.
8	Ratio of renewable energy to total village energy consumption per year.	-
9	Use of renewable energy in public facilities (village hall, health post, school).	-
10	Application of energy-saving principles (natural ventilation, natural lighting, etc.) in village buildings or homes.	-
11	Village based greenhouse gas emission reduction programs.	Forest conservation, composting, and eco friendly transportation.
12	Carbon footprint estimation or simulation based on residents' activities.	Simple approaches can be used.
13	Community activities or campaigns related to climate change adaptation and mitigation.	Awareness raising, environmental clean ups, and tree planting.
14	Community based disaster early warning systems (simple or digital).	-
15	Monitoring or evaluation of energy use and village climate policy through IT.	-

Source: UI green city metric guidelines (2024).

Table 4.3
Waste and Wastewater Management

No.	Category and Indicator (Village)	Description
1	Availability of village policy or planning on waste and wastewater management.	Included in village regulations or other planning documents.
2	Real actions on 3R (Reduce, Reuse, Recycle) at household or public facility level.	-
3	Percentage of household waste sorted or managed using 3R practices.	Estimated from sorting practices, waste banks, composting, etc.

To be continued Table 4.3.

No.	Category and Indicator (Village)	Description
4	Household organic waste management (compost, biopore, maggot, etc.).	-
5	Reuse of food waste at household or community group level.	-
6	Village inorganic waste management (collection, recycling, waste banks).	-
7	Availability of temporary waste storage or collection points (TPS) in the village.	Including basic 3R TPS.
8	Handling of hazardous household waste (used batteries, expired medicines, etc).	-
9	Simple electronic waste (e-waste) management in collaboration with district or third party.	-
10	Management of household wastewater (healthy septic tanks, communal wastewater systems, etc.).	-
11	Community activities in waste management through mutual cooperation (clean-ups, waste banks, education).	-
12	Paper and plastic waste handling (sorting, collecting, sending to recyclers, etc.).	-
13	Availability of waste sorting bins or integrated collection system.	-
14	Village programs to convert waste into value-added products (crafts, paving blocks, compost, etc.).	-
15	Use of technology or digitalization for monitoring and evaluating waste and wastewater management.	Such as apps, online reporting systems, or village dashboard.

Source: UI green city metric guidelines (2024).

Table 4.4
Water Governance

No.	Category and Indicator (Village)	Description
1	Availability of village water governance plans (planning document or village regulation).	Includes irrigation, clean water, spring conservation management.
2	Water conservation activities by residents or village institutions.	Such as reforestation, infiltration wells, spring protection.
3	Reuse of water in households/public facilities (such as greywater for plant irrigation).	-
4	Use of water-saving devices in village facilities (automatic faucets, drip irrigation, and such).	-
5	Percentage of treated water usage (piped water, boreholes, rainwater) against total village needs.	Can be estimated.
6	Program to manage rainwater runoff (zero run-off) or natural drainage systems.	Includes contour trenches, natural drains, vegetation buffers.
7	Village activities to educate residents on the importance of clean and efficient water use.	-
8	Programs for flood or seasonal inundation mitigation.	Such as drainage dredging, reservior, revitalization.

To be continued Table 4.4.

9	Rainwater harvesting or water storage programs (tanks, village reservoirs).	-
10	Programs to maintain water quality (well monitoring, river pollution bans).	-
11	Monitoring and evaluation of village water programs using IT or simple reporting.	-

Source: UI green city metric guidelines (2024).

Table 4.5
Access and Mobility

No.	Category and Indicator (Village)	Description
1	Availability of village access and mobility plans (including transportation and village roads).	Can be in RPJMDes, RKPDes, or village transportation regulation.
2	Ratio of private vehicles to total households or residents.	Estimate of motorcycles/ cars per household.
3	Availability of public transportation services between hamlets or to the town center.	Includes village motorbike taxis, minibuses, school transport.
4	Percentage of residents who travel regularly by walking, cycling, or eco friendly transport.	-
5	Availability and management of parking facilities at public village locations (hall, market, mosque, and such).	-
6	Village efforts to restrict private vehicles in certain areas or manage vehicle movement.	Such as car free day and restriction on heavy vehicles.
7	Village initiatives for shared/public vehicles: village car, electric motorbike, or communal charging station.	-
8	Support for pedestrians and cyclists (safe paths, signs, awareness campaigns).	-
9	Percentage of residents living within more or less 500 meters of main roads or transport access.	Can use participatory mapping or simple GIS.
10	Monitoring and evaluation of village access and mobility using tech or reporting systems.	Via WhatsApp groups, village dashboards, or manual reports.

Source: UI green city metric guidelines (2024).

Table 4.6
Governance

No.	Category and Indicator (Village)	Description
1	Percentage of village budget (APBDes) allocated for sustainability-related activities (environment, water, transport, etc.).	Can be calculated from budget for environmental-related programs.
2	Availability of village information media (web, notice boards, social media) for education or sustainability campaigns.	-
3	Public annual/periodic reports on village governance (such as development realization reports or village information system).	-
4	Number of environmental or sustainability campaigns held in the village in the past year.	-
5	Number of reports, activity documentation, or citizen innovations on environmental and sustainability issues	-
6	Village arts, cultural, or sports events promoting sustainability or environmental themes.	-

To be continued Table 4.6.

No.	Category and Indicator (Village)	Description
7	Number of village or youth initiatives related to green entrepreneurship or green jobs.	-
8	Education and awareness programs for children and the general public on environment and sustainability.	-
9	Activities or collaboration with local community groups promoting environmental actions (local NGOs, community institutions, youth groups).	-
10	Innovative village programs supporting sustainable or self-reliant village goals.	-
11	Village efforts to reduce inequality or increase social inclusion (creative economy, protection of vulnerable groups).	-
12	Disaster preparedness or risk mitigation programs (disaster response training, hazard maps, and such).	-
13	Monitoring and evaluation of sustainable village activities using ICT or manual reporting.	-

Source: UI green city metric guidelines (2024).

These adapted indicators provide a practical framework for assessing sustainability at the village level.

4.2. Identification of Village Activities Based on Adjusted Indicators

The following resultas are based on two distinct data sources which are interviews with the village officials and direct field observations.

4.2.1. Spatial planning and infrastructure

Interviews with the Village Head of Karangpring village revealed a strong commitment to sustainable spatial planning. The village possesses formal spatial planning documents, including land use zoning and area maps, which guide development management. Direct observations confirmed extensive green open spaces, including rice fields, gardens, and community managed forests in collaboration with Perhutani, a state forestry company. Vegetation in residential yards and green corridors along roads were also evident, enhancing ecological functions. Water infiltration features such as boreholes and reservoirs were observed as part of the village's water resilience strategy. Calculations based on spatial data showed a high ratio of public green open space to population, 152.4 hectares per capita, indicating abundant ecological space.

Social infrastructure includes inclusive public facilities accessible to vulnerable groups, basic health services through health posts and mobile units, and safety features like neighborhood watch posts and evacuation routes. The village also has multiple social fathering spaces, including mosques and open fields. However, interviews highlighted challenges such as poorly organized organic waste management and the absence of a local marketplace, limiting economic opportunities. Digitalization efforts in village planning exist but are not yet fully integrated.

4.2.2. Energy and climate change

Interviews indicated that Karangpring village currently lacks formal renewable energy policies or energy maps in its planning documents (RPJMDes). No renewable energy installations such as solar panels or biodigesters were observed during field visits, and no active programs promote renewable energy use. Consequently, the ratio of renewable energy to total consumption is effectively zero. However, the village has untapped renewable energy potential from spring water, which is suitable for micro hydro power and livestock waste for production. Community activities such as tree planting and

environmental clean ups were noted but are limited in scale. No community based disaster early warning systems or IT based energy monitoring were identified.

4.2.3. Waste and wastewater management

Village government interviews revealed plans to establish a waste bank and requests for a garbage truck, which is now operational. Waste collection occurs at neighborhood units and is transported to disposal sites. Collaboration with university students has led to the construction of trash bins and incinerators. Public education on environmental care is ongoing, though some residents still dispose of waste improperly, such as dumping into rivers. A notable example of green entrepreneurship is the Sumber Kembang coffee farmers group, which converts coffee husks into liquid fertilizer, demonstrating local innovation in waste reuse.

4.2.4. Water governance

Karangpring village benefits from abundant spring water sources on the slope of Mount Argopuro. Interviews with residents and water user associations confirmed communal management of these springs, which supply most households and agricultural irrigation. The surplus water supports local bottled water production by a village Islamic boarding school foundation. Direct observations noted water conservation activities and community clean up programs aimed at maintaining water quality. Formal water governance plans are absent, reflecting the village's self sufficiency in clean water.

4.2.5. Access and mobility in Karangpring village

Field observations showed infrastructure improvements in plantation areas to facilitate produce distribution. Interviews indicated high motorcycle ownership per household, with limited public transportation available once daily for market access. Residents commonly walk or cycle, reflecting eco friendly transport habits. However, pedestrian infrastructure and safety measures are lacking. Parking at public facilities is sufficient but unregulated, and no policies restrict private vehicle movement. The village owns an emergency vehicle for community needs.

4.2.6. Governance in Karangpring village

Village budget analysis revealed the approximately IDR 1.5 billion of the total IDR 1.8 billion budget is allocated to sustainability related activities, aligning with the UNDP recommendations. The village employs multiple communications channels, which include a website, notice boards, and social media, to promote sustainability awareness. Public reporting involves local administrative units, enhancing transparency. Environmental campigns and cultural events with sustainability themes are regularly conducted, primarily documented via WhatsApp groups. Collaboration with community organizations supports environmental education and green initiatives. Social protection programs target vulnerable groups, and disaster preparedness training is implemented. Sustainability monitoring is conducted through sub district surveys and annual reports.

4.3. Development of a Village Sustainability Report Concept Based on Data and Narrative Reporting

Integrating field observations and interview data with the UI green city metric framework enabled a comprehensive assessment of Karangpring village's sustainability status. This integration facilitated the identification of environmental, social, and economic dimensions of sustainability at the village scale. To capture the economic value of environmental assets and liabilities not reflected in conventional financial reports, a green accounting approach was adopted. The green accounting, also known as environmental accounting, is an accounting method that incorporates environmental costs and benefits into traditional financial accounting systems. It aims to measure

economic value of natural resources and ecosystem services, as well as the environmental costs associated with economic activities, which are often overlooked in conventional accounting. By doing so, green accounting provides a more holistic and transparent picture of an entity's true economic performance and sustainability. This approach enables the village to capture the economic value of its natural capital and the social benefits of sustainable practices, thereby supporting more informed decision making and resource management. Using this approach, a village green financial report can be prepared, integrating environmental, social, and economic indicators. This report complements traditional financial statements by providing a transparent and fairer measurement of the village's contribution to sustainable development.

4.4. Integration of Field Findings with the Green Accounting Approach

To illustrate the application of green accounting concretely, consider the village's green open space as an environemtnal asset. Karangpring's 152.4 hectares of green open space per capita represent ecosystem services such as carbon sequestration, biodiversity habitat, and flood mitigation. Through ecosystem valuation methods, such as contingent valuation or replacement cost approaches, the village can estimate the economic value of these services and record them as intangible environmental assets within its financial statements.

Besides, expenditures on social infrastructure such as community health posts or evacuation routes can be classified as sustainable social investments, reflecting the village's commitment to social resilience. These expenditures can be incorporated into village financial reports under environmental and social budget lines, following green budgeting principles. However, the absence of renewable energy installations represents a missed opportunity for capital investment in green energy, which green accounting would identify as a negative environmental capital or ecological energy deficit. The coffee farmers' initiative to convert coffee husks into liquid fertilizer exempifies green entrepreneurship, where production costs, savings from waste reduction, and potential sales can be quantified to assess both financial and ecological benefits.

Environmental externalities, such as waste disposal into rivers by some residents, generate restoration costs that green accounting would recognize as unpaid environmental liabilities. The village's abundant spring water resources constitute natural capital, while communal water management reflects social capital, both of which can be documented in environmental balance sheets and income statements. High private vehicle ownership increases mobility but also contributes to environmental costs from emissions and fossil fuel consumption. Green accounting can monetize these costs through carbon cost accounting, providing a basis for evaluating the sustainability of transprot infrastructure an policies.

The village's allocation of IDR 1.5 billion toward sustainability activities demonstrates de facto green budgeting, even if not formally documented. The use of digital media for reporting and public participation enhances institutional capital, which can also be reflected in green accounting frameworks. By integrating these environmental, social, and economic dimensions into a comprehensive village sustainability report, Karangpring village can transparently communicate its sustainability performance and guide future development aligned with green accounting principles.

4.5. Village Sustainability Reporting Concept of Karangpring Village

Based on the integrated findings, a village sustainability reporting framework was developed, incorporating environmental accounting principles into routine village financial governance. The report structure includes:

1) Executive summary:
a) Recognition of environmental assets.
b) Unrecorded environmental costs in the village budget (APBDes).
c) Community initiatives and local wisdom.
d) Challenges and recommendations.
e) Estimated total value of environmental assets and liabilities.
2) Summary of findings based on green city metric indicators and environmental accounting.

No.	Green Matric Aspect	Key Findings	Relevance to Environmental Accounting
…	……	……	……

3) Environmental balance sheet.

Environmental Asset	Volume/Value	Economic Value Estimation
……	……	……

4) Environmental income statement.

Activity	Social Valuation/Benefit
……	……

5) Notes to the green financial report:
a) Purpose of the report.
b) Base of preparation.
c) Environmental accounting policies.
d) Estimation and valuation methodology.
e) Limitations.
f) Next steps.

V. CONCLUSION

This study demonstrated that integrating green accounting approaches with the UI Green City Metric indicators in a village context enables the development of a more holistic and locally relevant village sustainability reporting system. Field findings in Karangpring Village showed that, although a formal accounting system for recording environmental contributions and burdens was not yet in place, various sustainability potentials and practices already existed in the form of local wisdom, community participation, and adaptive natural resource management. Through the development of the village green financial report, previously unrecorded ecological values could now be identified, measured, and recognized as integral parts of sustainable village development.

This research holds significant implications both theoretically and practically. Theoretically, it expands the scope of green accounting, previously focused on corporate and urban contexts, into village governance, enriching the literature on sustainability reporting at the grassroots community level and demonstrating that sustainability metrics can be localized. Practically, the village green financial report developed through this study may serve as a planning, reporting, and decision-making tool grounded in environmental data. This concept may also serve as a foundation for engaging both community members and village officials in formulating more inclusive and transparent sustainable development policies.

5.1. Limitations and Recommendations

This study has several limitations. First, most of the data used were qualitative in nature and derived from interviews and observations, leading to potential subjectivity in

interpretation. Second, limited access to specific quantitative data, such as energy consumption volumes, waste quantities, or the economic value of ecosystem services, constrained the depth of environmental financial analysis. Third, the green accounting approach used remained exploratory and could not yet be comprehensively tested in a comparative manner across different villages. Additionally, the involvement of village officials in the report preparation process was still limited, raising challenges in terms of validity and sustainability of implementation.

For future development, similar studies are encouraged to formulate more detailed and standardized quantitative indicators for each aspect of village sustainability, such as water, energy, waste, green open space, mobility, and governance. It is also crucial to involve a broader range of stakeholders, including environmental experts, public accountants, and village planners, to refine the green accounting methodology to make it more applicable and compliant with existing regulations. Further research is recommended to conduct comparative studies across villages with varying characteristics to test the replicability of the village green financial reporting model. Furthermore, integrating green accounting into village planning and budgeting systems (such as Siskeudes) could be a key strategy to institutionalize sustainability reporting and promote data-driven policy innovation.

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