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Implementation of Green Economy Values in Supporting the Movement for Environmental Care and Culture in Adiwiyata Schools in Bekasi

Abelia Nuraini[1]*, Novelia Utami[1]
Faculty of Teacher Training and Education, Universitas Muhammadiyah Prof. Dr. Hamka, Jakarta, Indonesia[1]
*Correspondence: E-mail: abelia.nuraini@uhamka.ac.id

ABSTRACT

This study aims to analyse the implementation of the green economy values in supporting environmental awareness and a culture of environmental responsibility at SMAN 5 Tambun Selatan, based on three *United Nations Environment Programme* (UNEP) characteristics: *resource-efficient, low-carbon, and socially inclusive.* Using a descriptive qualitative approach, data were collected through observation, interviews, and documentation involving the Vice Principal for Curriculum, the Adiwiyata Program Coordination, and students. Data validity was assessed through triangulation of sources and methods. The findings show that *resource efficiency* is reflected in material reuse and waste processing that generate economic benefits; low carbon is demonstrated through water and electricity conservation and reduced use of single-use containers; and social inclusion is reflected in environmental awareness initiatives, supporting facilities, school community participation, and external collaboration. These practices demonstrate how green economy values support sustainable resource management, environmental protection, and a shared culture of environmental responsibility in Adiwiyata schools.

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CONTACT: abelia.nuraini@uhamka.ac.id

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INTRODUCTION

Environmental issues are not limited to Indonesia; they are a global concern. The world Meteorological Organization has stated that the Earth's temperature continues to rise, triggering extreme weather events such as floods, droughts, and heatwaves across various countries. This is corroborated by the Indonesia Agency for Meteorology, climatology, and Geophysics (Ibrahim, 2026), which notes that the trend of global warming is no longer merely a future projection but a reality already being experienced in many parts of the world, including Indonesia (Bariri), 2025). Furthermore, the United Nations Environment Programme reports that the world generates over 400 million tons of plastic waste annually, much of wbich remains poorly managed and poses a risk of environmental pollution (Pristiandaru, 2023). In an effort to address these challenges, the United Nations has established the Sustainable Development Goals (SDGs) as a global sustainable development agenda to be pursued through 2030.

One approach aligned with the goals of sustainable development is the concept of a "green economy." According to (United Nations Environment Programme (UNEP), 2011), a green economy is an economic system that fosters improvements in human well-being and social equity, while simultaneously significantly reducing environmental risks and ecological scarcity. In practice, a green economy encourages investment in economic activities, infrastructure, and assets that enhance energy and resource efficiency, lower carbon emissions and pollution, and prevent the loss of biodiversity and ecosystem services (Programme, 2018). This concept is defined by three core characteristics: it is *Resource-Efficient, Low-Carbon, And Socially Inclusive* (UNEP, 2026). These three characteristics serve as a foundation for analysing the implementation of a green economy focusing on the efficient use of resources, the mitigation of environmental impacts, and the active involvement of and equitable distribution of benefits among members of the school community. In the context of education, these three characteristics are used to examine various school policies, programs, and activities that promote environmental sustainability and provide benefits to the school community. (Rizky & Sitorus, 2024).

The concept of a green economy was developed as an effort to realise sustainable development, including in Indonesia. However, environmental issues remain a challenge that must be addressed through the sustainable management of resources and the environment (BAPPENAS, 2021). One area facing such challenges is Bekasi Regency, specifically the districts of South Tambun (Tambun Selatan) and North Tambun (Tambun Utara). The Bekasi Regency Government, through its Environmental Agency, continues to manage waste within river channels as part of efforts to mitigate flood risks. This includes the removal of waste from rivers that flow through the South Tambun and North Tambun areas (Ismail, 2023). Furthermore, following floods in North Tambun, the Bekasi Regency Environmental Agency deployed dozens of trucks to collect organic and non-organic waste left behind by the floodwaters and to clear clogged drainage channels (Ismail, 2023). These circumstances indicate that waste and

environmental management remain critical issues to examine in the pursuit of environmental sustainabilityan endeavor that can also be supported by integrating green economy principles into educational settings.

The educational environment plays a crucial role in shaping students' knowledge, attitudes, and behaviours regarding environmental issues through various activities that support the realisation of sustainable development (Safitri et al., 2024). Implementing a "green economy" within schools aligns with the fourth Sustainable Development Goal (SDG 4: Quality Education) by fostering the integration of environmental education into diverse learning activities and school programs (Luthfi et al., 2025). Menurut (UNESCO, 2025), emphasises the importance of incorporating environmental issues into educational policies and curricula as part of efforts to strengthen education for sustainable development. Consequently, fostering environmentally conscious behaviour from an early age serves as a vital step toward environmental conservation and sustainable development (Handayani & Yudha, 2021). The green economy concept can be implemented in schools through tangible actions, such as waste management based on the 3R principle (Reduce, Reuse, Recycle), the conservation of energy and water, and the development of entrepreneurship initiatives focused on environmental sustainability. These practices are consistent with the framework of Education for Sustainable Development (ESD) as developed by UNESCO which underscores the necessity of equipping students with the knowledge, skills, values, attitudes, and capacity to take action in support of sustainability (UNESCO, 2025).

Law Number 20 of 2003 concerning the National Education System and Law Number 32 of 2009 concerning Environmental Protection and Management affirm that education holds a strategic position in efforts toward environmental conservation. The promotion of environmental awareness within educational institutions is further reinforced through the "Gerakan Peduli dan Berbudaya Lingkungan Hidup di Sekolah" (PBLHS), which serves as the foundation for the "Adiwiyata" (Green School) program (Kemenlh, 2022). This movement encourages schools to adopt environmentally friendly practices through activities integrated into both school management and the learning process.

The Adiwiyata Program has existed in Indonesia since 2006 as part of the government's efforts to foster schools that are environmentally conscious and cultivate an environmental culture, through the "Gerakan Peduli dan Berbudaya Lingkungan Hidup di Sekolah" (PBLHS). Over time, the implementation of the Adiwiyata Program was strengthened through the Regulation of the Minister of Environment and Forestry Number P.52/MENLHK/SETJEN/KUM.1/9/2019 concerning the Movement for Environmental Care and Culture in Schools (PBLHS) (BPK, 2019). These provisions were subsequently updated by the Regulation of the Minister of Environment and Forestry Number 23 of 2022, which amends the aforementioned Regulation Number P.52/MENLHK/SETJEN/KUM.1/9/2019 (Kemenlh, 2022). In practice, the Adiwiyata Program aims to establish schools that are environmentally conscious and possess an environmental culture through the execution of the PBLHS movement.

The implementation of a green economy within educational settings can be realised through the "Adiwiyata" (Green School) Program, which involves waste management and the utilisation of productive land initiatives that help foster economic awareness (Santosa, 2024). Furthermore, the green economy is integrated through resource efficiency and environment-based learning (Made & Wulandari, 2023). Another approach is the "Green Madrasa" program, which engages the school community in activities such as regular clean-ups, recycling, and the management of eco-friendly facilities (Mahardika & Anas, 2025). However, existing research has yet to specifically map the implementation of a green economy in schools based on the three characteristics defined by the UNEP: *Resource-Efficient, Low-Carbon, And Socially Inclusive*. Mapping these three characteristics is essential for a more systematic identification of how green economy practices are applied in schools that have attained the national "Adiwiyata" designation.

In this context, SMAN 5 Tambun Selatan serves as a relevant subject for research due to its success in implementing sustainable environmental management practices at the secondary education level, offering a concrete example for examining the application of green economy principles within a school environment (Redaksi, 2026). As a recipient of the National Adiwiyata (Eco-Friendly School) designation, SMAN 5 Tambun Selatan demonstrates a strong commitment to fostering a school culture that prioritises environmental stewardship. This is reflected in its implementation of the Adiwiyata or *Eco-Friendly School* program, which the school initiated in 2017 by developing various policies and initiatives focused on environmental conservation. This study offers a novel contribution by providing a comprehensive analysis of the implementation of a green economy at SMAN 5 Tambun Selatan, based on the three characteristics defined by the UNEP. It goes beyond merely identifying the existence of environmental activities, instead analysing how green economy values are manifested and internalised through various school-based initiatives that support a culture of environmental care. Consequently, this research focuses on the application of a green economy framed by the three UNEP characteristics: *Resource Efficient, Low Carbon, and Socially Inclusive* and explores how these values are realised and internalised through diverse school activities that promote an environmentally conscious and cultured school environment. The study aims to analyse the implementation of green economy values, based on these three UNEP characteristics, at SMAN 5 Tambun Selatan.

Based on a review of previous research, there is a need for a more specific understanding of how environmental practices in "Adiwiyata" (eco-friendly) schools can be interpreted through the lens of the three characteristics of a green economy as defined by UNEP: *Resource Efficient, Low Carbon, And Socially Inclusive*. In this context, this study maps the environmental practices implemented at SMAN 5 Tambun Selatan according to these three characteristics, while examining economic benefits, resource utilisation, the involvement of the school community, and the challenges encountered during implementation. Consequently, this study aims to analyse the integration of green economy values

at SMAN 5 Tambun Selatan based on the three UNEP characteristics: *Resource Efficient, Low-Carbon, And Socially Inclusive*.

LITERATURE REVIEW

1. Definition of Green Economy

The concept of sustainable development emphasises a balance between economic, social, and environmental aspects in meeting the needs of the present generation without compromising the ability of future generations to meet their own needs (Brundtland, 1987). This concept subsequently evolved into the "green economy," which focuses on sustainable economic growth, environmental sustainability, and the enhancement of societal well-being (United Nations Environment Programme (UNEP), 2011). (Lusinto, 2025) defines the green economy as an economic system that fosters sustainable, environmentally friendly, and equitable economic growth. In this context, the green economy is viewed as a macroeconomic objective supported by green financial instruments (Rudianto, 2026), as well as a framework that integrates social well-being and equity with efforts to mitigate the risks of environmental degradation (I Gusti Ayu Made Agung Mas Andriani Pratiwi, 2024).

The green economy also emphasises low carbon emissions, the efficient use of natural resources, and social justice (Imam Muttaqijn, 2024). (Nurfadilah, 2025) adds that this concept is aimed at fostering long-term societal prosperity by mitigating negative environmental impacts and promoting social justice. Based on these various perspectives, the green economy can be understood as a model of economic development that integrates economic growth, societal well-being, environmental sustainability, resource efficiency, and social justice in a sustainable manner.

2. Green Economy Indicators

According to the United Nations Environment Programme (UNEP), a green economy is an economic system that enhances human well being and social equity while reducing environmental risks and ecological scarcity. (UNEP, 2011). Identifies three key characteristics of a green economy: *Low Carbon, Resource Efficient, and Socially Inclusive*. In the context of education, these three characteristics can serve as a framework for analysing the implementation of a green economy within a school environment. "Resource-efficient" refers to the efficient use of resources; "low-carbon" emphasises the reduction of carbon emissions and environmental impact; and "socially inclusive" relates to the involvement of, and the equitable distribution of benefits among, members of the school community. This framework is used to examine school policies, programs, and activities that support sustainable environmental management. (Kuswati et al., 2025)

These three indicators are then broken down into the respective aspects of implementing a green economy within the school environment, namely:

a. Resource Efficient (Efficiency in Resource Utilization)

Resource efficiency emphasises the effective and efficient utilisation of resources through the reduction of waste, the reuse of items, and the repurposing of materials or waste to generate utility and economic value. In a school context, this characteristic is reflected in practices such as reusing items, operating a waste bank, and managing waste that holds practical or economic value (Syahyana & Putriana, 2025). The coding process focuses on the efficiency of resource use and the utility derived from materials, rather than on the reduction of emissions or the level of participation among the school community.

b. Low Carbon (Low Carbon Emissions)

Low Carbon focuses on reducing energy consumption, carbon emissions, and environmental pressure resulting from human activities (Eka et al., 2025). In a school context, this characteristic is manifested through electricity conservation, a reduction in overall energy use, and other activities supported by evidence of decreased emissions or environmental impact. Unlike *Resource Efficient* which centres on the efficient utilisation and reuse of resources *Low Carbon* emphasises the reduction of energy consumption and carbon-related impacts. Consequently, waste management activities based on the *Reduce, Reuse, Recycle* (3R) principle are not automatically classified as *Low Carbon*; they may only be assigned this designation if there is evidence that they contribute to a reduction in energy consumption, carbon emissions, or environmental pressure. This coding convention is used to consistently distinguish between the two characteristics when analysing the implementation of a green economy within schools.

c. Socially Inclusive (Social Inclusion)

Socially Inclusive emphasises the involvement of diverse social groups and the equitable distribution of economic and social benefits within the implementation of a green economy(United Nations Environment Programme (UNEP), 2011). In a school context, this characteristic encompasses the participation of principals, teachers, educational staff, and students in environmental activities, the availability of access and supporting facilities, and the fair distribution of program benefits among all members of the school community. (Mutmainah, 2023). Furthermore, identifying barriers to participation and evaluating programs are essential for understanding the challenges encountered and ensuring that every member of the school community has the opportunity to engage in and benefit from environmental initiatives (Iskandar, 2026). Thus, the application of a *socially inclusive* approach is assessed not only by the level of participation among school community members but also by the accessibility provided, the equitable distribution of benefits, and the efforts made to overcome barriers to social inclusion.

METHODS

1. Research Design

This study employs a qualitative approach with a descriptive method (Sugiyono, 2024) to describe the implementation of a green economy at SMAN 5 Tambun Selatan, Bekasi Regency. The research focuses on three characteristics of a green economy: *Resource Efficient, Low Carbon, and Socially Inclusive*. This approach is used to gain an understanding of the execution of environmental programs, the involvement of the school community, as well as the experiences and challenges encountered in implementing these three characteristics.

2. Population and Sample

Informants were selected using a purposive sampling technique based on their involvement in and knowledge of the implementation of a "green economy" within the school. The study involved six informants (Table 1): the Vice Principal for Curriculum, the "Adiwiyata" (environmental education program) coordinator, and four students two of whom were "Adiwiyata" committee members and two who were not. This selection process was intended to capture perspectives from school management, program implementers, and the student body.

Table 1. *Research Informants and Reasons for Selection*

No.	Informant Role	Reason for Selection
1.	Vice Principal for Curriculum	Provides information regarding school policies and support
2.	Adiwiyata Program Coordinator	Explains the implementation of and challenges faced by the environmental program
3.	Student Members of the Adiwiyata Committee	Provide a perspective on their involvement in the program
4.	Students Not Affiliated with the Adiwiyata Committee	Provide the perspective of students outside of the committee

Data adequacy is assessed based on the alignment of informants with the research focus, the representation of perspectives, and the comparison of information derived from various sources and data collection techniques. Thus, data adequacy is determined not merely by the number of informants, but also by the relevance of the information obtained to the research objectives.

3. Data Collection Methods

Data collection was conducted from July 16 to August 3, 2026, through observation, interviews, and documentation. Observations focused on the school environment, the activities of the school community, supporting facilities, and the implementation of environmental programs. Interviews were carried out to gather information regarding policies, program execution, the involvement of the school community, and challenges in implementing a green

economy. Documentation served as supporting data, consisting of visual evidence, facilities, and environmental activities relevant to the research focus. These three techniques were used in a complementary manner to obtain a comprehensive picture of how the characteristics of being *Resource Efficient, Low Carbon, and Socially Inclusive* are applied within the school.

4. Research Instruments

The research instruments include observation guidelines, interview protocols, and documentation guides, all developed based on the research focus and three characteristics of a green economy. The observation guidelines are used to record environmental conditions and school activities. The interview protocols are employed to gather information regarding policies, program implementation, stakeholder involvement, and challenges. Meanwhile, the documentation guides are used to identify supporting evidence relevant to the research findings.

5. Data Analysis Techniques

Data were analysed through the stages of data reduction, data display, and conclusion drawing, with the assistance of NVivo 15 software. Data from interviews, observations, and documentation were imported into NVivo 15 and then coded using a codebook developed based on three characteristics of a green economy: *Resource Efficient, Low Carbon, and Socially Inclusive*. Related codes were grouped into categories corresponding to these characteristics.

Subsequently, analysis was conducted through queries and visualisations to identify coding patterns and relationships between themes. Themes were established based on consistent patterns in the findings that were relevant to the research focus and supported by the available data. A hierarchy chart was used to present the grouping of themes, while a word cloud was employed to display prominent words within the analysed data.

6. Trustworthiness and Ethical Considerations

Data validity is verified through source triangulation and technique triangulation. Source triangulation is conducted by comparing information from the Vice Principal for Curriculum Affairs, the “Adiwiyata” (environmental education program) coordinator, “Adiwiyata” committee members, and students who are not part of the committee. Technique triangulation is carried out by cross-referencing data from interviews, observations, and documentation to identify both consistencies and discrepancies in the findings.

The research implementation must also be addressed from an ethical perspective, covering research permits, participant consent, confidentiality of identities, and the protection of informants. In cases involving informants under the age of 18, the procedures for obtaining parental or guardian consent, as well as the students’ own (assent), must be described in accordance with the

actual procedures followed. Formal ethical approval should only be cited if it has, in fact, been obtained.

7. Study Limitations

This study focuses on a single school and involves six informants selected through purposive sampling; consequently, the findings reflect the specific context of implementing a green economy at SMAN 5 Tambun Selatan and are not intended to be statistically generalised to all schools. The depth of the findings is also contingent upon the scope of observations, the experiences of the informants, and the availability of documentation during the research period. Therefore, the results of this study should be interpreted within the context and limitations of the data collection process.

RESULT

Based on data analysis using NVivo 15, the study on the implementation of a green economy at SMAN 5 Tambun Selatan identifies three key characteristics: resource-efficient, low-carbon, and socially inclusive. Interview results indicate that the green economy is implemented through waste sorting and utilisation, resource conservation, the cultivation of eco-friendly behaviours, and the involvement of the school community in the "Adiwiyata" (environmental education) program. The findings also reveal that the program has become integrated into daily school activities, although it still faces challenges such as limited space, time, and human resources, as well as varying levels of participation among students.

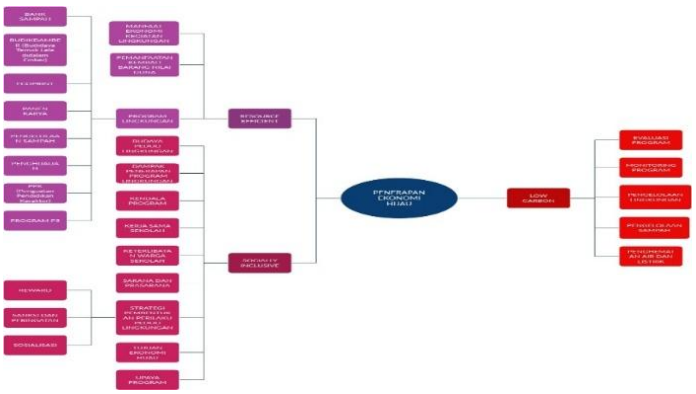


Figure 1. *Mind Map – NVivo 15*

The research mind map (Figure 1) indicates that the implementation of a green economy at SMAN 5 Tambun Selatan encompasses three key characteristics: Resource Efficient, Low Carbon, and Socially Inclusive. While these three characteristics represent distinct aspects, they are interconnected in supporting the application of a green economy within the school environment. Based on data categorisation using NVivo 15, each characteristic comprises several themes that describe the types of activities and the execution of environmental programs at the school.

Under the *Resource Efficient* characteristic, identified themes include environmental programs, waste management, waste banks, ecoprint (eco friendly fabric printing), project showcases (panen karya), fish farming in buckets (budikdamber), the P5 program (Strengthening the Profile of Pancasila Student), the repurposing of items, and the economic benefits derived from environmental activities. The *Low Carbon* characteristic encompasses water and electricity conservation, environmental management, waste management, as well as program monitoring and evaluation. Meanwhile, the *Socially Inclusive* characteristic covers the involvement of the school community, the impacts and challenges of programs, school partnerships, facilities and infrastructure, a culture of environmental stewardship, and strategies for fostering environmentally conscious behaviour implemented through outreach, the use of sanctions and warnings, and the provision of rewards.

These three characteristics indicate that the implementation of a green economy in schools encompasses resource management, environmental preservation efforts, and the involvement of the school community. This mind map illustrates the thematic structure derived from the NVivo 15 analysis, which is further elaborated through interview findings and supported by available observational and documentary data.

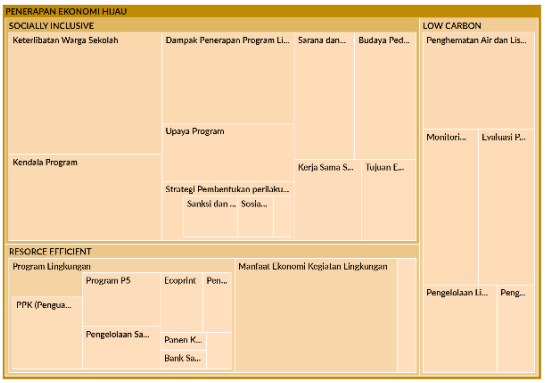


Figure 2. *Hierarchy Chart – NVivo 15*

Based on the *Hierarchy Chart* (Figure 2) generated from the NVivo analysis, the implementation of a green economy in schools is categorised into three primary dimensions: *Socially Inclusive*, *Resource Efficient, and Low Carbon*. The *Socially Inclusive* dimension encompasses the involvement of the school community, program constraints, program initiatives, and strategies for fostering environmentally conscious behaviour. The *Resource Efficient* dimension covers environmental programs and the economic benefits derived from environmental activities, while the *Low Carbon* dimension includes water and electricity conservation, monitoring, evaluation, and environmental management. This visualisation illustrates the grouping of research themes based on data coding results, with the size of each box representing its relative proportion, in accordance with NVivo's visualisation settings.



Figure 3. *Word Cloud – NVivo 15*

Based on the *Word Cloud* (Figure 3) generated from the NVivo analysis, the most prominent terms include "waste," "school," "economy," "inclusive," "carbon," and "resource." The appearance of these terms indicates that discussions regarding the implementation of a green economy in schools relate to waste management, the involvement of the school community, and the dimensions of being "socially inclusive," "resource-efficient," and "low-carbon." Other terms such as "cleanliness," "Adiwiyata," "ecobrick," and "conservation/saving" further illustrate the various environmental management activities and initiatives addressed within the research data.

The results of this analysis serve as the basis for outlining the implementation of a green economy in schools through three key characteristics: *Resource Efficient, Low Carbon, and Socially Inclusive*. The discussion focuses on activities observed within schools, the experiences and perspectives of informants, as well as evidence gathered from observations and documentation, to illustrate the application of each characteristic.

1. Resource Efficient

   The research results indicate that the implementation of *Resource Efficient* characteristics at SMAN 5 Tambun Selatan is carried out through waste sorting, the reuse of discarded items, greening initiatives, and environmental activities that offer both educational and economic value. Plastic waste is collected for recycling or sold to waste collectors, while dry leaves are utilised to produce compost. Other activities include the creation of ecobricks, ecoprints, and the showcasing of student projects.

   The Vice Principal for Curriculum Affairs explained that the school's environmental program encompasses "greening, maintaining cleanliness, and managing waste" (SN). Meanwhile, the head of the Adiwiyata (eco-school) student group described how waste is utilised by collecting it and selling it to waste collectors: "Yes, we collect waste and then hand it over to waste collectors to generate some money" (KA).

   These findings demonstrate that resource efficiency is achieved through waste reduction and the repurposing of materials that still hold value. However, the economic benefits have not yet been fully optimised, constrained by limited

space and the fact that composting processes have not reached their full potential. Evidence from observations and documentation such as photographs of sorted waste bins, recycling activities, or records of environmental programs could be included to further substantiate these findings, should such materials be available.

2. Low Carbon

The implementation of *Low Carbon* characteristics at SMAN 5 Tambun Selatan is evident through established habits such as energy conservation, the utilisation of natural light, water reuse, and waste management. One such practice involves reducing the use of artificial lighting during the day by taking advantage of sunlight. The Adiwiyata (environmental education program) coordinator explained, "We don't turn on the lights during the day. As you can see right now, we rely on sunlight; the windows and curtains are kept open" (RA).

In addition to electricity conservation, the school repurposes water such as water left over from wudu (ablution) and discharge from air conditioning units to irrigate plants. These practices reflect an effort to use resources more judiciously in daily operations. Waste management initiatives also contribute to reducing the waste generated by school activities, although the specific impact of these actions on carbon emissions cannot be definitively determined based on these activities alone.

These findings indicate that the *Low Carbon* approach is primarily manifested through the cultivation of habits centred on energy conservation and resource reuse. However, the available research data does not yet include direct measurements of changes in electricity consumption, water usage, or reductions in carbon emissions. Consequently, these practices should be understood as efforts to support low-carbon behaviour, rather than as quantitative evidence that the school's carbon emissions have decreased.

3. Socially Inclusive

The *Socially Inclusive* characteristic is evident through the involvement of the school community in cleanliness initiatives, waste management, and the Adiwiyata (environmental education) program. These activities are carried out by students, teachers, homeroom teachers, cleaning staff, and other stakeholders who support the program. The Adiwiyata coordinator notes that one of the goals of these activities is to "enhance student discipline" and foster a "sense of responsibility toward the environment" (RA).

Nevertheless, the involvement of the school community is not yet fully equitable. The Vice Principal for Curriculum explains, "Involvement is limited to certain groups" (SN). This aligns with the experiences of students who are not part of the Adiwiyata committee; they participate in cleanliness activities but are not directly involved in program planning (AD).

These findings indicate that the participation of the school community is more visible in the execution of daily activities, whereas involvement in planning remains restricted to specific individuals or groups. The school's strategy to cultivate environmentally conscious behaviour includes providing facilities, conducting monitoring and outreach, and implementing a system of rewards and warnings. Evidence from observations and documentation such as records of Friday activities, duty rosters, task assignments, or Adiwiyata program documents could further substantiate these findings, if available.

DISCUSSION

Based on this general overview, the research findings are subsequently elaborated upon in greater depth, organised according to the research sub-foci.

Topic 1. *Resource Efficient* in the implementation of a green economy at SMAN 5 Tambun Selatan

In this study, the characteristic of being *Resource Efficient* refers to efficiency in the sustainable use and management of resources, primarily through efforts to reduce waste and maximise the utilisation of available resources (UNEP, 2011). Practices are classified as resource-efficient if they demonstrate efforts to use resources sparingly, reuse materials that remain functional, or manage resources in a way that extends their useful life. The reuse or processing of resources that still possess utility including recycling and the utilisation of outputs derived from resource management also falls under this characteristic.

Resource Efficient is a key characteristic of a green economy, emphasising the effective, efficient, and sustainable use of resources. Research findings indicate that this characteristic is implemented at SMAN 5 Tambun Selatan through initiatives such as greening efforts, waste sorting and management, scheduled cleaning duties, the "Clean Friday" (Jumat Bersih) program, and the repurposing of used items via the Ecoprint technique. The practice of "Sampahku Tanggung Jawabku" further demonstrates an effort to foster a sense of accountability among students regarding the resources they consume and the waste generated by their daily activities. These findings align with research (Santosa, 2024) which suggests that the Adiwiyata (environmental education) program can cultivate green economy awareness through waste management and the utilisation of productive land. Similarly, research by (Mahardika & Anas, 2025) indicates that cleaning, recycling, and environmental management activities within the "Green Madrasa" program are consistent with the principles of resource efficiency and waste management.

The implementation of *Resource Efficient* at SMAN 5 Tambun Selatan goes beyond mere waste reduction; it focuses on the more responsible and sustainable use of resources. Plastic bottles, bottle caps, and used cooking oil are collected and sold to waste collectors, while dry leaves are repurposed to produce organic fertilizer as part of the school's PKWU (Entrepreneurship and Craft) curriculum. Furthermore, the school promotes the upcycling of discarded materials through a

"Work Showcase" (Panen Karya), where students create products that are then sold to the school community. These initiatives demonstrate that resources which might otherwise end up as waste can be repurposed, potentially generating economic benefits for the school or its members. However, as this study did not quantitatively measure the revenue generated from the sale of waste or the products created for the Panen Karya, these economic gains cannot be classified as a quantifiable increase in income (Alwasi et al., 2023). This illustrates that, from the UNEP perspective, *Resource Efficient* practices are not limited to reducing resource consumption or disposal; they also involve creating new value from materials previously dismissed as waste. The concept of green economic value is being internalised through the school community's habits of sorting, collecting, reusing, and processing resources that still hold utility. Students are encouraged not only to recognise waste as an environmental issue but also to identify resources that can still be utilised. Consequently, the internalisation of *Resource Efficient* values is evident in how the school community interacts with resources: rather than immediately discarding items after use, individuals now consider the potential for reuse or further processing. Such practices reflect both a commitment to maintaining a clean environment and a shift in how resources are managed to prevent them from immediately becoming waste. This aligns with other research indicating that *Green-Based Learning* can foster environmental awareness while simultaneously instilling green economic values in students (Nurhidayati et al., 2024). Similarly, research indicates that the Adiwiyata program can foster an awareness of the green economy through waste management and the utilisation of productive land (Syahyana & Putriana, 2025b).

Thus, the implementation of *Resource Efficient* at SMAN 5 Tambun Selatan is demonstrated not only through waste management and sorting, but also through the reuse of resources and the development of activities that generate economic value. This shows that environmental initiatives at the school have successfully linked resource management with economic benefits, thereby supporting the sustainability of the school's activities.

Topic 2. *Low Carbon* in the implementation of a green economy at SMAN 5 Tambun Selatan

In this study, the *Low Carbon* characteristic focuses on efforts to reduce energy consumption and activities that may generate carbon emissions, as well as to mitigate the environmental impacts associated with such emissions (United Nations Environment Programme (UNEP), 2011). A practice is categorised as a form of low-carbon implementation if it demonstrates efforts to conserve or reduce energy use, utilises more environmentally friendly energy sources, or involves other actions directly aimed at lowering emissions or one's carbon footprint. Waste management based on the 3R principle *(reduce, reuse, and recycle)* is not automatically classified as *Low Carbon*; it is only categorised as such if research data indicates that the practice is directly linked to efforts to reduce emissions or carbon output. Consequently, the *Low Carbon* classification in this study emphasises the connection between the practices employed and the reduction of

emissions and energy consumption, rather than focusing solely on resource efficiency or reuse.

The implementation of a *Low Carbon* at SMAN 5 Tambun Selatan is carried out through environmental management, waste reduction, and practices aimed at conserving water and electricity. Environmental management is realised through classroom cleaning activities, a Jumat Bersih initiative, and the habit of bringing personal food containers and water bottles to minimise the use of single-use items. Furthermore, members of the school community are encouraged to use water only as needed and to switch off lights, electrical appliances, and air conditioning when they are not in use. Interviews with the school community indicate that these habits are fostered to encourage the prudent use of energy and resources, while avoiding unnecessary consumption. These interview findings are supported by observations, which confirm that lights, electrical appliances, and air conditioning are indeed turned off when not in use, and that reusable water bottles and food containers are commonly utilised. While these practices demonstrate efforts toward energy conservation and a shift in behaviour regarding resource consumption, this study lacks data on electricity and water usage from before and after the program's implementation; therefore, it cannot quantitatively conclude that there has been a reduction in energy consumption, water use, or carbon emissions. This aligns with the characteristics of a *Low Carbon* approach as defined by the (United Nations Environment Programme (UNEP), 2011), which emphasises economic activities and development that reduce carbon emissions and environmental pressure. Consequently, the *Low* is best understood as the cultivation of habits such as energy conservation and the reduction of single use items rather than as measurable evidence of a decline in carbon emissions (Sinarsih & Chotimah, 2021). These findings are consistent with research by Junaidah, which shows that the Green Madrasa program is implemented through activities such as Jumat Bersih, recycling, and the management of eco-friendly facilities all of which align with the principles of resource efficiency and waste management (Mahardika & Anas, 2025).

The implementation of *Low Carbon* initiatives is also supported through environmental monitoring and evaluation activities. Monitoring is carried out via a classroom duty roster system, involving class presidents and the Adiwiyata (green school) team in overseeing cleanliness and the execution of environmental activities at the school. Additionally, CCTV systems are utilised to assist in monitoring the school's environmental conditions. Evaluations of cleanliness are conducted to identify existing issues and determine necessary corrective actions. Observations indicate that monitoring takes place through the classroom duty system and the active involvement of school personnel in overseeing the environment, while interviews reveal a clear division of roles in the execution and supervision of environmental activities. These findings demonstrate that the school possesses a mechanism for monitoring and evaluating environmental initiatives. However, the mere existence of such a monitoring mechanism does not in itself prove that these activities are consistently implemented or that they have successfully resulted in a reduction of resource consumption and carbon emissions. Consequently, in the context of this study, monitoring and evaluation

are understood as supporting mechanisms for overseeing the implementation of *Low Carbon* activities; their effectiveness in ensuring the long-term sustainability of the program, however, requires further empirical evidence and measurement.

Based on these findings, the implementation of a *Low Carbon* approach at SMAN 5 Tambun Selatan is evident in the shifting habits of the school community toward reducing resource consumption and waste specifically through the conservation of water and electricity, as well as a decrease in the use of single-use containers. These practices demonstrate that low-carbon principles are applied through simple, routine activities, supported by ongoing monitoring and evaluation to ensure the program's sustainability.

Topic 3. *Socially Inclusive* in the implementation of a green economy at SMAN 5 Tambun Selatan

In this study, the characteristic of being *Socially Inclusive* focuses on inclusive engagement and access, as well as the equitable distribution of benefits within the implementation of environmental initiatives (UNEP, 2011). If the implementation of environmental initiatives provides school community members with opportunities to engage with and access environmental facilities or programs in an inclusive manner and if the resulting benefits are shared equitably among them then such practices are categorised as *Socially Inclusive*. This engagement is evidenced by the participation of school community members in environmental activities, support for the availability of shared facilities, the cultivation of an environmentally conscious culture or set of behaviours, and collaboration with external parties that facilitate the execution of these initiatives. Thus, in this study, being *Socially Inclusive* is defined not merely by the presence of participation from the school community, but also by the existence of inclusive opportunities to engage in and derive benefits from the implementation of environmental initiatives.

is evident through the cultivation of an environmentally conscious culture, the provision of supporting facilities, and the active participation of the school community in various environmental initiatives. A culture of environmental stewardship is fostered through routine practices such as regular cleaning sessions, "Clean Friday" (Jumat Bersih) events, the adoption of the "LISA (Lihat Sampah Ambil)" motto, and the habit of using personal food and beverage containers. The school also provides essential infrastructure, including waste sorting bins, handwashing stations, cleaning tools, and leaf shredding equipment. These facilities are accessible to and utilised by the school community, ensuring that the *Socially Inclusive* nature of these efforts is reflected not only in the participation of individuals but also in their shared access to the necessary resources. Such habits and facilities demonstrate that environmental concern is integrated into the daily lives of the school community. Furthermore, the school community benefits from these facilities and activities through the creation of a cleaner environment, the availability of practical support, and the development of environmentally responsible habits. Consequently, these findings highlight key elements participation, access, and benefits within the school's environmental initiatives.

This aligns with other research indicating that the Adiwiyata (green school) program effectively integrates environmental values through specific activities and cultivates student awareness (Kuswati et al., 2025). Similarly, these findings are consistent with studies showing that the Adiwiyata program helps shape environmental awareness and character through hands on activities and the reinforcement of positive behaviours (Fikri et al., 2022).

Involvement in environmental programs at SMAN 5 Tambun Selatan engages various members of the school community, each according to their respective roles (Mutmainah et al., 2024). Interviews with the Vice Principal for Curriculum, the Adiwiyata (environmental education) coordinator, and students reveal how different members of the school community participate in various environmental initiatives. Observations further confirm the involvement of the school community in activities related to cleanliness and the management of the school environment. Additionally, documentation and information gathered during the research indicate that the school receives external support such as from the Bekasi Regency Environmental Agency, the Bekasi Waste Bank, and waste collection services to bolster its environmental efforts. This support manifests through various activities and facilities dedicated to environmental management. Such engagement and support reflect an effort to foster a school environment that encourages environmental awareness and provides benefits to the entire school community. However, interviews with students and observations suggest that participation in these environmental activities is not yet fully equitable, as some students remain less active. These findings highlight that the implementation of a *Socially Inclusive* approach requires not only the involvement of various stakeholders but also careful attention to ensuring equal opportunities for all to participate in and benefit from environmental activities.

The implementation of a *Socially Inclusive* approach faces several challenges, including the turnover of students, limitations in time, human resources, and available space, as well as the presence of students who are less active in environmental initiatives. These conditions indicate that the internalisation of green economy values has not yet occurred uniformly across all members of the school community. Such values are internalised through the repeated practice of environmental activities such as routine cleaning and other eco friendly endeavors with the goal that environmentally conscious behaviour becomes a habitual part of the school community's daily life, rather than something practiced only during specific programs. Student turnover necessitates the re-initiation of these habits, particularly for new students, through orientation and the introduction of the school's environmental culture and activities. Beyond habituation, the distribution of roles among school community members serves as another mechanism for fostering engagement. This structure allows individuals to participate according to their specific roles, while school-provided facilities ensure access to environmental activities. Consequently, the school conducts ongoing outreach especially for new students while expanding its range of activities and strengthening collaborations with external parties. Thus, the internalisation of *Socially Inclusive* values is evidenced by the processes of habituation, the provision of opportunities for engagement, the clear assignment of roles, and the availability

of facilities that support environmental initiatives. Nevertheless, this process is not yet fully optimal, as student participation remains uneven, and the school continues to contend with constraints regarding time, personnel, and space. Furthermore, the sustainability of external partnerships must be ensured so that support for environmental activities does not rely solely on temporary arrangements. Therefore, evaluating existing challenges and the level of community engagement is essential to refine program implementation and strengthen the long-term internalisation of green economy values.

CONCLUSION

Based on the research findings, the implementation of green economy principles at SMAN 5 Tambun Selatan can be analysed through three characteristics defined by the United Nations Environment Programme (UNEP): *Resource Efficient, Low Carbon, and Socially Inclusive*. Regarding the *Resource Efficient* characteristic, implementation is evident in waste sorting and management, resource reuse, and the transformation of resources into products exemplified by initiatives such as converting dry leaves into organic fertilizer, creating ecoprints, and showcasing student projects (Panen Karya). The sale of waste materials and eco friendly products demonstrates resource utilisation practices with potential economic benefits, although this study did not quantitatively measure the economic value generated. In terms of the *Low Carbon* characteristic, implementation is reflected in habits such as maintaining environmental cleanliness, reducing the use of single use containers, and practicing water and electricity conservation. While these findings point to conservation efforts and a shift toward more frugal resource consumption, the study did not measure specific changes in energy or water consumption, nor in carbon emissions. Meanwhile, the *Socially Inclusive* characteristic is demonstrated by the cultivation of an environmentally conscious culture, the provision of supporting facilities, the active involvement of the school community, and collaboration with external parties. Nevertheless, student participation is not yet fully uniform, and the execution of these initiatives remains constrained by limitations in time, manpower, and available space. In conclusion, this study indicates that green economy principles have been integrated into various environmental practices at SMAN 5 Tambun Selatan, aligned with the three UNEP characteristics; however, further efforts to enhance the engagement of the school community and better manage resource constraints are necessary to strengthen this implementation.

Based on these research findings, schools are encouraged to maintain existing environmental programs while further developing initiatives that have yet to reach their full potential particularly by improving waste management, such as optimising waste sorting, enhancing the operation of waste banks, and converting organic waste into compost. Furthermore, it is essential to strengthen the engagement of the entire school community by assigning more active roles in environmental activities and fostering stronger collaborations with relevant stakeholders. Future research could be conducted across multiple schools to provide a comparative analysis of how the green economy is implemented within

Adiwiyata (environmentally-conscious) schools. Subsequent studies might also supplement qualitative approaches by incorporating quantitative measurements such as electricity and water consumption, emissions, and the tracking of revenue or economic benefits derived from waste management. Additionally, longitudinal studies are needed to assess the long-term sustainability of these programs and the extent to which green economy values are internalised within the school environment.

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