



Analysis of the Effectiveness of Waste Management at TPS3R Mekarwangi in Realizing a Sustainable City: A Case Study on Transforming Waste into Economically Valuable Products

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Abstract

This study aims to assess the effectiveness of waste management by the Waste Processing Facility for Reduce, Reuse, Recycle (TPS3R) Mekarwangi (Mekar Mandiri) in supporting the realization of a sustainable city and in utilizing waste as economically valuable products, using the Triple Bottom Line framework, a management theory by J. Elkington, which encompasses environmental (planet), social (people), and economic (profit) dimensions. The research employs a mixed-method approach, focusing on semi-structured interviews with TPS3R staff, with variables determined according to environmental, social, and economic aspects. Data from the interviews were triangulated with information from Environmental Agency (DLH) officials, representatives of the neighborhood units (Rukun Warga) served, surrounding environmental documentation, and direct observations. The study also considers government regulations and standards, particularly Permen PU No. 03/PRT/M/2013, as a reference for assessing compliance and operational standards. The triangulated results were scored using a Likert scale of 1–4 to evaluate effectiveness. The findings reveal that waste management at TPS3R Mekarwangi is moderately effective in supporting the development of a sustainable city. In the environmental dimension, effectiveness is demonstrated through improvements in management quality and reductions in pollution. In the social dimension, effectiveness is reflected in the increase of service users and the creation of employment opportunities, although community participation in waste segregation remains limited. In the economic dimension, operational sustainability is maintained through community contributions, although external support and the development of recycled products remain suboptimal. This study highlights the relevance of applying the Triple Bottom Line concept, alongside government standards, in evaluating the effectiveness of community-based waste management oriented toward achieving sustainable cities.

Keywords: TPS3R Mekarwangi (Mekar Mandiri), Sustainable City, Triple Bottom Line, Effectiveness, Recycled Products

1. Introduction

According to data from the Indonesian Child Protection Commission (KPAI), cases of violence against children in 2024 reached tens of thousands (KPAI, 2025). Most of the cases reported by the public were sexual violence cases. The Ministry of Women's Empowerment and Child Protection (KemenPPPA) recorded 28,831 cases of violence against children throughout 2024 (NU Online, 2024). KPAI explained that young children are very vulnerable to violence both at home and in their immediate environment. This situation is due to a lack of education about children's rights and bodily privacy, making children vulnerable to becoming victims, especially since children often cannot identify the incidents they experience and report them (Fitri, et al. 2025).



Based on Law No. 20 of 2002 concerning the National Education System, early childhood education is defined as an effort to nurture children from birth to six years of age by providing educational stimuli to assist their physical and spiritual growth and development (Ministry of Education, 2002). This definition should be used as a reference for stimulating children to protect themselves. One form of guidance related to child protection is introducing children to their bodily privacy (Suryani, et al. 2024). On the other hand, introducing body privacy is part of sex education (Jafar, et al. 2024). Sex education begins with introducing the parts of the body, followed by learning about the function of the genitals as reproductive organs. The goal is for children to understand their bodies and the bodies of the opposite sex and to be able to avoid inappropriate situations (Jafar, et al. 2024).

Introduction to body parts is the beginning of a child's understanding of the concept of self and the individual rights that children should have. The development of reflective body awareness begins when children are 18-21 months old. Over time, children will explore their bodies and compare them with the bodies of others (Brownell, et al. 2007). As children's cognitive maturity increases, their knowledge about the body needs to be enhanced with awareness of their bodily privacy. Children should be aware that their bodies are their private property (Marlina & Pransiska, 2018). Good privacy awareness in children can form a strong foundation to protect them from potential abuse and give them a better understanding of their own boundaries and those of others. This privacy education is even more crucial in today's digital age, where privacy violations can occur in various forms, both directly and indirectly (Rahmadani, 2024).

Recent research findings from Smith et al. (2023) show that experience-based learning programs for early childhood, including toilet training integrated with the introduction of the concept of privacy, can improve children's understanding of bodily boundaries and strengthen protection against the risk of abuse. Toilet training needs to be introduced early to predict the reflexes of urination and defecation at the right time and also help children to do it in the right place (Wulandari, Rachmawati, 2024). Research on toilet training is usually limited to urination and defecation activities. In fact, there are many other activities related to the toilet, such as wudhu, bathing, and washing hands/feet, one of which is a medium for learning about the anatomy and function of their own body parts (Fitri, et al. 2025). During toilet training, children learn to practice cleaning their anus and genitals properly (Hasanah, 2020).

According to Erik Erikson's psychosocial development theory, children aged 1-3 years are in the stage of autonomy vs. shame and doubt, where children begin to learn self-control but also have the potential to develop shame and doubt if they do not receive the right support (Mokalu & Charis, 2020). Toilet training is an activity that contributes to the development of autonomy by training children to control their bodily functions so that they can avoid feelings of shame and doubt (Kamilla, et al. 2022). In early childhood, the application of toilet training within the limits of body privacy awareness includes children being able to go to the bathroom by themselves, not taking off their clothes in front of others, and not allowing others to touch their bodies, especially their private areas (Kurniawati, 2024).



However, based on initial observations at KB Yumna, toilet training is often focused solely on functional aspects, such as the child's ability to use the toilet independently, without integrating the concept of privacy awareness. This indicates a gap in the learning approach that could maximize the potential of toilet training as a means of increasing children's privacy awareness. Therefore, the purpose of this study is to increase children's privacy awareness through toilet training.

2. Research Method

The research method used in this study was classroom action research (CAR). According to Kemmis, CAR is self-reflective research conducted in social situations, including educational settings, to improve one's own practices (Izza, 2020) (Simanjutak, et al., 2023). Therefore, with this method, the problems experienced by children regarding their bodily privacy and the implementation of toilet training can be improved and enhanced through planning, action, and reflection so that the problems can be overcome. The research was conducted at KB YUMNA Padang Panjang City with 15 children aged 3-5 years. The research was conducted for three months in the second semester.

Data collection was carried out using direct observation and documentation techniques. According to Nawawi (2000), direct observation is a data collection method that involves observing and recording visible phenomena in the research object, which is carried out directly at the place where an event, condition, or situation occurring. Meanwhile, according to Margono (Sugiono, 2013), observation is a technique or method of collecting data by observing ongoing activities. The object of observation in this study was the increase in body privacy awareness through toilet training activities. Based on the observations, the reflection stage in the PTK design led to improvements in the lesson plan (RPPH) that included toilet training activities. These include classroom settings, preparation of learning media, preparation of learning materials, mastery of materials, and conditioning of children. Furthermore, the documentation technique is a method of collecting data during the research in the form of recordings of learning activities. The recordings collected are in the form of photos of children's activities.

The collected data were analyzed quantitatively and qualitatively. In the quantitative analysis, the percentage increase in understanding of body privacy was calculated. Meanwhile, the data analyzed qualitatively were obtained from observations of the toilet training learning process in increasing privacy awareness. The following is the quantitative analysis formula (Suryono, 2014):

$$P = \frac{F}{N} \times 100$$



Explanation:

P = Percentage result

F = Number of students who completed the activity

N = Number of frequencies / number of individuals

100% = Fixed number

An increase in children's privacy awareness is said to have increased if the percentage of children's activity results increases from the next observation. An increase in children's body privacy awareness is determined based on the following criteria:

75% - 100% : Developing Very Well (BSB)

50% - 75% : Developing as Expected (BSH)

25% - 50% : Starting to Develop (MB)

0% - 25% : Not Yet Developing (BB)

3. Results and Discussions

Pre-cycle

The first step taken by researchers before conducting classroom research is to begin observation. Researchers observed problems occurring at the YUMNA Guguk Malintang Kindergarten in Padang Panjang City, namely aspects of body privacy awareness through toilet training activities. The focus of observation was children's ability to urinate in the toilet, their ability to clean themselves after urinating in the toilet, and their ability to flush the toilet after urinating. recognizing the boundaries of the body that can be touched and seen by others, children knowing the appropriate place and time to take off and put on clothes, children showing an understanding of private body parts (for example, covering them or not allowing others to see them), and children appearing comfortable or uncomfortable when using the toilet, especially if there are other people nearby.

The teacher conducted a question-and-answer session about bodily privacy. Then the teacher explained the learning activities that would be carried out. During the learning activities, the researcher conducted preliminary observations or pre-cycle observations and found that some children still did not know what bodily privacy was and were not yet able to use the toilet independently. In addition, the children's fear of using the toilet was also clearly evident, as they did not want to take off their diapers, were afraid to go to the toilet alone, and crowded together when they wanted to use the toilet.

Cycle 1

In cycle 1, the results of observations on each indicator showed the following achievement percentages: 1) 40% of children were able to urinate in the toilet. 2) 40% of children were able to



clean themselves after urinating in the toilet. 3) Children's ability to flush the toilet after urinating was 36%. 4) Children's understanding of the boundaries of their bodies that can be touched and seen by others was 51%. 5) Children's knowledge of the appropriate place and time to take off and put on clothes was 58%. 6) Children's understanding of private body parts (e.g., covering them or not allowing others to see them) was 33%. 7) Children's comfort level when using the toilet, especially when others are nearby, was 37%.

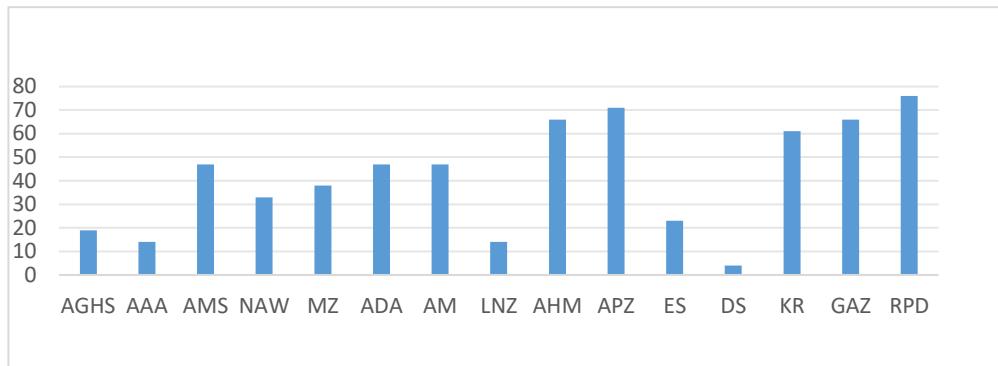


Figure 1. Percentage of Body Privacy Awareness in Each Child in Cycle 1

The graph above shows that observations in cycle 1 indicate that children's awareness of privacy is still low. Based on the percentage results, the minimum percentage is 4%. This is due to the lack of ability in children with special needs, who require more specific and gradual handling compared to other children. The maximum percentage is 76%.

Based on reflections conducted in cycle 1 on toilet training activities, it was found that most children still did not fully understand the concept of private body parts and who was allowed to see and touch those parts. This was evident from the observation results, which showed that children had low responses to questions related to body privacy. In addition, teachers still lack focus on teaching body privacy awareness in toilet training activities, so the main learning objectives have not been optimally achieved. The lack of supporting learning media, such as illustrative pictures, educational videos, or relevant teaching aids, is also an obstacle in delivering the material in a concrete and interesting way for children. Therefore, improvements in learning strategies, increased teacher capacity, and the addition of supporting media are needed to improve children's understanding of the importance of maintaining body privacy. Thus, in the second cycle, detailed improvements were made to the learning scenario using teaching aids.

Cycle 2



The results of observations in cycle 2 showed an increase in children's body privacy awareness compared to the results of cycle 1, as follows: 1) Children's ability to urinate in the toilet 84%, 2) Children's ability to clean themselves after urinating in the toilet 73%, 3) Children's ability to flush the toilet after urinating was 69%, 4) children's understanding of the boundaries of their bodies that can be touched and seen by others was 87%. 5) Children's knowledge of the appropriate places and times to take off and put on clothes: 80%, 6) Children's understanding of private body parts (e.g., covering them or not allowing others to see them): 62%, and 7) Children's comfort level when using the toilet, especially when others are nearby: 82%.

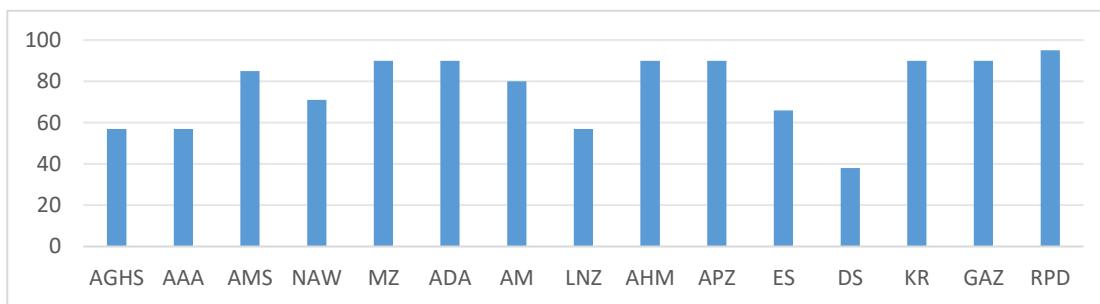


Figure 2. Percentage of Body Privacy Awareness in Each Child in Cycle 2

The chart above shows that in cycle 2, children's awareness of privacy increased significantly. Based on the percentage results, the minimum percentage found was 38% and the maximum percentage was 95%. This proves that increasing the focus of discussion on bodily privacy and using varied and interesting learning media for children can increase children's awareness of bodily privacy.



The differences in the results obtained for each indicator in cycles one and two are shown in the graph below:

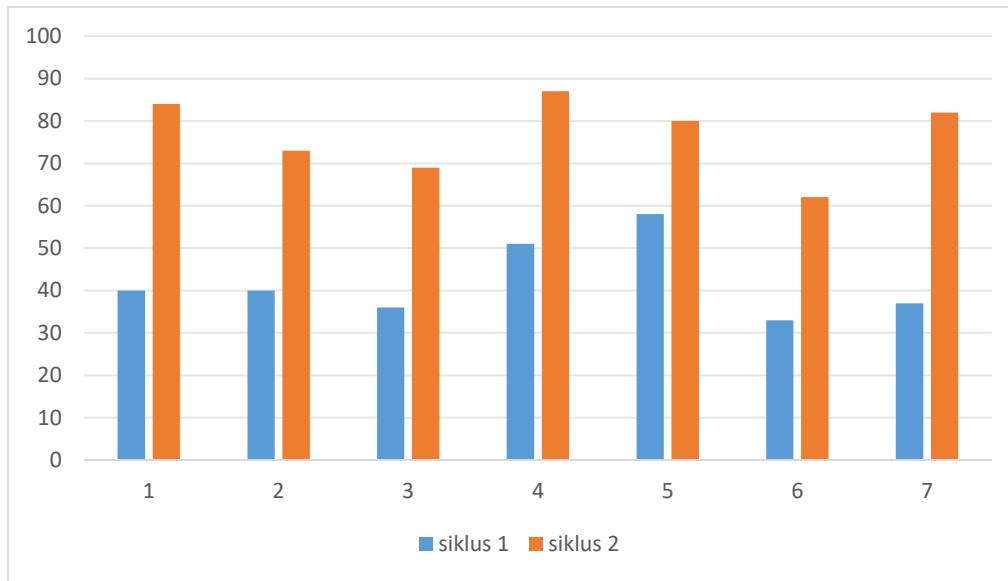


Figure 3. Comparison of Cycle 1 and Cycle 2 Percentages

The graph above shows that the research conducted in cycles 1 and 2 resulted in an overall improvement in children's abilities in cycle 2. This can be observed from a comparison of the graphs for the six indicators observed by researchers in each cycle.

Based on the observations made in cycle 1 and cycle 2, it can be seen that there has been an increase in children's understanding of body privacy, such as children being more independent in going to the toilet (taking off and putting on their own pants) without the help of others. Children have a better understanding of their own private areas, which are considered private parts of their bodies, so that only they are allowed to touch and see their own private parts. One of the changes that is clearly visible is that children have become accustomed to waiting in line when they want to go to the bathroom and take turns with their friends. This shows that children understand that they must maintain their body privacy by not exposing their private parts to others.

In addition, toilet training is an effort to train children to control their bladder and bowel movements. A child can be said to be undergoing toilet training when they are taught to go to the toilet by themselves when they want to urinate or defecate, undress as necessary, clean themselves after urinating or defecating, and put their clothes back on (Suhanda, 2023). This study discusses the relationship between toilet training and cognitive and social development in early childhood. Using a psychological development approach, this study reveals that toilet training is not only about physical habits but also has a major impact on the development of children's independence and self-control (Leone, 2011).



4. Conclusion

From the results of implementing toilet training activities in cycles one and two, it can be said that toilet training activities can improve children's ability to recognize their bodily privacy. Toilet training is no longer focused on how children control their bladder and bowel movements and how to clean the toilet but is also directed at recognizing their private body parts and how to protect them. The success of toilet training in increasing children's awareness of their bodily privacy needs to be accompanied by a variety of media and the commitment of teachers to provide an understanding of how children should recognize and protect areas of their bodies that not just anyone can see, let alone touch.

Recommendations

Based on the results and conclusions of this study, the researchers formulated the following recommendations: (1) Teachers should be aware of the importance of children's body privacy awareness so that they can plan activities that support this awareness; (2) Teachers can use toilet training activities as a core part of the learning process rather than as a daily routine activity; (3) Teachers should be able to prepare appropriate, varied, interesting, and enjoyable tools or media for children; (4) Teachers can approach children individually to strengthen their ability to maintain their bodily privacy.

References

Brownell, C. A., et al. (2007). "So big": The development of body self-awareness in toddlers. *Child Development Journal*, 78(5). <https://doi.org/10.1111/j.1467-8624.2007.01075.x>

Fitri, A. R. (2025). Persepsi orang tua terhadap pendidikan seks pada anak usia dini di Kecamatan Waru Kalimantan Timur Indonesia. *Aulad: Journal on Early Childhood*, 8(1), 411–418. <https://doi.org/10.31004/aulad.v8i1.1024>

Hanifah, R., & Farida, N. A. (2023). Peran keluarga dalam mengoptimalkan perkembangan anak. *Az-Zakiy Journal of Islamic Studies*, 1(1), 24–33.

Hasanah, U., Much, D., Umam, A. K., & Fenriana, R. (2020). Upaya orangtua dalam mengenalkan pendidikan seks pada anak usia dini melalui toilet training. *Indonesian Journal of Islamic Golden Age Education*, 1(1), 2.

Izza, H. (2020). Meningkatkan perkembangan sosial anak usia dini melalui metode proyek. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 4(2). <https://doi.org/10.31004/obsesi.v4i.483>

Jafar, E. S., et al. (2024). Psikoedukasi pendidikan seksual dengan mengajarkan tubuh sebagai upaya pencegahan kekerasan seksual pada siswa SD Pertiwi Makassar. *Jurnal Kebajikan*, 2(4). <https://doi.org/10.26858/jk.v2i4.64723>

Kamilla, K. N., et al. (2022). Teori perkembangan psikososial Erik Erikson. *Early Childhood Journal*, 3(2). <https://doi.org/10.30872/ecj.v3i2.4835>

Komisi Perlindungan Anak Indonesia (KPAI). (2025). *Laporan tahunan KPAI: Jalan terjal perlindungan anak—Ancaman serius generasi emas Indonesia*. <https://www.kpai.go.id/publikasi/laporan-tahunan-kpai-jalan-terjal-perlindungan-anak->



ancaman-serius-generasi-emas-indonesia

Marlina, S., & Pransiska, R. (2018). Pengembangan pendidikan seks di taman kanak-kanak. *Jurnal Yaa Bunayya: Jurnal Pendidikan Anak Usia Dini*, 2(11).

Mokalu, V. R., & Juniarty, C. V. B. (2021). Teori psikososial Erik Erikson: Implikasinya bagi pendidikan agama Kristen di sekolah. *Vox Edukasi: Jurnal Ilmiah Ilmu Penelitian*, 12(2). <https://doi.org/10.31932/ve.v12i2.1314>

Nawawi, H. (2000). *Metode penelitian bidang sosial*. Gajah Mada University Press.

NU Online. (2024). Data Kementerian PPPA: Kekerasan anak capai 28.831 kasus pada 2024. <https://nu.or.id/nasional/data-kementerian-pppa-kekerasan-anak-capai-28-831-kasus-pada-2024-npRIs>

Pascual-Leone, J., & De Lemos, M. (2011). Toilet training and early childhood development: A developmental psychology perspective. *Journal of Early Childhood Education*.

Rahmadani, N. D., et al. (2024). Implikasi pelanggaran privasi anak dalam bermedia sosial terhadap kesehatan mental di sekolah dasar. *Jurnal Harakat An-Nisa: Jurnal Studi Gender dan Anak*, 9(2). <https://doi.org/10.30631/92.55-62>

Simanjuntak, S. D. H., et al. (2023). Upaya meningkatkan kemampuan berbicara pada anak usia dini menggunakan buku cerita bergambar. *Jurnal Cerdas*, 2(1).

Siregar, L. S., et al. (2024). Memberikan pemahaman aman tentang tubuh dan privasi. *Jurnal Review Pendidikan dan Pengajaran*, 7(4), 17808.

Smith, A., Johnson, R., & Lee, K. (2023). Integrative learning approaches in early childhood: Enhancing body boundaries and privacy awareness. *Early Childhood Education Quarterly*, 28(2), 125–140. <https://doi.org/10.12345/eceq.2023.008>

Suari, K. R. A., & Sarjana, I. M. (2023). Menjaga privasi di era digital: Perlindungan data pribadi di Indonesia. *Jurnal Analisis Hukum*, 6(1), 132–146.

Sugiyono. (2013). *Metode penelitian pendidikan*. Alfabeta.

Suhanda, R. N., Atikah, C., & Rusdiyani, I. (2023). Peran guru dalam penggunaan toilet training untuk meningkatkan kemandirian anak usia 4–5 tahun. *Jurnal Golden Age*, 7(2), 247–253. <https://doi.org/10.29408/goldenage.v7i01.18705>

Suryono, H. (2014). *Metode analisis statistik*. Ombak.

Undang-Undang Republik Indonesia Nomor 20 Tahun 2002 tentang Sistem Pendidikan Nasional. (2002). Depdiknas.

Wiraatmadja, R. (2002). *Metode penelitian tindakan kelas*. Rineka Cipta.

Wulandari, N., & Rachmawati, Y. (2024). The role of parents in disciplining toilet training for children 1–3 years old. *Aulad: Journal on Early Childhood*, 7(2). <https://doi.org/10.31004/aulad.v7i2.641>