

Student empowerment in waste management to enhance community environmental awareness

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ABSTRACT

Effective waste management is a pressing challenge for developing countries, particularly as rapid urbanization and economic growth lead to increased waste generation. This study examines the application of Vahan Yengidunyan's Territorial Management Theory to enhance environmental cleanliness at Riyadhul Jannah Islamic Boarding School in Babakan, Ciseeng, Bogor. The theory focuses on the strategic planning and organization of space to sustain social order and optimize resource use within a territory. At Riyadhul Jannah, this approach is used to involve students in managing waste through a structured system of territorial division, task scheduling, assignment of responsibilities, monitoring, and rewards and sanctions. The study highlights the need for effective waste management practices, including waste segregation, reduction, and recycling, and the importance of student education and participation in these practices. The implementation of Yengidunyan's theory at the pesantren aims to foster environmental responsibility and sustainability among students, leading to a cleaner and more organized school environment. The results demonstrate that integrating students into the waste management process not only improves operational efficiency but also educates them about sustainable practices, contributing to both local and global environmental conservation efforts. The outcome of participatory monitoring indicate that 60% of students consistently disposed of waste in its proper place. The awareness of environmental cleanliness among students has increased about 80% based on survey results.

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INTRODUCTION

Waste management has become a critical issue for developing countries. As these nations experience rapid urbanization and economic growth, the volume of waste they generate increases significantly (Kumari & Raghubanshi, 2023). Effective waste management is crucial and must begin with thorough planning, seamless operational execution, and diligent oversight. Proper planning involves assessing the waste generation patterns and developing a

comprehensive strategy that includes waste reduction, segregation, and disposal methods (Pires et al., 2011). Operational aspects focus on implementing the planned strategies, ensuring efficient collection, transportation, and processing of waste. Regular management is essential to monitor and optimize these processes, address any emerging issues, and adapt to changing waste patterns. By integrating these elements—planning, operation, and management—communities and organizations can significantly improve waste management practices, reduce environmental impact, and promote sustainability.

Institutional waste falls into a category of waste that requires careful management due to its unique characteristics and potential impact (Auvaria, 2016). This type of waste, generated by institutions such as schools, hospitals, and government offices, often includes a variety of materials such as paper, electronic waste, and food scraps, which can differ significantly from residential waste. Proper management of institutional waste is essential to ensure efficient disposal and recycling, reduce environmental impact, and comply with regulatory standards. Effective handling of this waste not only mitigates potential health risks and pollution but also promotes sustainability by optimizing resource use and minimizing landfill contributions.

Pondok Pesantren Riyadlul Jannah, located at Jl. H. Madnur Kp Binong, Desa Babakan, Kecamatan Ciseeng, Kabupaten Bogor, West Java Province, is an Islamic boarding school that generates waste as part of its daily operations. The institution is currently working on improving its waste management practices to ensure a more effective and sustainable system. This effort includes developing better waste segregation, collection, and disposal methods to enhance overall environmental stewardship and reduce the impact of its waste on the surrounding community.

The primary challenge faced by Pondok Pesantren Riyadlul Jannah is effective waste management. The institution struggles with organizing and implementing efficient waste collection, segregation, and disposal processes. This difficulty is compounded by limited resources and infrastructure, which hampers their ability to address waste-related issues comprehensively. As a result, there are ongoing concerns about environmental impact and the overall efficiency of their waste management system. Addressing these challenges is crucial for improving sustainability and minimizing the negative effects of waste on the pesantren and its surrounding community.

Successful waste management requires the active involvement of environmental, community, and financial stakeholders. Effective waste management systems depend on collaborative efforts that include environmental awareness and practices, community participation in waste segregation and recycling, and sufficient financial investment to support infrastructure and operational costs. Engaging these three areas ensures a holistic approach where environmental sustainability is promoted, communities are educated and motivated to contribute, and financial resources are allocated to maintain and enhance waste management practices (Troschinetz & Mihelcic,

2009). By integrating these elements, waste management initiatives can achieve greater effectiveness and sustainability.

Given these considerations, Pondok Pesantren Riyadlul Jannah recognizes the importance of effective waste management and is addressing this by involving its students in a regional management system. By integrating students into the waste management process, this pesantren aims to foster a sense of responsibility and awareness about waste issues. This approach not only helps in managing waste more efficiently but also educates the students about sustainable practices and environmental stewardship. Implementing a regional management system with active student participation ensures that waste management becomes a shared responsibility, contributing to more effective and sustainable outcomes.

METHOD

Territorial management, as conceptualized by Vahan Yengidunyan, is explored in his journal article titled "Territorial Management in the Sphere of Social-Spatial Planning, Spatial Organization and Control as a Practice of Reproduction of the Social Space." In this work, Yengidunyan discusses how territorial management involves the strategic planning and organization of space within social environments, aiming to maintain and reproduce the social order. This approach emphasizes the importance of managing specific territories or regions to ensure the effective functioning and sustainability of social systems, which is particularly relevant in the context of community-based settings like schools or residential areas.

Yengidunyan defines territorial management as a process of planning, organizing, and controlling the use and development of a territory. This process encompasses various strategies, policies, and actions implemented by public administration, self-government bodies, organizations, and community representatives. The goal of territorial management is to ensure the sustainable and efficient use of resources and infrastructure in both populated and non-populated areas within a defined territory (Yengidunyan, 2024). By coordinating these efforts, territorial management aims to optimize the development and maintenance of these areas, balancing social, economic, and environmental needs.

Yengidunyan, in his theory of territorial management, draws inspiration from Edward T. Hall, whose work focuses on how individuals or groups manage and respond to areas or territories they perceive as their own (Hall, 1966). In the context of a pesantren, students who are given responsibility over specific areas are more likely to feel a sense of ownership, which in turn motivates them to maintain cleanliness in those spaces. Edward T. Hall is well-known for his research in anthropology and non-verbal communication, particularly for introducing the concepts of personal space and territoriality in social relationships.

Territorial management involves several key elements that are essential for its effective implementation. Firstly, spatial planning is crucial, as it involves the careful design and organization of the physical space to ensure that

resources are optimally allocated and used. This includes zoning, infrastructure development, and environmental considerations (Yengidunyan, 2024). Secondly, regulation and control are vital, encompassing the establishment of rules, policies, and guidelines that govern the use of the territory. These regulations help maintain order and ensure that the space is used sustainably and efficiently (Simamora & Junuudhizbulloh, 2023). Thirdly, stakeholder engagement plays a significant role, as the involvement of public administration, local communities, organizations, and other relevant parties is necessary for the successful management of a territory. This participatory approach ensures that the needs and interests of all stakeholders are considered, leading to more equitable and effective outcomes. Additionally, resource management is a key component, focusing on the sustainable use and conservation of natural, economic, and social resources within the territory. This includes managing both human and material resources to maximize efficiency and minimize waste (Artamevia & Yuanjaya, 2024). Finally, monitoring and evaluation are critical for assessing the effectiveness of territorial management practices (Basyah & Fajar, 2024). Regular evaluation allows for the identification of areas for improvement and the adjustment of strategies to better achieve the desired outcomes. Together, these elements form the foundation of territorial management, ensuring that the territory is developed and maintained in a way that is sustainable, efficient, and responsive to the needs of its inhabitants.

To contextualize the theory of territorial management, Riyadhul Jannah has developed the following implementation concept. Here is the implementation concept developed by Riyadhul Jannah to contextualize the theory of territorial management 1) Territorial division, 2) Task scheduling, 3) Assignment of responsibilities, 4) Monitoring and evaluation, 5) Rewards and sanctions.

Yengindunyan's theory was adapted at the Riyadhul Jannah Islamic boarding school due to considerations of the unique values that thrive in boarding schools, which emphasize collectivity and obedience. This territorial division was applied dynamically, taking into account locations where garbage tends to accumulate and areas that are often gathering points for students. In this context, Seniors/Ustadz observe and study the habits of students, especially when they are active outside of school or dormitories during break times. Thus, territorial management in its application is not understood as a rigid administrative division. This territorial management theory is not merely grafted but adopted in an acculturative manner, taking into account the habits of Riyadhul Jannah students in disposing of waste.

RESULT AND DISCUSSION

As of 2021, the population of Islamic boarding schools, or pesantren, in Indonesia is remarkably extensive, reflecting the significant role these institutions play in the country's educational and religious landscape. The number of students, or santri, has also seen a substantial increase, indicating the growing importance and reliance on pesantren for education in Islamic teachings as well as general subjects. According to the latest data, Indonesia,

across its 33 provinces, is home to a staggering 553,099 pesantren. These institutions collectively accommodate a total of 4,373,694 santri. This large and ever-expanding population of both pesantren and santri underscores the vital role these institutions play in shaping the social, cultural, and religious fabric of Indonesian society, making them crucial centers for community development and moral education.

Table 1. Number of Islamic boarding schools, teachers, and students by province

No	Province	IBS	Teacher	Student	Year
1	Aceh	1.286	25.115	272.601	2020/2021
2	Sumatera Utara	252	7.661	94.888	2020/2021
3	Sumatera Barat	240	4.166	44.118	2020/2021
4	Riau	301	4.981	53.06	2020/2021
5	Jambi	290	5.18	53.295	2020/2021
6	Sumatera Selatan	378	6.927	86.667	2020/2021
7	Bengkulu	54	899	9.489	2020/2021
8	Lampung	904	11.383	96.583	2020/2021
9	Kep. Bangka Belitung	57	990	9.28	2020/2021
10	Kepulauan Riau	98	1.536	15.02	2020/2021
11	DKI Jakarta	113	2.198	22.508	2020/2021
12	Jawa Barat	9.31	117.281	901.222	2020/2021
13	Jawa Tengah	3.927	62.025	558.62	2020/2021
14	DI Yogyakarta	337	5.637	54.326	2020/2021
15	Jawa Timur	5.121	95.681	970.541	2020/2021
16	Banten	5.344	63.87	467.175	2020/2021
17	Bali	92	1.214	9.63	2020/2021
18	Nusa Tenggara Barat	730	25.001	291.464	2020/2021
19	Nusa Tenggara Timur	35	364	4.011	2020/2021
20	Kalimantan Barat	265	4.415	54.681	2020/2021
21	Kalimantan Tengah	91	1.651	16.18	2020/2021
22	Kalimantan Selatan	264	7.161	93.198	2020/2021
23	Kalimantan Timur	176	3.646	37.432	2020/2021
24	Kalimantan Utara	23	413	3.406	2020/2021
25	Sulawesi Utara	22	400	6.071	2020/2021
26	Sulawesi Tengah	109	1.489	12.553	2020/2021
27	Sulawesi Selatan	342	7.695	82.283	2020/2021
28	Sulawesi Tenggara	109	1.995	17.286	2020/2021
29	Gorontalo	31	704	7.262	2020/2021
30	Sulawesi Barat	86	1.542	15.056	2020/2021
31	Maluku	24	173	1.2	2020/2021
32	Maluku Utara	28	632	5.808	2020/2021
33	Papua	37	606	5.216	2020/2021
34	Papua Barat	18	234	1.564	2020/2021

Source: <https://satudata.kemendiknas.go.id/dataset/detail/jumlah-pondok-pesantren,-guru,-dan-santri-menurut-provinsi>

Based on the data above, particularly for West Java, if we calculate the average number of students per pesantren, there would be approximately 968 students in each pesantren in the region. Although this is not always the case—some pesantren may have more or fewer students—the fact remains that these students live in one location for an extended period. They eat, sleep, and therefore generate waste in that location. This highlights the importance of territorial management to ensure that waste is effectively managed, maintaining the cleanliness and health of the pesantren.

Many students at Riyadhul Jannah still lack the knowledge and awareness regarding waste management. Educating them on proper waste management

is crucial for maintaining the cleanliness and health of the pesantren environment. Important topics to be taught include: the types of waste, such as organic waste (e.g., food scraps, leaves, and other biodegradable materials), inorganic waste (e.g., plastic, metal, and other materials that are difficult or impossible to decompose), and hazardous waste (e.g., batteries, expired medications, and household chemicals). The principles of 3R—Reduce, Reuse, Recycle—should also be emphasized: Reduce by minimizing the use of items that could become waste, Reuse by finding ways to use items again, and Recycle by processing materials to create new products. Additionally, students should be educated on waste segregation, teaching them to separate waste into organic, inorganic, and hazardous categories for easier and more efficient management. They should also learn about composting, understanding how to turn organic waste into compost, which can be used as fertilizer for the pesantren's gardens. The dangers of plastic waste, particularly its negative impact on the environment, such as soil and water pollution, should also be addressed. Furthermore, the importance of active participation in waste management within the pesantren through assigned tasks and responsibilities should be instilled in the students. The health impacts of poorly managed waste, which can become a source of disease, need to be explained as well. Creativity in waste processing, such as turning recyclable materials into useful products like crafts, is another important aspect. Finally, it is essential to communicate the rules and discipline surrounding waste management in the pesantren and emphasize the significance of following these rules to maintain a clean environment. Educating students on how good waste management practices can contribute to global environmental conservation is also vital.

The socialization of waste management practices to the students of Riyadhul Jannah is of paramount importance in fostering a culture of environmental responsibility and sustainability within the pesantren. Educating the students about proper waste management not only helps maintain the cleanliness and health of their living environment but also instills in them a sense of duty to protect the environment (Nurhasanah & Kurniasih, 2023). Through awareness and hands-on involvement, students learn to minimize waste, segregate it effectively, and contribute to recycling efforts, all of which are essential for creating a sustainable and healthy community (Debrah et al., 2021). This knowledge empowers them to take active roles in maintaining their surroundings and prepares them to be environmentally conscious citizens in the broader society.

The effectiveness of the territorial management method at Riyadhul Jannah hinges on the students' knowledge and understanding of waste management. Without a solid foundation in waste management practices, students will lack the necessary awareness and skills to properly manage and maintain their assigned areas (Molina & Catan, 2021). This could lead to ineffective waste disposal, environmental degradation, and a failure to uphold the cleanliness and hygiene standards of the pesantren. Therefore, educating the students about waste is crucial, as it equips them with the tools they need

to successfully implement territorial management and contribute to a healthy, sustainable living environment.



Picture 1. Coordination meeting for socialization planning

Therefore, after conducting the waste management socialization, we implemented the following core steps in applying the territorial management theory: *first*, territorial division. In certain areas of Riyadhul Jannah, waste tends to accumulate more frequently, requiring a dedicated group of students to be on standby for proper management. These key locations include the dormitories, mosque, kitchen, courtyard, and bathrooms. These five areas, referred to as territories, will be further divided into smaller sections to ensure more focused and effective waste management. This approach ensures that each area is consistently monitored and maintained, helping to keep the pesantren clean and well-organized.



Picture 2. Placing trash bins at designated points and creating trash bins

Second, task scheduling. In the task scheduling system at Riyadhul Jannah, there are both daily and weekly controls to ensure effective waste management. Each day, specific groups of students are assigned to monitor and manage the cleanlines of their designated territories, following a rotational system that ensures every student shares responsibility. Additionally, there is a designated day each week when all students work together to collect and sort waste across the entire pesantren. This collective effort not only reinforces the

importance of teamwork but also ensures that all areas are thoroughly cleaned and waste is properly segregated. This structured approach helps maintain a consistent standard of cleanliness and instills a strong sense of accountability among the students.

Third, assignment of responsibilities. The concept of Assignment of Responsibilities at Riyadhul Jannah involves delegating specific tasks to each student and appointing senior students as Area Coordinators. Each student is given a clearly defined role within their assigned territory, ensuring that all aspects of waste management and cleanliness are covered. These tasks might include sweeping, collecting trash, sorting recyclables, or maintaining cleanliness in specific sections such as the dormitories, mosque, or bathrooms. By giving each student a specific responsibility, the system promotes a sense of ownership and accountability. In addition, senior students are designated as Area Coordinators, overseeing the work within their respective territories. These coordinators are responsible for guiding their peers, ensuring tasks are completed efficiently, and reporting any issues that need further attention. This hierarchical structure not only helps in maintaining order and discipline but also fosters leadership skills among senior students, while ensuring that the overall management of the pesantren's environment is both organized and effective.

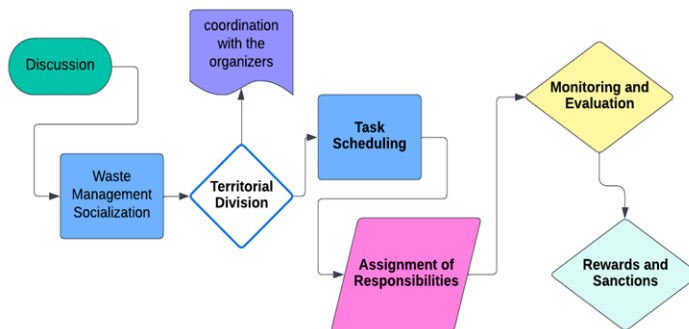


Picture 3. Waste management socialization

Fourth, monitoring and evaluation. In the Monitoring and Evaluation process at Riyadhul Jannah, two key components ensure the effectiveness of the waste management system: Regular Supervision by Seniors/Ustadz and Weekly Evaluations. Regular supervision involves senior students and Ustadz actively overseeing daily waste management activities within their assigned territories. Their role is to monitor the completion of tasks, provide guidance, and address any issues that arise, ensuring that the standards of cleanliness are consistently met. This ongoing supervision helps maintain discipline and accountability among the students. Complementing this is the Weekly Evaluation, where the performance of each territory is assessed based on specific criteria such as cleanliness, waste segregation, and overall organization. These evaluations provide feedback to the students and highlight areas for improvement, while also recognizing those who excel in maintaining

their responsibilities. Together, these components create a continuous loop of monitoring and feedback, fostering a culture of responsibility, improvement, and pride in maintaining a clean and healthy environment within the pesantren.

Fifth, rewards and sanctions. The rewards and sanctions system at Riyadhul Jannah is designed to motivate students to maintain high standards of cleanliness and responsibility within their assigned territories. This system includes two key components: Rewards for the Cleanest Area and Sanctions for Negligence. Rewards are given to the groups of students who consistently maintain the highest level of cleanliness and organization in their designated areas. These rewards, which might include public recognition, privileges, or tangible incentives, serve to encourage positive behavior and reinforce the value of diligence and care in waste management. On the other hand, Sanctions are imposed on those who neglect their duties or fail to meet the expected standards. These sanctions, which could range from additional responsibilities to loss of privileges, are intended to underscore the importance of accountability and the consequences of negligence. By balancing rewards and sanctions, this system not only promotes a culture of cleanliness and responsibility but also ensures that all students are actively engaged in maintaining a healthy and orderly environment in the pesantren. All of these activities can be simplified in a diagram as follows:



Picture 4. Flowchart of waste territorial management implementation

The outcome of participatory monitoring indicate that 60% of students consistently disposed of waste in its proper place. The awareness of environmental cleanliness among students has increased about 80% based on survey results. Another positive result is the awareness of students to sort non-organic waste before it is burned at the special waste incinerator owned by the Ridyahul Jannah Islamic Boarding School. However, the main challenge identified in this study is the absence of formal policies issued by Islamic boarding schools or madrasas regarding waste that can bind and guarantee the continuity of this system. This finding also emphasises the importance of institutions in maintaining a good waste management system.

The implementation of waste management methods with territorial division such as this has proven to be feasible and can be used as a model to be replicated in other Islamic boarding schools while maintaining contextual

appropriateness. Waste management methods such as this can significantly increase individual awareness. The main implication found from this study is the urgency of formal policies in maintaining program sustainability. This is a critical concern for all programs run in Islamic boarding school environments.

CONCLUSION

To maintain the cleanliness of the pesantren environment, the most fundamental step is to cultivate students' awareness of the true nature of waste—its types, dangers, management, and even potential benefits. In this context, effective socialization is the primary requirement. However, socialization alone, without concrete follow-up actions, will fade away without producing meaningful change. Therefore, an implementative method is needed to actively engage students in practical waste management. This is where the Territorial Management theory and method become relevant. It involves several key components, including territorial division across dormitories, the mosque, classrooms, kitchen, courtyard, and bathrooms; task scheduling through daily and weekly rotations with cleaning sessions every morning and afternoon; assignment of responsibilities, with specific tasks for each student and area coordinators (senior students); regular monitoring and evaluation conducted by seniors or ustadz, along with weekly reviews; and a system of rewards and sanctions, granting recognition to the cleanest area and imposing consequences for negligence. An important point highlighted by the research findings is that maintaining consistency in waste management programs requires balanced and binding policies for both students and the institution, providing a clear legal foundation for continuous evaluation.

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