Waste Bank Digital Images Interpretation in Shaping Sustainability Perceptions

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Abstract. The discussion over the waste bank brings up issues such as practices, policies, worldviews, attitudes, and knowledge gaps. The interaction between visual and environmental messages can bring a wide complexity. Recognizing such dynamics has sparked research on environmental visual structures in environmental communication. This research seeks to understand on how visual frames shape sustainability perceptions through waste bank digital images interpretation. It employs mix-methods with concurrent procedures benefitting from images on the internet. The quantitative method uses questionnaire to 254 respondents of Bandung citizens, while the qualitative uses semi-structured interviews of three chosen respondents. The data gathered is then analyzed through visual framings of sustainability and environmental communication. The result shows the visual frames of waste bank images interpretation strongly shape sustainability perceptions meaning the sustainability aspects in waste bank images can be interpretted comprehensively. Additionally the pragmatic and constitutive aspects of environmental communication were also fulfilled by the interpretation.

Keywords: Environmental Communication, Waste Bank, Visual Framing, Image Interpretation, Sustainability

1 Introduction

As the world's population grows, so does the amount of waste generated by industry and households. The biggest sources of waste creation are densely inhabited cities and neighborhoods. Waste is still a challenging environmental challenge to solve in Indonesia, as the population, economic growth, and changes in people's consumption patterns all contribute to an increase in waste. In Indonesia households generally generate 48% the most waste, followed by 24% from traditional markets 19% commercial areas, and 19% public facilities [1], and this is emphasized in 2020 which is expected to reach 67.8 million tons, with households waste accounting for 37.3 percent [2].

Due to the restricted capacity of the landfill area and the difficulties of expanding the landfill area, the annual increase in trash output has been an issue. In developing countries, the most pressing issue with waste management is how to effectively collect and treat waste, because

survival is such a primary priority in certain countries that waste management does not rank highly on the list of public concerns [3].

In Indonesia waste banks are locations for sorting and collecting waste that may be recycled or reused and has economic value, as defined by Minister of Environment and Forestry Regulation number 97 of 2012. The existence of a waste bank stems from community concerns about the environment, which is getting increasingly choked with waste, both organic and inorganic. Additionally, the number of people in Indonesia will continue to rise, which will result in an increase in the amount of waste produced until the amount of land available to store the waste increases. This may be observed in Indonesia's overall population, which reached 272.23 million people on June 30, 2021, a rise of 879 thousand people from 171.35 million at the end of 2020 [4]. With such a big population, waste in Indonesia will continue to expand due to insufficient dumping facilities, resulting in environmental issues that will disrupt people's lives. This is due to landfills, which remain the most common and last resort for reducing waste [5]. The habit seen in Indonesian communities in treating solid waste is burying or burning rubbish, which is far from living in harmony with nature. The creation of the collect-haul-dispose waste management strategy has not been a solution to the trash problem [6], since it can be mainly based on an uneasy attitude toward waste and the establishment of a final disposal site, yet the waste problem remains unsolved.

The discussion over the waste bank brings up issues such as practices, policies, worldviews, attitudes, and knowledge gaps such as the inadequate services, inadequate money, inadequate environmental regulations, bad institutional structures, inadequate understanding of complex systems, inadequate sanitation [7] which contribute to the inability to efficiently manage waste bank. Furthermore, public perceptions of waste bank sustainability in terms of environmental, economic, and social benefits have not been completely incorporated. Exposure to media coverage plays a big role in shaping public opinion on contentious matters [8, 9], including environmental issue such as waste bank.

The public's understanding of and views about waste bank practices, as well as their long-term viability, are heavily reliant on public messaging. Public perceptions of waste bank towards sustainability are important to research as it is part of climate change communication. To overcome the communication challenges of human nature, party identity, and media fragmentation, communications must be personalized to a specific medium and audience, with carefully researched metaphors, allusions, and analogies that promote a new way of thinking about climate change's personal relevance [10]. The news media's greater dependence on visual communication to explain complicated processes and foster learning emphasizes the need of examining how visual material influences scientific understanding.

Several studies on waste bank attitudes have been undertaken, but least have been done towards sustainability using image interpretation. Wang & Hao [11] establish research on public perception of effective and efficient trash management through individual waste sorting in China which brings the debate fueled in part by people's differing expectations of central and municipal administrations. Ningrum, Zulkifli, & Susanti [12] elaborates on the waste bank's actions that have a good impact on the environment while also increasing the public economy. Their research aims to examine how the public perceives the Kebumen Gemilang Sejahtera (KGS) trash bank in Palembang's Kampung Iklim 2 Ilir. Singhirunnusorn, Donlakorn, & Kaewhanin [13] examines into the elements that influence household recycling habits as well as the possibilities of households joining a community-based recycling bank. Their research looks at two communities in Mahasarakham municipality in Thailand, where conditions and

trash recycling management differ. While for the visual interpretation, Krause & Bucy [14] look at how members of the public understand and make sense of photographs of hydraulic fracturing (fracking) displaying environmental risk, economic reward, or issue protest in different ways. Based on the previous research, the topic of individuals perception on waste bank sustainability through image interpretation has not been done, therefore this research is urgent to conduct. This research focuses on the how much individuals interpret differentially framed images of waste bank towards sustainability.

2 Literature Review

2.1 Environmental Communication

There are many different interpretations of environmental communication which adds environment to the communication contexts that can contribute to earth, life, and wilderness. Mulyana [15] describes the various communication contexts as "multiple communication settings based on the specifications". Open and Hamacher [16] defines environmental communication can as a plan and strategy that uses the communication process and multiple media to support political policy making and project execution with a focus on environmental sustainability. However, the message that exists in human behavior and relationship with nature via creating awareness about environmental preservation is the focus.

Every human being on the planet is an environmental communicator because they produce a message as they exchange and receive messages about the planet they live on. Environmental communication is becoming more common as global environmental challenges such as climate change, natural disasters, and global warming become more prevalent. The systematic generation and exchange of human communications in, from, to, and about the world surrounding humans and human connection with nature is known as environmental communication [17]. Environmental communication focuses on the message that exists in human behavior and relationship with nature by raising awareness about environmental preservation. Every human is an environmental communicator since they exchange and receive messages about the earth on which they live [17].

Environmental communication is becoming more common as global environmental challenges such as climate change, natural disasters, and global warming become more prevalent. This is clear in the debates and stories that have appeared in print, television, and social media. According to Pezzullo and Cox [18], this is due to the human desire to communicate about what is going on in his environment. Human intervention in environmental concerns, on the other hand, does not always serve as the foundation for environmental communication research. Environmental communication encompasses more than just providing information and discussing issues such as air pollution, global warming, chemical hazards, and endangered animal species; it also considers the role of language, visual images, protest, music, and scientific reports as symbolic actions.

Burke [19] coined the phrase "symbolic action" for environmental communication, which asserts that even the least emotive language contains solicitation or persuasion. This is since language and other symbolic gestures, as well as words, stimulate action. To put it another way, language actively sharpens cognition, shapes meaning, and guides humans toward a larger universe. The notion of environmental communication grows fuller and better at portraying the complexity of phenomena confronted by humans when it focuses on symbolic action. In this approach, environmental communication can be understood as a pragmatic and constitutive

mode of expression - naming, forming, directing, and negotiating - arising from the relationship of human ecology to its surroundings, including nonhuman systems like natural elements, animals, and plants [18]. Cantrill and Oravec [20] point out that how humans communicate about the world around them has a big impact on the environment they shape and experience. As a result, human attention to nature, the environment, and the world in which they live results in environmental communication. This is demonstrated by the fact that environmental communication frequently goes unnoticed in ordinary life.

Environmental communication, on the other hand, frequently encounters fundamental challenges [18]. The environment emerges as a popular issue that creates worries about nature, wild species, forests, transportation, rivers, and so on as a result of human action, yet the environment has only a small scope in the public realm without human intervention. This action, on the other hand, is a catalyst for environmental destruction. Therefore, this research uses the definition of environmental communication [18] as a pragmatic and constitutive mode of expression – naming, shaping, directing, and negotiating – from the relationship of human ecology to its environment, including nonhuman systems such as natural, animal, and plant elements. The definition affirms that environmental communication is a pragmatic and constitutive aspect as our understanding of the environment and the relationship of humans with nature. This view can occur because of the willingness of environmental activists who strive to make the community aware to care about the surrounding environment. The existence of environmental activists is what can reduce differences in knowledge about environmental problems due to communication barriers that often occur. The existence of environmental activists is what can reduce differences in knowledge about environmental problems due to communication barriers that often occur. Cox (2010) also divides environmental communication into two different functions: (1) Pragmatic function, persuasive or educational, helping humans solve their environmental communication problems; and (2) Constitutive function, has a purpose in the formation of a perception or consciousness of man continuously in the form of maintaining and protecting his environment. This research will also seek these functions using the qualitative data.

2.2 Visual Interpretation

Environmental communication benefits from media to deliver the message of preserving environment or as simple as human relationship with nature including visual representation. There has been a surge in the use of visual representations of the environment to explain science to lay audiences [21]. Individuals participate in an interactive process when deriving meaning from images, which is influenced by the stimulation qualities of the visual as well as the viewer's prior knowledge and situatedness. The assumption of a fixed relationship between an image and a particular interpretation is dismissed by this dynamic interplay between image components and individual attributes [22]. As a result, visual representations of science may promote alternate readings around the research rather than enhancing comprehension of emergent challenges.

The interaction between visual and environmental messages can bring a wide complexity. Recognizing such dynamics has sparked research on environmental visual structures in environmental communication [23]. Visuals, on the other hand, lack inquiry as compared to rhetorical analysis and verbal framing of difficult themes [24], even though audience understandings of informational graphics have been studied). This research fills a vacuum in the literature by examining how visual representations of environmental issues, particularly images of waste bank, influence audience interpretations on sustainability. By providing a frame, or

conceptual structure connected with the desired topic, visual imagery can aid in the comprehension of environmental challenges. Visual frames can be used to illuminate complex subjects, such as environmental concerns, by providing rich descriptive information that aids in interpretation. Furthermore, strategic communicators know how to use visual framing strategies to highlight the prevailing ideas they want to emphasize.

2.3 Waste Bank

The term "waste bank" refers to a waste management activity that employs a financial system. According to Cecep [25], a waste bank is a home waste management system that employs a waste deposit system to a body founded and agreed upon by the local community to house waste of economic value that is stored and then traded for cash. As a result, the waste that is saved has been categorized by kind, making it easier for managers to classify and then convert into items of economic worth in a creative manner.

Waste banks exist to address community worries about the environment, which is becoming increasingly clogged with waste, both biological and inorganic [26]. Organic waste collected in the waste bank can be used as fertilizer, while inorganic waste will be sold back to the collector. Kusumantoro [27] claims that the waste bank's goal is to raise community awareness about the importance of being friends with waste in order to get direct economic benefits from waste.

Sorting waste, handing waste over to waste banks, weighing waste, recording, and the proceeds of the sale of waste submitted are put into the savings book, then the share of the proceeds of waste sales between savers and executors, according to the Regulation of the Minister of Environment and Forestry no. 13 [28]. The waste bank's work system is what allows people to profit financially from waste collection. Waste banks are unable to penalize people who throw waste, so they must rely on a rewards system (reward or reward) such as money saving [29].

2.4 *Sustainability*

One of the most used keywords in environmental science is sustainability. There appears to be nothing that can't be defined as 'sustainable,' as anything can be hyphenated or coupled with it. Cities, economies, resource management, business, livelihoods – and, of course, sustainable development – are all examples of sustainable development. As a result, sustainability might be defined as a system's ability to recover from such shocks and pressures and return to stable states [30]. Sustainability is a multidisciplinary concept that has been used in many discourses. Political scientists developed political theories that incorporated a 'green' politics perspective, putting sustainability concerns at the center of a normative understanding of social and political change, based on broader popular political concerns about the relationships between environment, well-being, and struggles for social justice [31].

The Brundtland Report of 1987 introduced the concept of sustainability as a policy concept. The tension between mankind's desires for a better existence on the one hand, and nature's constraints on the other, was the subject of that text. Over time, the notion has come to be reinterpreted as embracing three dimensions: social, economic, and environmental [32]. The term "sustainability" was coined in the forestry industry, and it refers to never harvesting more than the forest yields in new growth [33]. In 1713, the word *Nachhaltigke*it (German for

"sustainability") was first used in this context [34] which brings concern about protecting natural resources for the future is perennial.

[35] coined the Triple Bottom Line concept, which suggests that sustainability has three elements as a way to operationalize corporate social responsibility, as the phrase bottom line suggests, and it comes from the field of management science. To the traditional bottom line (profit), caring for the environment (the earth) and being good to people should be added, for example, by providing handicapped facilities and recruiting minorities (the social dimension). Sustainability aims to reach an equilibrium in the benefits of social, environment, and economy.

3 Research Method

This research uses a concurrent procedures strategy that incorporates both quantitative and qualitative data. Concurrent approaches are used to give a thorough examination of research issues [36]. Through the distribution of surveys, quantitative method is employed to establish an understanding about standing attitude that influences how individuals interpret images of waste bank depicting sustainability frames. The population is determined as by the age of 17 to 74 of Bandung citizens which accounts for 1.741.967 individuals (Badan Pusat Statistik Bandung, 2020). The number of samples follows MTurk online experiment [37, p. 327] which accounts to 250 – 260 respondents. Therefore, this research uses 254 respondents. The respondents are assigned to assess 15 images of waste bank activities provided from the various sources on internet. These 15 images are curated and organized into three categories to depict three aspects of sustainability: environment, social, and economic.

The procedure for selecting images involve discussion from visual and photography-interested environmental communication to find and read online news pieces, blog posts, social media, and waste bank images from various internationally and nationally known websites and news such as such as worldbank.org, gatra.com, kompas.id, waste4change.com., etc. pikiran-rakyat.com, posjateng.id, citarumharum.jabaprov.go.id, gatra.com, bisnis.cdn, etc. This procedure yielded a 15-image sample with 90 statements related to environmental, economy, and social aspects. The topic statements are shown on Table 1.

Table 1. Sustainability Topic Questions

No	Aspect	Topic
1	Environmental	Environmental Conservation
		Environmental Damage
		Quality of Human Health
		Image Ambiguity
		Quality of life
		Message to protect environment

2	Economy	Financial Benefit
		Poverty Reduction
		Unemployment Reduction Effort
		Image Ambiguity
		Quality of Life
		Message to Improve Local Community
3	Social	Involvement of Local Community
		Involvement of Women
		Attempt to Make Community Secure
		Image Ambiguity
		Involvement of Young Generation
		Message to Involve Local Community

To find out the level of respondents' framing level, the questionnaire uses six topics in each aspect of sustainability and then it is measured from 1 (lowest) to 5 (highest) through scoring category of 100% (254 respondents) as shown on Table 2, with 'x' as the actual framing level.

Table 2. Framing Scoring

Range	Score	Framing Level
$100 < x \leq 200$	Very weak	$100 < x \leq 200$
$200 < x \leq 300$	Weak	$200 < x \leq 300$
$300 < x \leq 400$	Strong	$300 < x \leq 400$
$400 < x \leq 500$	Very strong	$400 < x \leq 500$

Meanwhile, the qualitative method is employed to gather in-depth information and analyze on how individuals interpret differentially framed images of waste bank towards sustainability. Purposive sampling is used to acquire information through semi-structured interviews with three chosen respondents as informants. Each informant represents the framing level they provided

in the questionnaire shown on table 3. The informant of very weak score is not determined as no informants score at that level.

Table 3. Informants List

No	Score	Informant	Gender	Education	Age
1	Weak	Hermansyah	Male	Elementary School	57
2	Strong	Olivia	Female	College	21
3	Very strong	Desi	Female	College	19

Qualitative data can also be gleaned via the review of literature and documents. Following that, these two methodologies are combined with mutual assistance to produce a full analysis. The questions from the interview are referred to environmental communication functions which consist of pragmatic and constitutive.

4 Result And Discussion

According to the questionnaire, the majority of respondents had completed senior high school (75.2%), followed by a bachelor's degree (23.6%), a master's degree (0.4%), a doctoral degree (0.4%), elementary school (0.4%), and junior highschool (0.4%). In addition, there are 40.2 percent women and 59.8 percent men in the population. However, this research does not go into greater detail about these characteristics. From the questionnaire scoring of 254 respondents, the result can be known that the visual frames shapes sustainability perception in a strong level (366.89/500) which can be seen on table 3.

Table 3. Questionnaire Scoring

Frame	Image	Score
Environment	1	Strong
		306.25
	2	Strong
		338.23
	3	Strong
		342.92
	4	Strong
		315.22
	5	Strong
		342.52
Economy	1	Strong
		386.75

	2	<u>Strong</u>	
		378.65	
	3	<u>Strong</u>	
		391.52	
	4	<u>Strong</u>	
		392.08	
	5	<u>Strong</u>	
		394.3	
Social	1	<u>Strong</u>	
		381.03	
	2	<u>Strong</u>	
		383.6	
	3	<u>Strong</u>	
		393.88	
	4	<u>Strong</u>	
		382.45	
	5	<u>Strong</u>	
		373.95	
Overall Score		<u>Strong</u>	
		366.89	

The table 3 can be used to determine that each framing has a score of strong. However, each image contains at least one statement with a score that is considered to be weak. In the social and economic frames, several statements have scores that amount to very strong, however in the environmental frame, the highest score only amounts to strong. For example, the statements that amount to very strong in economy are financial benefit, poverty reduction, and message to improve local community as shown on Figure 1.

Figure 1. Economic Frame Image 1 [38]

In the other side, the statements that amount to very strong in social are involvement of local community, involvement of women, and involvement of young generation as shown on Figure 2.

Figure 2. Social Frame Image 1 [39]

The environmental frame has the lowest score out of the three sustainability frames, coming in at 329,03, followed by the social frame at 382,98, and the economic frame at 388,66. Because every image contains at least one low score, the environmental frame has the lowest overall score. For instance, in Figure 3, the categories with the lowest scores are quality of life, image ambiguity, and environmental conservation.

Figure 3. Environmental Frame Image 1 [40]

In Environmental Frame Figures 4 and 5, environmental damage and image ambiguity both received the lowest scores. It means the respondents can adequately interpret images of waste banks without having to deal with significant ambiguity, and waste banks have a weak framing of causing environmental damage.

Figure 4 . Environmental Frame Image 2 [41]

According to the lowest scores for environmental damage and image ambiguity, both scores can be associated with positive perceptions.

Figure 5. Environmental Frame Image 3 [42]

However, only image ambiguity was the cause of the lowest ratings in Environmental Frame in Figures 6 and 7. The two images can both be correctly interpreted by respondents without leading to confusion, according to the lowest image ambiguity score.

Overall, all three frames are still considered to be strong even though each frame in each image has a low score that can be interpreted as weak. Additionally, the follow-up interviews with three selected respondents which became informants were conducted to gather more comprehensive information.

Figure 6. Environmental Frame Image 3 [43]

Figure 7. Environmental Frame Image 5 [44]

The first informant (Hermansyah) is the only respondent with elementary school diploma. He received the lowest rating of all the responders (21,6 out of 30). He stated that he is unfamiliar with the idea of sustainability and has never heard of it. He did, however, reside in a community where a waste bank was already operational, and he took part in a number of waste bank-related neighborhood activities. He understood the function of waste banks and the advantages they provide for the environment, the economy, and society by carefully examining each image. The second informant (Olivia) has a middle score with a senior high school diploma and is currently pursuing an undergraduate degree. Her rating (24 out of 30) is average. She claimed that she was familiar with the idea of sustainability because she studied it in college. Although a waste bank has not yet been built in her neighborhood, she was able to recognize their images and the advantages they offer. With a high school diploma and further study leading to an undergraduate degree, the third informant (Desi) received the highest score. She received a 29 out of 30 rating. She mentioned that while in college, she studied courses on sustainability, waste banks, and involved in the development of waste banks in her neighborhood. She was able to successfully connect sustainability issues with the advantages of waste banks as a result.

All three informants, who are also questionnaire respondents, stated that sustainability and waste banks are difficult issues that call for a deeper comprehension of concepts and procedures. In the environmental communication perspective, the waste bank image interpretation is closely related with how an individual perceived the phenomenon around their surrounding. The definition of the word "environmental communication" is the pragmatic and constitutive

modalities of expression—the identifying, shaping, orienting, and negotiating—of individual's ecological connections in the world, including those with nonhuman systems, components, and species [18]. The interpretation of the waste bank image has caused this expression to appear. The pragmatic function includes the communication techniques, both verbal and nonverbal, that express an objective. It is also modality of expression of greeting, informing, demanding, promising, requesting, educating, alarming, persuading, and refusing, while the constitutive function. All informants confirm that the waste bank images used in this study have demonstrated a pragmatic use for embedding the introduction of the sustainability idea. Additionally, it piques the informants' interest in learning more about at least one area of sustainability. Furthermore, the majority of Bandung's neighborhoods now have a waste bank, which has changed how the public views the its significance. Therefore, the waste bank images may function as a nonverbal, practical tool for sustainability.

The waste bank images have driven the informants to consider the meaning of sustainability as a constitutive function. Even with the presence of waste banks in his neighbourhood, the first informant said that he found the concept of sustainability difficult to comprehend. However, after viewing the waste bank images in this research, he became interested in learning more about how waste banks are related to social, economic, and environmental factors. Due to their prior education, the other two informants have a stronger comprehension of this subject. Although there is currently no waste bank in the second informant's neighborhood, she has a thorough understanding of the three aspects of sustainability. Additionally, the third informant has developed the strongest skill set for interpreting waste bank images due to her extensive experience, thorough knowledge of waste banks, and involvement in the neighborhood waste bank. After seeing the waste bank images, all three informants acknowledged that they desired to engage in more waste bank activities. This has led to the waste bank images serving as a constitutive function for navigating the meaning and value of waste banks as well as their relation to sustainability.

5 Conclusion

The interpretation of waste bank images using visual frames to represent environmental, social, and economic sustainability perspective has been very powerful in Bandung. Additionally, the waste bank images' interpretation served the pragmatic and constitutive environmental communication functions by affecting sustainability perceptions through three visual frames. To better understand the drivers behind strong waste bank image interpretations, more research must be done. The results of this study may offer an intriguing angle from which to investigate the relationship between education levels and perceptions of sustainability.

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