

## **Boboiboy Animation Episode, Care of the Earth: Managing Solid Waste with the 3R Method**

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### **Abstract**

*The increasing volume of domestic solid waste needs a sustainable solution to avoid complex environmental issues. The 3R practice of reuse, reduce, and recycle is said to be one of the efforts taken to educate the community on how to manage residential solid waste. A practice that wants to be cultured in the community must begin as early as childhood. As the saying goes, strike while the iron is hot. The application of environmental care practices to the younger generation can be implemented in the form of entertainment by inserting animation which attracts children's attention. This study analyses solid waste management with the 3R method featured in Boboiboy animation. There are three episodes of Boboiboy's animation of "Jagalab Bumi" used as the main study text (episodes 21, 22, and 23). Based on this analysis, it was found that this animation have successfully highlighted the 3R concept in three episodes of "Jagalab Bumi" including showing how the does solid waste management process is carried out at the landfill. The explanation of this method was successfully presented clearly and easily understood by the audience. This is able to influence and leave an impression on the audience indirectly.*

**Keywords:** Environment Management, Solid waste, Animation, Boboiboy, Environment, Earth, 3R Method.

## **INTRODUCTION**

The accumulation of solid waste remains a critical global issue as it threatens human health and causes devastation of the environment when it is not managed properly (Knickmeyer, 2020). Municipal solid waste is generated due to the explosion of the global population, urbanization processes, and industrial development, all contributing to an increase in waste generation (Sohoo et al., 2021; Tan et al., 2022). Urban areas, which are focal points of population concentration, have their own waste management systems, but weaknesses in their management affect waste disposal. The increase in household numbers in Malaysia directly correlates with the increase in generated solid waste. The substantial production of solid waste leads to an overflow of waste at disposal sites, causing these sites to reach maximum capacity and eventually necessitate closure before their intended lifespan (Beddu Asis et al., 2022). The best approach to municipal solid waste management involves controlling waste production, improving collection systems, and transferring waste to designated treatment facilities (Abdullah, 2022). This helps control the amount of domestic waste generated. Every year, people worldwide generate approximately 2.01 billion metric tons of solid waste. By 2050, this number is expected to triple (Gautam & Agrawal, 2021).

The effectiveness of waste management is evaluated based on the amount of waste disposed at disposal sites. The lower the amount of waste, the better the operational waste management. The increase in waste generation leads to various other problems at disposal sites, such as leachate production, emission of greenhouse gases, infectious diseases, and contamination of water, soil, and air (Beddu Asis et al., 2022). In Malaysia, solid waste management is guided by the National Solid Waste Management Policy (DPSPN), which was formulated to enhance waste management efficiency across the country in 2006. This is implemented through the enactment

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of Act 672 (Solid Waste and Public Cleansing Management Act 2007) and Act 673 (Solid Waste and Public Cleansing Corporation Act 2007), leading to the establishment of two specialised agencies under the government, namely the National Solid Waste Management Department (JPSPN) and the Solid Waste and Public Cleansing Corporation (SWCorp). Both agencies are responsible for policy monitoring and enforcement that are related to waste management activities (Zakaria et al., 2022).

In waste management, the 3R approach serves to conserve the environment by promoting the reuse of waste, reducing disposal at its source, and recycling as an alternative for remaining waste. The "reduce" and "reuse" principles involve waste materials that are not yet classified as final waste, as these materials can still be utilized. Materials classified as final waste or residuals undergo recycling methods and meet disposal standards (Zakaria et al., 2022).

### Study Objectives and Methods

This study analyzes how solid waste is managed using the 3R concept (Reduce, Reuse, and Recycle) as depicted in the third season of the animated series "Boboiboy" in the episode titled 'Jagalah Bumi' (Take Care of the Earth). This Boboiboy animation highlights the importance of practicing the 3R approach for the environment, focusing on reducing daily solid waste, minimizing natural resource consumption, and reducing the release of harmful gases for the preservation of the environment in the future. The study employs qualitative methods, specifically text analysis and literature review. Text analysis involves three episodes from the third season of the Boboiboy animated series, specifically episodes 21 to 23. In these episodes, the environmental management approach using the 3R concept is presented and structured in a suitable order. The literature review encompasses information acquisition and studies through references from books, journal articles, theses, conference papers, encyclopedias, and scholarly projects. It also involves retrieval of information from the internet.

### Synopsis

*Cikgu Papa Zola* praises the class of 5 *Jujur* for their Mathematics exam results as all the students passed the exam. However, he points out that they have failed in terms of maintaining cleanliness. The corridor and the 5 *Jujur* classroom are dirty and filled with litter. Simultaneously, *Cikgu Papa Zola* announces that a cleanliness inspector will come to assess the cleanliness level of their class. This prompts the students of 5 *Jujur* to work tirelessly to clean the classroom before the cleanliness inspector arrives. The cleanliness inspector is satisfied with the cleanliness level of the 5 *Jujur* class, making the students relieved. At this point, the cleanliness inspector explains the 3R campaign in conjunction with National Recycling Day.

On their way home from school, the students are attacked by a giant creature using trash as a shield. Gopal, Yaya, and Ying then encouraged the residents of *Pulau Rintis* to clean up the city because the power of the giant creature cannot be augmented without trash to use as a shield. At the same time, Yaya, Ying, and Gopal teach the residents the proper way to manage household waste. As a result, there is no trash in the local community, rendering the giant creature unable to generate a new shield. Ultimately, Boboiboy and his friends defeat the giant creature. During the Earth Day Carnival, there are exhibitions, explanations, and stalls showcasing 3R-related products, as well as the carnival launch. At the Ministry of Housing and Local Government (KPKT) booth, visitors are introduced to waste disposal models and waste disposal sites. The public is educated about the process of managing solid waste, the 3R approach, and the impact of waste pollution. Yaya and Ying also explain the benefits of recycling.

### LITERATURE REVIEW

The animation industry in Malaysia has seen rapid growth since the establishment of the Multimedia Super Corridor and Multimedia Development Corporation in 1996. During this time, there has been an influx of animations from abroad, especially from the United States and Japan, whose content often contrasts with the lifestyle and values of Malaysian society. The establishment of the Multimedia Super Corridor and Multimedia Development Corporation aimed to drive the digital economy development of the country and served as a starting point for the establishment of numerous local production companies, capable of producing high-quality

animations. The animations produced highlight local culture, diversity, family values, Islamic way of life, and Malaysian heroes (Wong and Achin 2021; Nasir et al. 2022). This establishment provided funding for the development of the animation sector, offering contracts to various companies. As a result, high-quality local animations emerged, such as "Usop Santorian," "Anak-anak Sidek," and "Kampung Boy" (Hasri and Syed 2021b). For instance, Animonsta Studio developed BoBoiBoy by aligning with the government's aspirations to preserve local culture in their commercially developed animation products (Hasri and Syed 2020 & 2021b).

Children are attracted to watching animations due to their unique characteristics, creativity, captivating colors, characters, and storylines, which enhance the appeal to young audiences. This attraction influences the emotions and social lives of children, impacting their developmental growth, especially from a sociological perspective (Debora, 2021). It contributes to the development of children's intellectual values in alignment with contemporary childhood intellectual development (Mahmor & Hashim 2015; Kusuma Putra 2019). However, the duration of exposure to animated films can have varying effects on children, which differ from one individual to another (Ginanjar & Saleh 2020).

The Boboiboy animation utilizes characters with a fantasy hero theme. The animation's narrative is constructed through intertextual elements and aligns with Henry Jenkins' concept of transmedia storytelling. From the perspective of fictional concept construction and narrative pathways, the Boboiboy animation centers around the 'Power Sphera Universe' as its focus to ensure that its storytelling is robust, concise, unique, and capable of development from various angles (Hasri and Syed 2021b). The entire narrative world is seen as a pivotal factor in making this animation global in nature and gaining acceptance from various countries around the world. However, Wong and Achin (2021) argue that solely focusing on visuals in character design and narrative storytelling is insufficient, as animation is an emotional medium that requires viewers to step into the shoes of the hero and perceive the world through the viewers' visual lens. Thus, the 'Power Sphera Universe' plays a role in translating the emotions of viewers who comprehends the concept of power.

There is a tendency for children to imitate behaviors when watching popular television programs, such as the Boboiboy animation. This imitation affects and enhances their mastery of the Malay language vocabulary (Ghilzai et al. 2017; Oktaviani 2022; Sabardila et al. 2023). According to Sabardila et al. (2023), there are two forms of imitation that children engage in when exposed to the Boboiboy animation: linguistic imitation and behavioral imitation. Linguistic imitation involves children mimicking the language used in the animation, which adds new vocabulary to the Malay language. A similar finding was also obtained by Oktaviani (2022) in a study conducted with students from SDN Bangah Sidoarjo. The analysis found a positive and significant influence on the use of the Malay language due to the frequency of watching. The imitation of the Malay language among children is manifested through imitating their communication with peers, including phonological indicators (sounds), grammar (words and sentences), vocabulary (including terms), spelling, and meaning. Many Malay words are often imitated in the Boboiboy animation, such as "jangan risau" (don't worry), "macam mana tuh" (how is that), "apa tuh" (what is that), and others. They also imitate the signature slogan "terbaik" (the best) or "memang terbaik" (truly the best), which is a distinctive feature of Boboiboy. These words are spoken while imitating and using Malaysian Malay language nuances (Oktaviani et al. 2023). Due to the extensive nature in which children are easily exposed to and influenced by what they see and hear, this group requires supervision and guidance from adults.

The characters portrayed in the Boboiboy animation demonstrate a level of intellectual aptitude that is suitable for the storyline and the age range of the audience (Mohd Shuhaimi et al. 2017). Each character in this animation is created and designed in accordance with the storyline concept and narrative type used (Juhan & Ismail 2016). Moreover, the animation is found to highlight male characters in a more dominant role compared to female characters, who often assume supporting roles (Sundaraj & Balaraman 2022). This portrayal reflects the socio-cultural aspects of the underlying society that places responsibilities and leadership roles on male individuals. From the perspective of Malay intellect, Fadzil & Dalal (2023), who analyzed the characters in the Boboiboy: The Movie animation, found that the concept of heroism is depicted through the main protagonist as a form of justice against villains. This research employs the "Konsep Budi" by Lim (2002) and the "Struktur Simpati" by Smith (1995). Analysis of both these concepts reveals how local audiences are influenced and shape their

perceptions of the main protagonist character, thereby eliciting a sense of sympathy towards the fictional character. This study also explains the audience's engagement with fictional characters in the Boboiboy animation, especially in terms of moral evaluation of their actions.

More studies have looked at the Boboiboy animation from the perspective of its impact on violence and aggressive behavior among child viewers, despite the animation having many positive aspects such as enhancing proficiency in the Malay language, promoting loyalty, cooperation, and resilience. The animation is said to have the potential to influence aggressive behavior and emotional development in children due to its portrayal of physical and verbal violence (Ghilzai & Ahmad 2017; Anggraeni & Estaswara 2022; Jai et al. 2022). This aggressive behavior among children gradually occurs after exposure to the animation over a specific period. Aggressive behavior is categorized into physical and verbal forms. Physical behavior involves actions such as harming other children, engaging in fights, and displaying behaviors like hitting, kicking, biting, pinching, pushing, quarreling, and kicking specific objects. Verbal behavior is manifested through actions like sneering or pouting, mocking, labeling peers with specific names, and making fun of others (Musfira 2018; Hanifah & Rakimahwati 2022; Jai et al. 2022). The study by Jai et al. (2022) also found that these children not only tend to disturb their peers at school but also exhibit behavior that prioritizes self, difficulty in interacting with peers, reluctance to share toys, and a preference for solitary play. However, in the study by Sabardila et al. (2023), children exposed to television programs were observed to imitate all behaviors they watched, whether positive or negative. Not all children's television programs have a positive impact on their behavior, but certain animations like Boboiboy were found to establish behaviors of mutual assistance, understanding the meaning of friendship, and more. Based on these various studies, it can be concluded that children are influenced by behaviors and exhibit varying effects based on the duration of exposure they receive (Ginanjari & Saleh 2020; Oktaviani et al. 2023). Almost all these studies also recommend that children receive supervision and guidance from adults while watching these animations.

Not many studies have analyzed animations from an environmental perspective. While the study by Solihah & Sundari (2020) is related to the use of interactive environmental animations in school subjects, the animations created were intended solely as teaching aids and tools for learning. These animations were specifically developed for educational purposes and were not meant for public consumption. This is different from the studies conducted by Mamat & Yaacob (2021) and Mamat et al. (2022), which analyzed the animation "Upin and Ipin" using Eko's criticism, focusing on factors, impacts, and methods to reduce the impact of haze pollution. "Upin and Ipin" is a commercially produced animation widely watched in many countries such as Malaysia, Singapore, Indonesia, Brunei, Thailand, the Philippines, Vietnam, Cambodia, Hong Kong, and South Korea. As a result, the show has been translated into several languages, including Malay, English, Arabic, Mandarin, Spanish, and Indonesian. However, studies specifically exploring the presence of environmental themes in the "Boboiboy" animation have not been conducted to date. Therefore, the presence of such a study, linking the management of solid waste and the 3R (Reduce, Reuse, Recycle) method within the "Boboiboy" animation, is hoped to play a role in shaping the character and identity of Malaysians who will better appreciate and sustainably care for the environment. Considering the findings of studies that link imitation behavior among children to what they watch, it is likely that "Boboiboy" episodes 21 to 23 on the topic of 'Protecting the Earth' aim to convey environmental messages for the future sustainability of the planet.

### **Managing Solid Waste Using the 3R Method**

Solid waste must be properly managed to ensure the sustainability of the environment. A caring attitude towards the environment should be instilled from a young age. Animations can serve as a medium to cultivate love and awareness for the environment, aligning with the interests of children who enjoy entertainment shows, animations, and cartoons. "Boboiboy" animation has been found to effectively convey various information because of its popularity among children. Its engaging and entertaining visual elements have the potential to influence children's understanding of the concept of solid waste management using the 3R method (Reduce, Reuse, Recycle), encouraging them to practice these principles in the future. This exposure provides children with insights into environmental management, ultimately nurturing a generation that cares for sustainable

environment. Therefore, this section analyzes the presence of the 3R method for solid waste management within the "Boboiboy" animation's episodes focused on environmental conservation.

### **Solid Waste Management Using the 3R Method in Animation**

Almost all human activities generate waste and need to be managed sustainably. Separating solid waste at its source involves the process of segregating all solid waste generated at the original source based on the composition of the waste, namely paper, plastic, recyclable materials, and residual waste (Ministry of Health Malaysia 2016). The 3R method functions to ensure that waste flow is managed properly to ensure environmental sustainability. It becomes a continuous practice that can generate various benefits for society and the country. Managing solid waste through the 3R method is carried out to maximize benefits for the community and the environment by reusing, minimizing, or recycling waste materials.

In the animation "Boboiboy," the management of solid waste is carried out using the 3R method, namely Reuse, Reduce, and Recycle. The presentation of this 3R method has been introduced to the audience through a conversation that takes place between *Cikgu Mamazila*, Yaya, and Ying, who explain to the students of Class 5 Jujur on how to segregate solid waste from its source, as shown in the following dialogue:

- Yaya: Orang ramai juga diingatkan untuk mengasingkan sisa pepejal dipunca yang bertujuan untuk memudahkan proses kitar semula.  
*The public is also reminded to separate the solid waste at the source which aims to facilitate the recycling process.*
- Cikgu Mamazila: Ha, betul tu. Mari kita kurangkan pembuangan sampah harian melalui program 3R ni.  
*Ha, that's right. Let's reduce our daily waste through this 3R program.*
- Yaya: Program kitar semula 3R ni terdiri daripada 3 perkara.  
*This 3R recycling program consists of 3 ways.*
- Ying: Reduce  
*Reduce*
- Yaya: Kurangkan penggunaan barang baru seperti beg plastik, kertas, dan lain-lain  
*Reduce the use of new items such as plastic bags, paper, and others.*
- Ying: Reuse  
*Reuse*
- Yaya: Guna semula barang lama, contohnya gunakan semula botol kaca lama untuk simpan alat tulis.  
*Reuse old things, for example reuse old glass bottles to store stationery.*
- Ying: Dan Recycle.  
*And Recycle.*
- Yaya: Kitar semula dengan mengasingkan sisa pepejal dipunca.  
*Recycle by separating solid waste at the source.*

(Jagalah Bumi, episod 21, minit 12.29)

*(Take care of the Earth, episode 21, minutes 12.29)*

Based on this excerpt, daily waste disposal is managed using the 3R method. The audience is introduced to this method as early as minute 12.29, which is the initial minutes of how the exposure to solid waste management is done. Yaya reminded her classmates about the need for segregating solid waste to facilitate the recycling process. This is further reinforced by *Cikgu Mamazila's* dialogue supporting such waste management method and subsequently introducing the concept of 3R. The curious nature of the children highlights many other questions related to 3R and the concepts being used. At this point, Teacher Mamazila explains clearly about the matter, then asks Yaya and Ying to explain the 3R method in an alternating manner with intermittent dialogues from some students like Gopal and Boboiboy. This presentation creates a relaxed, amusing atmosphere that keeps young viewers engaged, even though the conveyed information is serious and academic in nature.

The use of digital technology, multimedia, and specific applications serves as a medium to convey messages to children because this group is more inclined towards multimedia and technology containing attractive elements like animation, graphics, text, and songs (Ayob et al. 2023). These type of media can deliver complex messages in an easier, more captivating, enjoyable, and quickly understandable form (Barokah 2022; Pongilatan et al. 2022). The joy associated with something stimulates them to understand the conveyed messages in the animation easily and brings about a positive impact. Thus, indirectly, the message about solid waste management and the 3R method intended for children is conveyed more effortlessly.

### Reducing (Reduce)

The 3R method is a sustainable practice that revolves around waste management, emphasizing three consistent strategies: Reduce, Reuse, and Recycle. These three concepts are interconnected and work towards a more sustainable form of solid waste management. Reducing, or reducing the amount of waste is a concept that aims to decrease the amount of waste generated each day (Ismail et al. 2014). This method achieves its goal when the separated solid waste during the recycling process is reused, indirectly leading to a reduction in the amount of waste brought to disposal sites. The reduction in solid waste brought to disposal sites also affects the number of waste disposal centers that need to be established in a given area and the operational lifespan of these centers before closure due to reaching its capacity.

In the animation "Boboiboy," the audience is explained the concept of waste reduction (reduce) through a dialogue spoken by Yaya while explaining the 3R concept in episode 21, which is "Reduce the use of new items like plastic bags, paper, and others" (Episode 21: minute 13.29). This dialogue explains the meaning of the 'Reduce' concept, which is a way to minimize waste disposal by practicing the use of reusable items like plastic bags and paper.

The audience becomes aware of the connection between the three processes of reduce, reuse, and recycle in the "Boboiboy" animation, highlighted through a brief dialogue when Boboiboy, Yaya, and Ying visit a waste disposal site model at the Ministry of Local Government and Housing Development (KPKT). KPKT officers explain the processes involved in managing household waste from the community source to the final release into the environment. This entire process makes them realize the various impacts on the environment that have occurred and the need for proper waste management to mitigate those impacts. The KPKT officers conclude that waste disposal needs to be reduced to prevent further pollution. While the specific term "reduce" is not explicitly mentioned, the ensuing discussion among them highlights that these children (Boboiboy, Yaya, and Ying) are beginning to understand the interconnectedness of all the actions. This is portrayed through the following dialogue:

- Boboiboy: Tapi bang macam mana kita nak kurangkan sampah? Hari-hari orang buang sampah.  
*But how are we going to reduce waste? we throw garbage every day.*
- Pegawai KPKT: Oh itu senang je... adik asingkan sampah. Letakkan sampah seperti saki baki makanan ke dalam tong sampah. Kemudian, letakkan barangan yang boleh kitar semula di tepi tong sampah. Mudahkan?  
*Oh, that's easy... You separate the garbage. Place garbage such as leftover food in the trash. Then, place the recyclables next to the bin. Make it easy?*
- Yaya: Ooooo. Jadi, lori pengangkut hanya akan hantar yang betul-betul sampah ke tempat pembuangan  
*Ooooo. So, the transport truck will only send the real garbage to the dump.*
- Ying: Dan barangan yang boleh kitar semula tu akan dihantar ke pusat kitar semula  
*And the recyclable items will be sent to the recycling center*
- Pegawai KPKT: Betul tu! Jadi sampah akan berkurangan dan banyak lagi barangan dapat dihasilkan melalui kitar semula  
*That's correct! So there will be less waste and more items can be produced through recycling*

(Jagalah Bumi, Ep.23: 7.34)

(Take care of the Earth, episode 23, minutes 7.34)

Based on this episode series (Episode 23), the audience will understand that solid waste can be reduced through recycling methods, as explained by the KPKT officers and the children (Boboiboy, Yaya, and Ying). At the same time, the children are exposed to the concept of recyclable materials that can still be reused, such as bottles, paper, plastic, and so on. Sustainable living practices are crucial for the collective well-being in the future. Therefore, an understanding of environmental sustainability within the community is necessary to ensure increased awareness and the practice of the 3R principles. People need to realize that many waste materials, like plastic, require an extremely long time (hundreds to thousands of years) to degrade and are difficult to dispose of, while plastic waste is the second-largest contributor to the total waste disposal amount at landfill sites (Selangor State Assembly 2018). Plastic waste burdens the environment due to its long degradation period, and the constant addition of new waste exacerbates the problem. The lightweight and visually appealing nature of plastic also contributes to the deaths of marine aquatic life, like turtles that are prone to choking on plastic debris (Lah & Chamhuri 2021). Early exposure to the 3R practices among the younger generation is highly beneficial in shaping a generation that is more environmentally conscious. Such early exposure is crucial for the current generation to instill a sense of care and practice sustainable living. This will shape their attitudes towards the environment and influence their lifestyles in the future.

### **Reusing (Reuse)**

Reusing (Reuse) means using an item repeatedly (Ismail et al. 2014). In Malaysian society, the practice of reusing old items is not commonly observed, as many people consider items that are old, empty, worn out, broken, damaged, or non-functional as useless and eventually will be discarded. According to Abdul-Rahman and Wright (2014), the process of reusing used items should begin with the assumption that previously used materials can still be repurposed into different forms. Many items like paper can be reused as scrap paper or for wrapping items in the kitchen. Beverage bottles can be reused to store cold water in the refrigerator. Used tires can be repurposed into objects like swings, flowerpots, furniture, jewelry, and more. Creativity and innovation can transform old and worn-out items like cans, bottles, notebooks, curtains, furniture, etc., into new, beautiful, and creative products.

The Reuse method (Reuse) and the reduction of waste (Reduce) are briefly discussed in episodes 21 to 23 of "Boboiboy," in comparison to the Recycling method (Recycle). In episode 21, Yaya explains the concept of the 3R method, specifically the Reuse method (Reuse), to her classmates in a dialogue like "Reuse old items, for example, reuse an old glass bottle to store stationery" (Episode 21: minute 13.29). In this explanation, Yaya provides an example of reusing an old glass bottle as a container for storing stationery. Reuse-produced recycled products are further mentioned in episode 23, such as notebooks, paper cups, tires, flowerpots, and Earth Day bags. Examples of these products can be found in Ying's announcement to visitors at the Earth Day Carnival in a dialogue that goes, "There are recycled notebooks, paper cups, tires, flowerpots, and Earth Day bags. They are all made from recycled materials" (Guard the Earth, Episode 3: 5.19). Although this dialogue mentions that all these items are "recycled materials," they are new products that can be reused, created from repurposed used items.

### **Recycling (Recycle)**

Recycling (Recycle) refers to the process of collecting and processing discarded materials as waste, and then reusing these materials to create new products (Ismail et al. 2014; United States Environmental Protection Agency 2022; Khalil et al. 2023). There are several methods of recycling, including biological, chemical, thermal, or energy methods. Chemical recycling, for example, involves the use of chemicals that act as raw materials in the recycling process (Zakaria et al. 2022). Recyclable materials like plastics and fabrics require chemical treatment, such as de-polymerization, to break down polymers into smaller molecules. The practice of recycling saves manufacturing costs as well as helps to protect the environment by reducing pollution, limiting dependence on landfill sites, reducing the use of natural resources, and lowering carbon footprint (Saud et al. 2022). Items like cans or beverage bottles can be recycled to create new products, whether they retain their original form or change their purpose. A product intended for recycling must be separated from other solid waste at its source before undergoing the recycling process.

In the "Boboiboy" animation series "Jagalah Bumi" episodes 21 to 23, Recycling is the most frequently and extensively explained concept across all episodes. These episodes detail the basic recycling methods that can be practiced by all groups, including children (without involving complex recycling processes that require technology and chemical usage). In episode 21, the audience is introduced to the general meaning of Recycling (Recycle). This is evident through Yaya's explanation in a dialogue, "Recycle by separating solid waste at its source" (Episode 21: 12.29). Furthermore, at minute 13.46 of the same episode of "Jagalah Bumi," Ying and Yaya provide a more detailed explanation of how the process of separating solid waste at its source is carried out, as shown in the following excerpt:

- Ying : Asingkan sisa pepejal dipunca dengan mengasingkan sisa kitar semula daripada sampah harian kita  
*Separate solid waste at the source by separating recyclable waste from our daily garbage*
- Yaya: Kemudian sisa baki dimasukkan kedalam tong hijau macam ni.  
*Then the rest is put into a green bin like this.*
- Ying: Dan sisa pepejal bahan kitar semula diasingkan mengikut kumpulan  
*And solid waste recyclables are separated by group*
- Yaya: Sisa kitar semula terdiri daripada 3 jenis. Kertas, plastik dan lain-lain. Pastikan kita asingkan bahan kitar semula mengikut kategori yang betul.  
*Recycled waste consists of 3 types. Paper, plastic and others. Make sure we separate the recyclables according to the correct category.*
- Ying: Ha, letakkan sisa kitar semula di tepi tong sampah pada hari kutipan  
*Ha, put your recyclables by the bin on collection day*

(Jagalah Bumi, Episod 1: 13.46)

*(Take care of the Earth, episode 1, minutes 13.46)*

According to the Solid Waste and Public Cleansing Management Corporation, SWCORP (2020), recyclable materials such as paper, glass, aluminum, plastic, and others need to undergo a separation process from household solid waste. Waste materials must be separated into specific categories: paper, plastic, bottles, and residual waste. The separated recyclable waste will be placed into recycling bins according to their respective types. Daily waste materials consist of items like food waste, kitchen waste, disposable diapers, and other non-recyclable household waste. These waste materials should be separated, placed in securely tied bags to prevent liquid leakage and spillage, and to avoid scattering of residual waste. Separation of other miscellaneous recyclable materials includes electronics, fabric, leather, rubber, and hazardous waste.

In the "Boboiboy" animation series "Jagalah Bumi," the most extensively covered topic is the segregation of waste materials to meet recycling requirements. KPKT officers serve as characters who explain the necessary segregation methods when managing solid waste through a dialogue like "Separate the waste. Put waste like food scraps into the waste bin, then place recyclable items beside the waste bin" (Guard the Earth, Ep. 23: 11.40-11.55). In episode 22 of "Jagalah Bumi," at minute 15.07, characters Ying, Yaya, and Gopal explain to the residents of Pulau Rintis how to segregate recyclable waste as follows:

- Penduduk 1: Jom kita kitar semula sampah....ehm macam mana nak asingkan ni?  
*Let's recycle the garbage....ehm, how do we separate it?*
- Yaya, Ying & Gopal: Bahan plastik, kertas dan lain-lain...  
*Plastic, paper and other materials...*
- Ying: Contoh bahan plastik adalah botol minuman plastik, beg plastik, bekas makanan plastik dan styrofoam  
*Examples of plastic materials are plastic drink bottles, plastic bags, plastic food containers and styrofoam*
- Yaya: Kalau bahan kertas macam surat khabar lama, resit, majalah dan kotak kadbod  
*If paper materials like old newspapers, receipts, magazines and cardboard boxes*
- Gopal: Lain-lain ni pula macam tin minuman, botol kaca, bekas makanan aluminium dan lain-lain  
*Others are like drink cans, glass bottles, aluminum food containers and others*



(Jagalah Bumi, episod 22: 15.07)

*(Take care of the Earth, episode 22, minutes 15.07)*

Separating recyclable materials according to categories streamlines waste management and treatment processes and is the best approach for handling the capacity of solid waste disposal sites (Ministry of Health Malaysia 2016; Beddu Asis et al. 2022). According to Budin et al. (2006) and Pillai (2023), while organic waste isn't suitable for recycling, it can be managed intelligently through composting. Composting is a natural decomposition technique involving aerobic microorganism reactions to recycle organic materials. Various methods can be employed for composting, including using plastic bags, flowerpots, sacks, stacked tires, dug holes in the ground, or employing pile methods. Composted materials can be reused as natural fertilizers for agriculture and gardens within three to twelve months. Research by Ismail et al. (2014) found that composting practices reduced solid waste disposal in landfill sites from 76.2 percent to 100 percent. This method has been extensively implemented in Japan, with the participation of over 7,000 households for food waste collection. The practice has been highly embraced in Japan where recycling has become a cultural norm (Zamri, et al. 2020).

Recycling programs were initiated in 1993 and 2000, yet the recycling rate remains low (Lim 2022). Wee and Mat Radzuan (2010) conducted a study on recycling practices in Batu Pahat, Johor, finding that while residents had basic knowledge about recyclable materials, the practice of recycling was inadequate. The use of the recycling bins provided was also limited. There appeared to be a lack of awareness about environmental sustainability. Lim (2022) used Batu Pahat as a research site for recycling programs. Despite the 12-year gap from Wee and Mat Radzuan (2010) study, recycling programs still struggled to gain public support and implementation in the area. According to Ibrahim (2022), the knowledge and attitudes of the Muslim community towards recycling are favorable, but the practice remains at a moderate level. This means that studies like Ahmad et al. (2022) on public knowledge of recycling programs in Penang and Kuala Lumpur showed that awareness levels remained unchanged after 11 years. There has been a shift in attitudes and practices among youth in educational institutions. A study among students of Politeknik Tuanku Sultanah Bahiyah, Kulim, found very satisfactory levels of knowledge and practice in recycling (Khalil et al. 2023). Vocational college students are aware of the problems of plastic bottles, suggest solutions, and link waste management's importance to environmental conservation and public health (Mohamada et al. 2022). However, recycling campaigns at an IPG campus started slowly but improved with modifications (Wai et al. 2022). Lack of recycling bins is among the reasons for low student participation in such programs.

Studies related to waste management through Recycling methods demonstrate that the public is aware of its benefits and has knowledge about it. However, in terms of practice and behavior, the levels remain moderate to low. This highlights the need for suitable methods to raise awareness across all segments of society. Education is a targeted method as it's more easily implemented during youth when the minds are more malleable. Education varies in nature, including the use of animation. When the "Boboiboy" animation series touches on this topic in "Jagalah Bumi," it depicts efforts to create awareness and promote sustainable living practices for the future. This practice needs to be extensively embraced by society to ensure its effectiveness. The message conveyed in conversations between Boboiboy and his friends reflects this intention:

- Ying: Kita kena sebarkan risalah ini dulu lah.  
*We have to distribute this pamphlet first.*
- Yaya: Haah. Kita kena beri kesedaran kepada orang ramai tentang kepentingan asingkan sisa pepejal dan 3R  
*Haha. We have to give awareness to the public about the importance of separating solid waste and 3R*
- Gopal: Alah, bukannya ada masalah sampah pun kat bandar ni.  
*Alah, it's not like there is a problem with garbage in this city.*
- Ying: Kau pasti beh. Tengok tu..  
*Are you sure? Look at that.*
- Boboiboy: Hee... Teruknya bandar kita ni  
*Hee... Our city is terrible*

- Fang: Haah dah melimpah-limpah dengan sampah  
*Haah, it's full of garbage*
- Yaya: Herm... Sebab tu kita kena ajar orang ramai tentang 3R  
*Herm... That's why we have to teach the public about the 3R*
- Ying: Ye lorh. Tak guna kalau kita je paham orang lain tak paham  
*Yes lorh. It's useless if we only understand others don't understand*

(Jagalah Bumi, Episod 21: 17.25-18.04)

*(Take care of the Earth, episode 21, minutes 18.04)*

This conversation highlights the effort to expose the practice of 3R in society to change the culture of disposing of daily waste without separation. Without the practice of 3R, waste is not separated; everything is considered waste and needs to be discarded. As a result, the quantity of residual waste continues to increase because there are no materials being reused through recycling methods.

In "Boboiboy" animated series, episode 23 also introduces the National Recycling Day, celebrated annually on November 11th. National Recycling Day serves as a platform to introduce and promote the importance of 3R practices (Reduce, Reuse, and Recycle) to the public. It acts as the pinnacle event for educational programs and public awareness initiatives related to 3R practices and cleanliness culture. It provides a platform for recognizing and appreciating those who actively engage in 3R activities, cleanliness culture, and the development of recycling technologies. In the animation, Gopal questions the significance of National Recycling Day through the dialogue "Hey, every day my father asks me to throw away and recycle...why do we need to celebrate it today?" (Protect Earth, episode 21: 11.42). Ying explains this matter further in the dialogue "National Recycling Day aims to raise awareness among everyone about the importance of 3R activities" (Protect Earth, episode 21: 12.23).

The "Boboiboy" animated series is one of the favorites among children in Malaysia, Indonesia, and many other countries like Japan and the United States. Although the animation serves as entertainment for children, analysis reveals that it subtly embeds an awareness of environmental care through the 3R approach in the "Protect Earth" episodes (episodes 21 to 23). Educating the younger generation to practice recycling is a wise step towards a sustainable environment in the future, as recycling is the most effective method to reduce waste in landfills (Mongholnchaia runya 2005). The effectiveness of a waste management system is assessed based on the amount of waste disposed of in landfills. The lower the amount of waste, the better the waste management at the operational level. Proper waste management minimizes the production of leachate, reduces greenhouse gas emissions, prevents diseases, and mitigates water, soil, and air pollution (Beddu Asis et al. 2022).

## CONCLUSION

Sustainable management of solid waste extends the life of the planet. Without systematic and proper waste management, environmental degradation becomes difficult to be prolonged. The 3R approach is regarded as one of the best methods, proven to be effective and adopted by many countries. However, its efficiency can be enhanced through widespread adoption within the community, as it greatly facilitates the processes of reduction, reuse, and recycling. Hence, public awareness about comprehensive waste management is crucial. The implementation faces substantial challenges since the practice of 3R needs to be ingrained as a culture, requiring early nurturing of awareness. Thus, instilling a culture of environmental sustainability through animations frequently watched by the younger generation is one feasible method.

The "Boboiboy" animation series titled "Protect Earth" in episodes 21 to 23 has effectively introduced the method of solid waste management using the 3R concept: 'Reduce', 'Reuse', and 'Recycle'. The audience is shown the proper way to manage solid waste using the 3R approach. Despite being primarily created as entertainment for children, the analyzed episodes manage to convey the scientific and information-rich aspect of the 3R concept. The 3R concept and the waste management process at landfills have been presented in a concise, digestible manner suitable for young minds. Preserving the environment requires a change in the attitudes of consumers or communities. Education is considered pivotal in altering the way people think and act towards sustainable environmental management. It influences the way of life that needs to be cultivated for

the long term. The animation proves to be an intermediary that influences the younger generation to be more mindful of sustainable environmental care.

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