Jurnal Komunikasi ISKI, Vol. 10 (2), 2025

J U R N A L

KOMUNIKASI

IKATAN SARJANA KOMUNIKASI INDONESIA

E-ISSN: 2503-0795
P-ISSN: 2548-8740

Understanding the Gender Role in E-waste Management: A Textual Analysis Using Hashtag on Instagram

http://dx.doi.org/10.25008/jkiski.v10i2.1171

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Submitted: January 16, 2025, **Revised**: August 22, 2025, **Accepted**: December 3, 2025
Accredited by Kemristekdikti No. 152/E/KPT/2023 until Vol 12(1) in 2027

Abstract - Taking gender issues into consideration when implementing a program or project is often seen as a burden. Understanding gender roles can help decision-makers and policymakers develop better regulations and increase the value of the project or program. However, understanding the role of gender in the e-waste issue could be challenging. This research explores e-waste management through a gender perspective on social media using the hashtag (#) because it is often used as an identification tool in creating various micro-communities. This study focuses on understanding how females and males behave differently when communicating about e-waste on social media. The research questions are: (1) what is the profile and characteristics of #ewaste enthusiasts on Instagram, (2) what user-driven activities are associated with #ewaste being promoted on Instagram, and (3) what the predominant shared values and beliefs within are #ewaste. Using a generated list of results when the search query "e-waste" was used, this study found 125 accounts on Instagram that participated in communicating e-waste handling. Data analysis is used to perform a textual analysis of profile biographies and thematic analysis of both visual and textual data to understand gender behaviour in e-waste. The result showed that female participation is easier to understand than male posts through their intention to share information and knowledge using a small story. The male frequently uses a short caption needs further interpretation to understand their post's meaning. Using hashtags helps researchers profile the characteristics of participants in e-waste handling campaigns and how they create a community in social media. This study implies the genderlect theory in the digital era. The difference between the use of language in creating meaning for e-waste handling between men and women**.** The study concludes that there is a difference in using language as a symbol of communication between men and women in expressing their interest in e-waste management.

Keywords: E-Waste: Hashtag; Genderlect; E-Waste Management; Short Story

Introduction

Our society is currently in the age of electronification. The digital revolution has created a surge of electrical equipment waste worldwide. Global E-waste Monitor estimated that in 2022, the

world will generate 62 billion kg of e-waste, or an average of 7.8 kg per capita. Unfortunately, only 23.2 percent of the e-waste generated was documented as adequately collected and recycled (Baldé, et al., 2024). Therefore, raising awareness and motivation, as well as changing behavior in e-waste handling, is essential. The introduction Section contains an explanation of why the issues need to be researched (research significance) and all supporting data or scientific evidence based on personal observations or the results of other researchers' studies. The formulation of this research problem is always based on real conditions and is objectively scientific.

E-waste also refers to electrical and electronic equipment (EEE) element and their component disposed of by their owner as garbage without any intention of being reused (Hassan & Dhusia, 2020). Generally, the source of e-waste is household electronic equipment, computers, laptops, printers, refrigerators, televisions, printers, mobile phones, and other electronic entertainment devices. E-waste is considered hazardous due to specific components of some electronic equipment containing highly toxic substances (Oswald & Reller, 2011), (Shagun & Arora, 2013). Therefore, it should be treated separately from other solid waste.

Some studies have shown that the recycling of e-waste in both developed and developing country carried out with rudimentary technology, which can cause severe damage to the environment and human health. For instance, lead and mercury in e-waste are potent neurotoxins, particularly among children who can suffer from IQ deficiency (Oteng-Ababio, 2012). Plastic and PVC from cable and computer housing can impact reproductive and developmental problems, cause immune system damage, and interfere with regulatory hormones (Shagun & Arora, 2013). Health and environmental problems could affect both men and women.

In addition, e-waste is destined for reuse, resale, or recycling in addition to being disposed of due to the valuable materials such as gold, silver, platinum group metals, copper, aluminum, plastic, etc. This means that e-waste has economic value as well. Furthermore, the monetary value of e-waste recycling should be considered a job opportunity for both men and women, supported by appropriate and environmentally friendly technology.

Indonesia possesses multiple legal foundations for the management of electronic waste, which include Presidential Decree 61/1993 on the Ratification of the Basel Convention, Presidential Regulation 47/2005 on the Ratification of the Ban Amendment, Law No. 32 of 2009 on Environmental Management, Presidential Decree No. 18/1999 specifically addressing B3 Waste Management, and Law No. 18 of 2008 on Waste Management. Their focus areas include electronic trash, handling of hazardous waste, and second-hand electronic hardware. However, awareness of e-waste issues in Indonesia is still comparatively lower than that of other developing countries in Southeast Asia. Therefore, electronic waste management is the shared obligation of the private sector, community, and large corporations (Bahraini, 2022).

Santoso et al. (2019) estimated that in 2028, the total amount of electronic garbage produced in Indonesia's e-waste stream will reach 49,627,917 units by 2028, equivalent to over 487,416 tons. Cellular phones are the most extensively wasted product in Indonesia in terms of quantity (Santoso, Zagloel, Ardi, & Suzianti, 2019). Like other waste produced by society, e-waste is a shared responsibility for both men and women.

In Indonesia, more than 400 people, both men and women, are involved in informal and illegal e-waste recycling, especially battery recycling. In this process, women have a small role, such as decomposing and drying the components of used batteries, but they have the same risk of being exposed to negative impacts as men (MoEF & Siswantini, 2020). Moreover, the Ministry of Environmental and Forestry Indonesia (MoEF & Siswantini, 2021) also found that men have more access to e-waste information than women. However, women have more intention to participate in reducing the negative impact of e-waste recycling. Indonesia, Filipina, India, Malaysia, and Africa recorded that the primary source of e-waste is households, and women as homemakers have more power to decide whether to reuse or dispose of the e-waste (Siswantini, 2021), (Shagun & Arora, 2013), (Miner, Rampedi, Ifegbesan, & Machete, 2020). Women's role in deciding e-waste disposal is also found in several government institutions and industries.

Embracing gender issues in waste management could help decision-makers develop more precise decisions or increase the project's value or intervention, including finding the right way to solve the core problem of e-waste segregation, collection, and recycling. Segregation of e-waste could be

complicated as it has a variety of items that qualify as e-waste (Oswald & Reller, 2011), and many electrical appliances have more than one owner.

The data on men's and women's participation in e-waste management shows how gender affects e-waste management. Including gender in e-waste allows a theory based on gendered communication style. The theory of gender communication was suggested by Deborah Tannen (1991) as a genderlect theory that describes the way men and women converse. The theory acknowledges and appreciates the language of differing sexes and attains mutual respect and understanding. The characteristics of language use among men and women are carried over into online communication.

Instagram is a social media platform that facilitates interaction among individuals through computer-mediated communication. The platform is a valuable source for a better understanding of existing or emerging practices and behaviour among specific communities (Ramjaun, 2020). On this platform, the user can use a hashtag (#) as a symbol that classifies themes, topics, or groups. For example, if a user wants to know about the zero-waste lifestyle, type #zerowastelifestyle, and all the user's desired options will be displayed (Permatasari & Tijayanto, 2017).

Commonly, the use of hashtags in e-waste includes #ewaste, #ewastemanagement, #ewastereccycling, #ewastedropbox, or #ewastedropzone, and concerning gender, there is no specific hashtag for the issue. Most of the study on e-waste in the previous research focus on legislation (Takur & Kumar, 2021), gender-based recycling motivation (Hassan & Dhusia, 2020), (Mohamad, Thoo, & Huam, 2022), (Gilal, Shah, Adeel, Gilal, & N.G..Gilal, 2022), awareness on e-waste recycling (Attia, Soori, & Ghaith, 2021), (Nisha, Shajil, Dutta, & Jain, 2022), and other issues related to circular economy and youth participation in e-waste management.

Results of the previous studies show that gender has a significant role in modeling e-waste handling behaviour and knowledge of the negative impact of improper e-waste handling. In addition, social media platforms are often used to promote e-waste handling and recycling practices. This research is limited to using hashtags on Instagram to understand the differences between men and women in using the language on e-waste management. Indeed, this research intends to explore hashtags on Instagram in e-waste management based on a gender perspective. This research related to communication aims to promote environmental communication in practice and implement genderlect theory regarding e-waste on social media.

Theoretical Framework

E-waste and Gendered Implication.

Gender issues in e-waste management relate to social norms, beliefs, and values. Burke's Identity theory (2000) asserts that individuals form their gender identity early on. Therefore, men and women have a distinct perception of who is responsible for domestic waste management (Mwangi, 2021).

Several research findings indicate that gender, as one of the demographic variables, significantly contributes to describing e-waste recycling behaviour. Hasan & Khusia (2020) found a difference in awareness regarding e-waste management between men and women and their interest in recycling. Social media also influences the different interests in recycling between men and women (Delcea, Crăciun, Ioanăs, Ferruzzi, & Cotfas, 2020).

Gull et al. (2023) found that the number of women on the board of directors in the company significantly affects the compensation for waste generation (Gull, Atif, & Hussain, 2023). Women's cultural and social status also influences their motivation and intention in waste segregation and recycling (Bayu, 2023).

The previous research showed that incorporating gender in waste management, including e-waste, can lead to policy formulation in e-waste management and foster sustainable development goals. This study, which focuses on gender-based expression through the e-waste hashtag on social media, contributes to formulating policies that promote sustainable waste management.

The other case study from China found that females are more concerned about environmental issues, such as supporting a ban on plastic bag regulation, and are willing to reduce plastic bag use (Li, Wang, & Saechang, 2022).

The Role of Instagram and Hashtag

Various social media platforms are available, allowing users to utilize multiple accounts. Specific social media can automatically link to other platforms, such as Facebook posts that link to Instagram, Twitter, or other platforms. Environmental enthusiast can share their activity on e-waste segregation, handling, information on dropping off e-waste, and sharing waste recycling methods on social media. The user could also manage their post of e-waste handling to increase visibility and identify potential participants in their conversation about e-waste.

Zikrulloh (2023) asserts that social media significantly and favourably influences attitude, subjective norms, perceived behavioural control, moral obligation, and intention (Zikrulloh, 2023) towards specific planned behaviour.

Daer, Hoofman, and Goodman (2014) identified five functions of hashtags on social media, including *emphasizing* or drawing attention without judgment #*sustainableLiving*; #*happylivehere*; *critiquing* or assessment of the topic discussed, such as #*choicethediscountstore*; #*whatisshethinking*; *identifying* as an expression of author self or emotional expression, for instance, *iterating*, and rallying. Therefore, hashtags are an efficient way to increase social media content's visibility, reach many users (Martin et al., 2016), improve the content post, and garner more likes and followers (Messina, 2007).

In addition, conceptualizing a distinction between men and women allows for the development a theory based on gender communication patterns (Ray & Pani, 2019). Gender communication is the exchange of information and ideas between individuals of different genders (Ivy & Backlund, 2000). Deborah Tannen categorizes this communication style as genderlect, a type of speech that exhibits particular characteristics that conceal it as either stereotypically masculine or feminine (Griffin, 2012).

In terms of technological usage, literature analysis found that there is a significant role of gender in technological adoption, including social media usage. Women use social media as a productive tool, but men use it only for entertainment (Goswami & Dutta, 2016)

Materials and Methodology

This research follows up on the work of Ramjaun (2021). The sample of this study was drawn from Instagram's generated list results when the search query "e-waste" was made on the platform's desktop search facility. The criteria of the posts to be analyzed in this study are (1) only posts from individuals to be considered, which means excluding brand, company, and type of organization; (2) only posts in English and Indonesian (with English translation) to be selected.

Data Collection. Data was collected from the most recent posts in July 2024: 159K posts by e-waste management organizations, e-waste recycling companies, and foundations. There were 125 posts from individuals. This study's data come from those 125 individuals' posts.

Data Analysis. A data analysis method is consistently applied to perform a textual analysis of profile biographies and a thematic analysis of both visual and textual data to understand gender behaviour in e-waste.

Result and Discussion

Gender Characteristics and activities of e-waste handling on social media

The result of this study was presented in this section**,** systematized based on the three themes, namely: (1) Male and Female activities on e-waste handling; (2) The rise of female-led #e-waste handling; (3) the new ideology on e-waste, as shown in Figure 1.

All direct quotes and visualization**s** in this section have been anonymized to adhere to ethical guidelines. Any brands mentioned by participants in their posts have also been anonymized. The direct quotes have also been edited to allow for better clarity. The thematic maps indicate.

Male and female activities in e-waste handling

Communication e-waste handling on Instagram, both males and females show almost similar activities. They represent their concern about e-waste by introducing products created from e-waste, such as digital paintings, shoes, accessories, e-waste drop-boxes, and so on. Females usually used longer captions than men, such as:

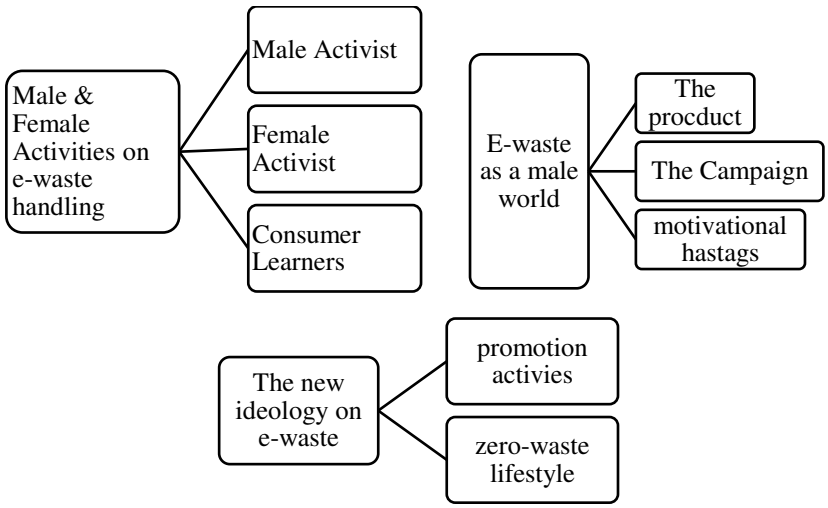

Figure 1: The thematic map representing the key theme and the sub-theme

"Yes, that latest gadget is SO COOL. But where will it end up when it gets too glitchy? Our old phones, laptops, and chargers might weigh up to 110 million tonnes by the middle of the century. Fortunately, there are a few ways you can prevent e-waste." (*Female caption for the photo of the latest gadget, on July 31)"*

"At it again #ewaste, #recycle, #diy #upcycle, ##diyjewelry, #imperfect (*Male caption for the photo of specific tools of jewelry making, post on July 30*)

The caption example illustrates that females will likely use a short story to promote e-waste handling. At the same time, male posts require more interpretation. Understanding male posts takes more time and effort because they are brief and vague. Another example is a male post that only uses words to explain their photograph of the e-waste collection, "Bold and Solid." Both males and females in the state seem to have a similar role as consumer activists since they use social media as a platform to advance e-waste collection and recycling actively.

It is not just captioning; the way they post something is also different. As a comparison, here are some of the samples of transcribed video content by both genders from #ewaste during another period of data sampling:

"Do you have old electronics, batteries, and wires that you don't know what to do with? Stop, don't throw them in the trash. Electronic waste, aka e-waste, must be recycled because it tends to cause fires in landfills. But where can you recycle it? Check with your local recycling program first. And if they don't accept e-waste, check out stores like Best Buy, Staples, Lowe's, and Home Depot. Plus, you can check out Earth911 for more options" (*Posted by a female creator on @itsthegarbagequeen accoun*t)

She approaches her audience by sharing information in a long narrative. She talks to the audience like a friend, suggesting something. This approach is more inclined to building relationships. Another example is from a post of e-waste art photography by @dr.soundarya_vemuri with this caption:

"A great initiative. This portrait is made of E- waste.. indicating.. anything can look or be made beautiful…, only thing is that you should have the sense to see beauty in everything.. A shot by Dr. Soundarya.vemuri. #sustainability #ewaste #ewasterecycling #masterpiece #beauty #consiousliving #savetheplanet #artwork #serenity #serendipity #abstract #ashotononeplus #greenplanet"

She tried to engage with her followers and audiences by sharing her thoughts and opinions. Adding quotes also gives more meaning to this post. This storytelling approach is often seen on social media. By adding emotions to captions and posts, creators could get more online engagement.

Women and men have different approaches to sharing something and using social media. Women use social media as a productive tool, but men use it only for entertainment (Goswami &

Dutta, 2016). This explains the difference in behaviour between male and female individuals. Women try to share stories or spread awareness using their social media. That is why they are more informative and talkative when sharing news and information about e-waste. They can give examples, suggestions, and complete explanations regarding e-waste.

On the other hand, men only use social media for entertainment purposes. That is why they only give short captions or comments on Instagram. Probably, they like the topic or want to share something that interests them without the deep intention to share all the details. Of course, this is not the case for all men. Some also share insightful posts. However, most men who post informative videos are the ones who are very interested in sustainability issues.

For example, @theconservation kid is an award-winning conservationist and the co-founder of @thecleanupkids. His work is deeply related to climate action. In December 2023, he posted reels with this caption:

> "Electronics can be hard to deal with after they have run their course. You hate to throw them out, so what do you do? We go to @alwaysberecycling. They are an incredible local business here in the Chattanooga area."

He also add the information of the dangerous of e-waste and the solution to reduce the negative impact of e-waste:

> "E-waste comprises 70% of our overall toxic waste. Only 12.5% of E-Waste is recycled. 85% of our E-Waste is sent to landfills and incinerators are mostly burned, and release harmful toxins in the air! Good news, there are alternatives. If you need help locating a recycling program in your area, just let me know".

In addition, he uses a hashtag of #trash #waste #recycle #ewaste #ewasterecycling #recycling #reducereuserecycle #metal #heavymetal, to make his reels more visible to audiences.

He describes the content nicely in a long narrative. However, this approach is not widely used among male individuals. It is easier to find female creators who use this approach than men. That is why there is a specific note that mostly the men who use these complete narrative captions are the ones who are deeply committed to climate action.

E-waste as a male world

Our analysis also revealed that around 48% of posts with the #ewaste hashtag were from individual female profiles and 52% from individual males. E-waste handling is perceived as a man's world. This can be seen in the posts of companies using #ewaste hashtags. Male activists create more advanced products from e-waste and promote the product as commercial product. Many individual activists also encourage the reuse of e-waste disposed of by others. E-waste is more often seen as something masculine.

A survey in Indonesia reported that male employees dominate workers in e-waste recycling. Most female workers perceive e-waste recycling as unsuitable for females due to the many activities that rely on physical and menial work. It is not true because many women are involved in e-waste recycling activities. A report stated that more than 8 million children in Indonesia have more than five micrograms per deciliter (µg/dL) of lead in their blood, and one of the reasons is that women (mothers) also have high levels of lead (UNICEF, Earth, Strategies, & KLHK, 2022). Many women in Indonesia are involved in illegal e-waste recycling, such as using batteries with high lead levels. Considering the chance of passing this lead contamination to their children, including women, when discussing e-waste is crucial.

Based on the data, males and females have similar intentions in campaigning for e-waste collection in certain places and sharing motivational hashtags while promoting e-waste, such as #sustainableliving, #sustainablehome, #nontoxichome, #greenmarket, #zerowaste, #reuserecycle, #greenbeauty, #lowwasteliving, #fairtradejourney, #zerowastejourney, #secondhandphones, and #greenmama.

In the end, hashtags could circulate the messages to other users and circulate within the community. This finding is relatively new because most research has found that women tend to be

more aware of environmental issues. As a study in China suggests, females are more concerned about environmental problems, have a stronger intention to use reusable items, are more supportive of sustainable policies, and are more willing to reduce single-use plastic products (Li et al., 2022). However, we should consider that the topic of technology is more masculine.

Although environmental topics are more prevalent among women, studies have shown that men dominate electronics because they love it much more than women (Macneil et al., 2008). Another study mentioned that men are found to be more technologically adept compared to women; women also have higher levels of computer-using anxiety compared to men (Goswami & Dutta, 2016). These data support the findings of this research because the technological aspect of e-waste helps to balance out the interests of both men and women. Women will be more attracted if the topic is just about environmental issues. However, since e-waste also discusses technology, a very masculine topic, many men are interested in this issue.

The new ideology on e-waste

Our analysis revealed that promoting e-waste handling aligns with a zero-waste lifestyle and circular economy. They also promote their product created from e-waste. The hashtag #zerowaste is often found in many male and female post captions. For example, a female post campaigning less waste lifestyle by using a second-hand mobile phone:

> "After a year or so with a phone that struggled to hold charge, kept blacking out and was pretty worse for wear, I'd been putting off getting another phone. But choosing to buy second-hand with @greenmarket.eco_uk was a no-brainer. The phone arrived next day delivery with a 12 month warranty, and it was as good as new for half the cost? (*female post, 23 July 2022*)

Most male posts focused on the financial advantage of e-waste collecting and recycling and promoted the safe handling of e-waste. On the other hand, e-waste recycling interests not only adult men and women but also teenagers. Our research also revealed several teenage posts about e-waste recycling products, showing the e-waste community in the digital world.

Additionally, teenagers cannot be taken lightly when we are talking about environmental issues. The EdWeek Research Center created a poll for more than 1,000 teenagers regarding their feelings and understanding of climate change. They found that 79% said climate change is real and mainly caused by human activity (Will & Prothero, 2022). This very high percentage proves that teenagers are aware of the problems we are currently facing. Even more, a poll of 1,000 teenagers by The Body Shop reported that 80% feel pressured to save the planet but now know how to do it and make a difference (Young, 2019).

The rise of a prominent climate activist like Greta Thunberg shows that the young generation cares about this problem. With the increasing number of digital natives, it is unsurprising that many teenagers are eager to learn more about this e-waste issue. This generation is also very active on social media, so it is no wonder this topic is also discussed with various hashtags on Instagram.

Figure 2: Advantages and disadvantages of e-waste recycling by men

Figure 2. The example of the advantages and disadvantages of e-waste posts created by men. The circulation of messages on social media represents the role of online communication with multimodalities in understanding gender roles in managing e-waste as a new lifestyle linked to other environmentally friendly lifestyles.

This study extends previous research and discussion regarding waste management through the gender lens by focusing on electronic waste or e-waste. The findings suggest that e-waste collection and recycling are being promoted on Instagram by government and non-governmental organizations, industries, and individuals. Using a gender lens, this study portrays the role of gender in e-waste presented on social media.

Segregation of e-waste could be complicated as a variety of items qualify as e-waste (Oswald & Reller, 2011). Therefore, as found on the Instagram posts, individual posts about e-waste collection and recycling are limited. Industries, foundations, or government institutions dominated the posts. The study also reveals that e-waste is "a man's world." It could be seen in the individual posts and organizations that men conduct most of the collection and recycling activities.

Regarding the observation of Instagram posts using #ewaste, they found that although female participation in promoting e-waste is limited, their understanding of the harmful impact of e-waste component material is seen to be increased. Female participants also campaign to separate e-waste from other solid waste (Oswald & Reller, 2011). In addition, this research also found that the way males and females communicate on e-waste is easy to differentiate. Their campaign is visible and considers the number of people participating in the conversation through likes and comments (Treem, Leonardi, & Hoof, 2020). This phenomenon is represented by the text, caption, picture, or photograph they post on Instagram.

Conclusions

The communication visibility of e-waste by males and females on social media helps the researcher to understand the role of gender in e-waste. The limitation of individuals who participate in campaigning or promoting e-waste handling is not a burden to see their contribution through their intention to share information and knowledge using a small story. Female participation is easier to understand than male posts. A male frequently using a short caption needs further interpretation to determine the meaning of their post. Using hashtags helps researchers more easily profile the characteristics of participants in e-waste handling campaigns and how they create a community in social media.

Understanding the different approaches of men and women in social media can be vital because both genders are interested in and involved in e-waste activities. Research showed that this topic is enjoyable for both men and women. It also attracts audiences from various age ranges (teenagers to adults).

Understanding the underlying motives behind men and women using social media can also encourage more discussion of e-waste. Since women like building relationships and discussing things on social media, they are more likely to follow sustainability accounts. On the other hand, because men prefer to get entertainment from social media, we can post funny images or memes to grab their attention. Men usually post shorter captions as well, so using lengthy narratives will not be effective. By alternately using both strategies, e-waste campaigns will get more attention from both genders. It will lead to an increase in climate activism on social media platforms.

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