Waste Management Literacy and Sustainable City in Bandung, Indonesia: A Netnography Research

Siswantini[1], Ulani Yunus[1], Gayes Mahestu[1]
[1]*Marketing Communication Program, Communication Department, Faculty of Economics & Communication, Bina Nusantara University, Jakarta, Indonesia 11480*

Keywords: Management, Netnography, BPJS.

Abstract: Recently, zero waste city is a popular movement in waste management. This concept is challenging since the concept requires holistic implementation of waste management dimension. One of the challenging dimension in waste management practice for the country which has a large number of a population such as Indonesia is community participation. Furthermore, the very first step in raising community participation in environmentally sound of waste management is to understand their preferences, concerns, and behavior. The existing of WhatsApp has provided new opportunities for the development of various models of community participation in waste management, as developed in the city of Bandung. This paper aims to describe the activity of waste management literacy conduct in BJBS WhatsApp group. The Forum believes that zero waste city is the first step towards to the sustainable city. The conversation analysis using netnography methodology shown that the making meaning of zero waste management represented by the level of participant involvement in the discussion. Additionally, the finding also found that the interaction among participant, represent the waste management literacy, through the exchange of messages.

1 INTRODUCTION

One of the goals to be achieved from sustainable development goals is a sustainable city and community. Zero waste city concept promote the sustainable waste management system which needs community participation. Recently, the concept of zero waste city is widely implementing in numbers of cities around the world. In 2016, Indonesia had launched the program of "Zero Waste Movement" to reach the condition of zero waste in 2020. Designing the zero waste is very challenging, it is referred to as the dimension of waste problems itself. There are dimension of waste problem from economic issues (Morrissey & Browne, 2004) social and culture (Marshall & Farahbakhsh, 2013; Pauline & Froztick., 2009; Zotos, Karagiannidis, Zampetoglou, Malamakis, Antonopoulos, Kontogianni & Tchobanoglous G 2009; Chung & Lo, 2004; Gille, 2001), to the political issues (Marshall & Farahbakhsh, 2013). Numbers of researches showed that the success of waste management implementation supported by community participation (Tukahirwa, Mol & Oosterveer, 2010), media exposure (Chan, 1998; Tremblay, 2013) and the system itself (Marshall & Farahbakhsh, 2013). Therefore, zero waste condition should recover all possible problem in every dimension. One of the challenging dimension in waste management practice for the country which has a large number of population such as Indonesia is community participation. Furthermore, the very first step in raising community participation in environmentally sound of waste management is to understand their preferences, concerns and behaviour (Chung & Lo, 2004)

In 2005, Bandung areas, faced catastrophic waste management since the biggest landfill collapsed and killed hundreds of people. Consequently, tons of solid waste could not be transferred to the landfill, then the city faced health environmental problem, polluted by the methane gas from the solid waste which accumulated throughout the city. The moment had forced the national government to issued was management regulations, followed by provinces and cities and/or districts in the country. The moment then memorized as waste national awareness days, all stakeholders of waste management take a collaborative action to increase the quality of regulation implementations. Currently, Bandung

Siswantini, ., Yunus, U. and Mahestu, G.
Waste Management Literacy and Sustainable City in Bandung, Indonesia: A Netnography Research.
DOI: 10.5220/0010019700002917
In *Proceedings of the 3rd International Conference on Social Sciences, Laws, Arts and Humanities (BINUS-JIC 2018)*, pages 488-497
ISBN: 978-989-758-515-9

generates 1,500 to 1,600 tons of waste a day. Unfortunately, only 75% transported to landfill, and the rest still accumulate in TPS (temporary storage area). The composition; 63% is domestic waste or food scraps and 23 percent are recyclable and /or reused and rest is residual. Therefore, if the local government has a system to process food waste, it will reduce the burden of transporting waste to the landfill. Regrettably, there is no supporting system to process the rest.

In 2014, Bandung local government launched the zero waste area program. In alliance with the group of individual's namely Forum Bandung Juara Bebas Sampah/BJBS, they run the program in 20 urban villages. The purpose of the program is to bring waste management close to the source. Furthermore, in order to keep the program maintainable, the forum bears a series of activities that support zero waste city development. One of it is managing online discussion forum through WhatsApp group. Since the first introduced in 2013, the forum has created any number of programs and collaboration of zero waste practice. In the other side, the discussion forum afforded to the learning process of zero waste practice among participant. Regarding to Searle (2003) the learning process in accordance with a literacy event. In this context, literacy sees as social construction and histories that cannot be generalized to various cultures, because every culture has its own uniqueness. Adopted the concept of literacy event form Heat (1983) who defined as interactional events which involve, reading, writing and interpreting and interacting around the piece of writing, relevant with the interaction process in the BJBS discussion forum. Besides, Heat argued that literacy event typically occurs in schools, in a home and, in the community include in social media, as virtual community.

The literacy event in the BJBS WhatsApp group focus on the zero waste strategy, sustainable waste management, and other ideas of zero waste city development. Therefore, the event consistent with the waste management literacy in social perspective. Generally, the discussion ensues almost every day, starts with the questions from one of the participants that need more information about zero waste practice. Consequently, if the issues categories as urgent, the discussion can take many days until the solution of the problem encountered. Moreover, this paper aims to describe the activity of waste management literacy conduct in BJBS WhatsApp group, which provide an essential information, idea and/or suggestion for the government and other stakeholder of waste management. Furthermore, this paper could be used as a locus of sustainable city development toward community zero waste life style.

2 ZERO WASTE CITY PRACTICE IN BANDUNG

The zero waste concept was introduced by Dr. Paul Palmer who developed his research to solve chemical waste problems. The zero waste system, required all materials to be in an optimum level of consumption (Palmer, 2004) no material is wasted (Murphy & Pincetl, 2013; Mason, Brooking, Oberender, Harford & Horsley, 2003; Colon & Fawcett, 2006). Moreover, the zero waste city is a city that one hundred percent implement a recycling system (Zaman & Lehmann, 2011; Fujita & Hill, 2007) suggest that solid waste should be handled since the product has not become waste, and this is related to the existence of system, regulation, institutional, financing, and public participation.

Zero waste practice in Bandung started with applying the concept of zero waste area program that is a place where the waste management system is conducted independently by the community. The program carrying out five principles, namely citizen involvement, independence, efficiency, environmental preservation, and integrity. This system is planned, developed, operated, managed, capitalized, and owned by the community and endorsed and supported by the Government of Bandung (BPLH, 2015). Conversely, the concept of zero waste developed by the government of Bandung emphasizes the independence of citizens in waste management. In 2017, there are 20 urban villages which have implemented the concept of zero waste lifestyle. In the model areas, the community is assisted by selected NGO, that responsible for supporting the program implementation.

2.1 Waste Management Literacy

Generally, literacy defines as the capacity of human beings to apply their knowledge and skills on specific issues and conduct analysis, and communicate effectively the views, solutions proposed and interpretations of problems in various situations (OECD, 2010). Since the term of literacy relates to the context, such as financial literacy for a financial issue or environmental literacy for learning process in raising knowledge of the environment. Solid waste is one of the most complex environmental problems as it produces by individuals, but the final process of the

materials becomes the responsibility of the government. However, community participation has an important role in accomplishing integrated waste management. In order to raise awareness and community participation, waste management literacy is needed, so it encourages a person to have knowledge and skills in managing waste.

Therefore, the activities of literacy, communication, and interpretation of the environment are interrelated activities. Heat (1983) and Breen (1994) mentions that literary events generally occur in the classroom, but the practice is reflected in activities within the home or in the public sphere or in the community (Baron, Bruce & Nunan, 2002). Along with the development of information technology, where the internet becomes a space that allows distance education, then there also environmental/ecological literacy activities can take place. This concept is in line with what Mocker and Spear (1982) have proposed: self-directed learning or self-learning where self, in view of Okamoto, Kayama, Cristea and Seki (2001) refers to autonomous behavior for both individuals and groups who agree to study together.

3 NETNOGRAPHY IN ECOLOGICAL LITERACY RESEARCH

Since introduced in 1990, netnography was widely used in various kind of researches on online-based consumer behavior, marketing, and education (Kozinets, 2010). Moreover, Sandlin (2007) use the techniques in exploring the process of created lifestyle meaning from the magazine. Accordingly, the methodology can be used to describe the construction and the meaning of participant roles in supporting Bandung Zero waste city development. The discussion in BJBS Forum in WhatsApp group takes place intense every day with the main theme around schemes, action plans, and collaborations in encouraging the building of sustainable waste management systems. In order to understand the ways' discussion participant construct and making meaning of their role building sustainable waste management system, through their participation in the discussion, the methodology of netnography was used. Below is the explanation of how the technique is used as well as a brief presentation of relevant finding.

3.1 Entree

The BJBS discussion forum is a closed group that is specifically followed by individuals who have an interest and concern in solving Bandung waste management problem. Consequently, to be a part of the forum, the participant should meet with the criteria: active direct either indirect in supporting the Bandung zero waste city development. The researchers have the opportunity to become a participant in the forum, as previously actively promoting community behavior change in waste handling, in the community participation group discussions. Further, the coordinator of the group provides the recommendation to join the BJBS discussion forum.

3.2 Data Collection

The investigation of this paper from BJBS members in WhatsApp group. The observation started from August 2015 - December 2015 which is the initial period of strengthening the concept of zero waste city among forum members. During this period the conversation is then copied and paste into the word processor and then transferred to the qualitative data analysis NVivo. Archived post in that period reached 4273 posts covering 10 Main topics about sustainable waste management, especially in realizing zero waste and sustainable city. The BJBS Forum is a closed-ended discussion forum whose members are selectively selected so that by 2017 there were 96 participants from solid waste practitioners, government representatives, local NGOs, academics, individuals engaged in waste management and waste processing businesses. Finally, the researcher kept reflective field notes, in which ongoing analysis occurred through participant comments (Bogdan & Biklen, 2003) and researcher memos (Glaser & Straus 1967).

3.3 Analysis and Interpretation

Using Kozinet's approach to conversations in WA groups then export to qualitative data analysis, and categories according to the need to answer the research questions (Sadlin, 2007). Then the data is analyzed using constant comparative techniques (Glaser & Straus, 1967). Furthermore, the data are grouped into categories according to research questions that intend to explore zero waste city construction among members of the discussion forum and the meaning of their participation role in realizing that goal. There are two types of categories: level of

involvement in the forum and consumption of activity and message that represents the construction of zero waste city.

3.4 Finding

3.4.1 Waste Management Literacy Process

The BJBS forum was initiated by a group of an alumnus of Bandung Institute of Technology which was later supported by Alumni Association. Furthermore, the development of this forum also contains individuals from the government, NGO, academics and waste handling practitioner. Since its establishment in 2013, the forum has conducted various activities such as monthly meetings, discussion forums in WhatsApp groups, and implementing knowledge management. Several collaborative activities with various parties have resulted in the program of BebasSampah.ID (BSID) a web-based program in promoting information and big data of waste handling activities in Bandung areas, escorting the preparation of Bandung waste management master-plan, encouraging the development of zero waste area program and implementing a bio-digester program and various other activities.

This section reports findings from the discussion in WA group BJBS forum and, to illustrate the kinds of findings that can be generated from netnographic research. The discussion forum in the WhatsApps group plays an important role in raising knowledge, information, and skill of the group member, and as media in discussion the action plan of zero waste city. Through the analysis found that almost all participant categories as insiders, and only two participants' categories as devotees. The insiders represent the participant that have strong ties to the group and to the consumption activity and tend to be long-standing and frequently referenced members (Kozinets, 2010). They frequently act as discussion initiator, they post question, opinion or suggestion to the hot issue in the practice of waste handling. The conversation shows that there are four active insiders include; forum leader, waste management practitioners, academics and government representation. They take a turn in questioning, post an opinion and/or suggestion for the government or other participants. The devotees are the participant that have strong consumption interests, but few attachments to the online group (Kozinets, 2010). Actually, the role of insider and devotees on these group are alternate, conferring to the theme being discussed.

The messages exchanged during the discussion, usually based on field situation. Nevertheless, some discussions were made because of the need for information from other members. For example, when there are participants who want to know more about biodigester, then he/she will post the questions in the forum. Furthermore, if there are other participants who know it, it will immediately provide information. Often, from the initial information, it will develop into a discussion of wider waste management strategies, especially in the realization of a zero waste city. The daily discussion theme, states by the initiator, frequently by the member of the core team. In the period of analysis found that there is a study cycle where the participant. The interaction among participant through their message represent the study cycle, there are a reception, integration, and expression and review the communication-based own written word (Malcolm & Rochecouste, 1998). The reception takes place when the participant reading the message and decide whether they participate in the discussion or not. The integration occurs when participant comprehends to the discussion materials and, following up with an action or confirm the action by sending the photo of their activities. This taken action or confirm action is the third step of the cycle which involved of what has been learned, namely expression. The expression also can be seen in the collaboration among participant in enlarging the area of zero waste place. Finally, there is a review stage, where the participant considers the evaluation which has been discussing of what they have expressed. This involves, for example asking about the relevant interpretation of zero waste indicators they had been extant in the area of implementation, or receiving and responding to the feedback given directly by discussion initiator.

The waste management literacy model that takes place in this online discussion forum is in line with self-directed learning, in which self, as directed by Okamoto et.al. (2001), represents autonomous behavior in determining its involvement in the learning process. Additionally, the learning process, as stated at the beginning, uses an extra-textual framing where participants compare and add information received from other sources. Communication action among participants is based on the meaning of the third model proposed by Blummer (1969), that the meaning of symbols is a social product formed by agreement between the parties interacting, and in this case, the interaction between participants. Accordingly, the Social media as a medium of interaction is treated by its users such as face-to-face media, so non-verbal communication

that occurs in the face-to-face replaced by emoticons or emotional icons whose meaning can only be formed according to the background of the participants' knowledge and experiences on the themes under discussion.

3.4.2 The Construction of the Meaning of Zero Waste City

The second categories of the conversation is the making meaning of zero waste city through a message exchanged in the discussion. According to the results of conversation analysis, it appears that the discussion that occurred in this forum not only as a medium of collaboration and communication but also as a medium for education, this forum becomes a class representation where the members interact and various skills. Moreover, in this section will be presented the results of the conversational analysis with the netnography techniques, and classifies the results of the conversations in the theme: waste management innovation; education and collaboration in realizing zero waste city as a representation of the level of environmental literacy.

Making Meaning of Waste Management Innovation. Referring to the waste management law in Indonesia innovation means to efforts to develop new findings or improve the quality of existing waste management models, especially in reducing and waste handling. An innovation of waste management to solve the waste problem in Bandung city, absolutely necessary. Moreover, this innovation is not only related to technology but also about systems and components of the system as a whole, that's what researchers gathered from the various conversations that occurred in the forum BJBS. One of the innovations that researchers have observed is reflected in the conversation of August 22, 2015, that discuss waste management transparency. The initiator post a suggestion about what needs to provide in creating waste management transparency, she suggests a list of the activities and asking other ideas from the forum. At the end of a conversation, the forum resulted in 13 ideas to be offered to local government in supporting waste management transparency. Table 1, figure out the discussion of waste management transparency idea:

Table 1: Discussion example of waste management transparency at August 15, 2016

Account	**Messages**
CTR - Initiator	A discussion tomorrow at Eco Camp will discuss transparency related to the solid waste system. What is the information that needs to be supplied by the government, or also information that can be provided by collaborative transparency? But broking information, just like that, won't effectively make automatic changes. Can you lose the burden of the information provider (the term is the word)? So that, transparency really works ... you need to understand first what key information is really needed. Key criteria, meaning that the info actually triggers a certain action (action cycle). For example below, which info do you think is important for friends to transparently: The transportation schedule behind the garbage truck? What is the monthly retribution fee? Where is the TPS? What is it?
RIS (SWM specialist)	There is a lack of transportation schedule at each polling station So people can know, if there isn't, then don't bring garbage to the polling station
JRSN (Initiator of BJBS Forum)	The data in community group level
DVD (NGO representation)	The key now is how all of the data is transparently interpreted so that it triggers community participation in community interaction and waste management (government and other parties). How, for example, between a dealer and waste sources, coordination occurs which further increases recyclability. For example, when the hearing was held in the park it was quite a lot of recyclable waste ...

	how could each park be connected directly to those who needed supplies? How does the connection occur between the processing and utilization of processing? For example, this map should facilitate synchronization of biodigester placement with urban farming locations that require liquid (hydroponic) fertilizer. Synchronization between biodigester and urban farming programs through government or CSR, and mentoring programs

Furthermore, alongside with the waste management transparency in the period of observation found that there are four other innovation ideas includes: plastic bag diet promotion, waste bank management in school, and a biodigester regulation.. Table 2, is the example of discussion about plastic bag diet:

Table 2: Discussion example of plastic bag diet, at August 27, 2016.

	Message
HN – Initiator (Communication specialist)	Let's reduce the use of plastic bags (support with series of photograph from the event – **Writer**)
TN (NGO)	Rhy, the ending can't get the feeling of reducing the plastic bag
RHY (NGO)	Agree Bu. Related to waste is very uncontrolled, even the booth next door (but not notice which school, obviously adiwiyata), buy food in Styrofoam :(Event follow-up the event, a joint team will be formed (according to local regulation 17/2012) to ensure that local regulations are running. Hopefully it can be formalized in the form of a mayor's decree Sorry for the one who was present at the event, the program not yet #zerowaste and #goodfestival Mrs. TN, I hope you are willing as the Ambassador of housewife for
	#DietKantongPlastik, we will schedule it for a photo session he he he.
CN	Provide an article for a newspaper, opinion /reader, hehe. Create an activities and collaborating are not easy. It easy to create a comments # lesson learnt
JRSN	It's ok, lesson learn and declare of the lack Evaluation to the critical of evaluation of the critical point of the difficulty What made Rhy and the team's efforts difficult and unsuccessful, made the zero waste event? The budget, Ignorance, is not supported by other committee commitments, or what?
TN	There should have been a challenge for the women who came, to shop without plastic bags. It must be far more striking. And then, asking them to tell us about their experience, the show was at the mall

As a result, the range of waste management innovation can be categories as social engineering and technical engineering. The Social engineering in the forum discussions can be seen from the issues raised, were further offered of community engagement and development of waste management regulations in social perspective. Accordingly, the promotion of plastic bag diet and waste bank in school can be classified as social engineering, since furthermost of the participant suggest creating a promotion with other community involvement. The innovation as if implemented then expect will be a motivation for the emergence of behaviour change in handling plastic waste. Housewives, who were able to control the use of plastic bags from the source, promote as an ambassador in reducing the plastic bag usage. Accordingly, if every housewife can influence 1-2 people around to reduce the usage of plastic bags, it can create a massive impact on the scale of the city

Additionally, the waste bank management in school, categories as social engineering as suggested by participant the waste bank is one of the community participation models in waste reduction. The discussion on waste bank continues until the question arises about why it should be named "waste bank".

The discussion ended with a scheme to find another appropriate name other than the waste bank, or other accepted name. However, the model of the waste bank has regulated in governent regulations, therefore the name of the waste bank could be changed to another name. Waste bank in Indonesia, categories as one of the requirements to the city/district to be nominated in an environmental national award, consequently, although some of the people disagree with the idea, the program should be a part of a city waste management system.

In addition to social innovation, BJBS participants also discussed the innovation of waste processing technology and the final waste processing site. A variety of alternative waste processing technologies are also discussed. Interestingly light discussion themes are always associated with the issue of waste, such as when commemorating the hero's day some members share an idea how to commemorate the hero's day by keeping in touch with the issue of waste. In other words, all the discussions in this forum cannot be separated from the goal of realizing the vision of zero waste city, through community participation, decentralization, and integration of activities among the activists of the waste handling and the government. The themes of discussion categories as technological engineering in waste management.

Finally, the making meaning of innovation in zero waste city development on BJBS discussion forum was conveyed by the members involved in discussions in accordance with their competencies. Additionally, referring to Kozinet, the characteristics of insiders can be seen from the many opinions, suggestions or criticisms presented on the theme discussed (2010). These insiders are those who have discussion initiatives or highly technical and social competence on waste management. Moreover, the competence of insiders can also be synonymous with individuals with high environmental literacy as proposed by Roth (2010) that is operational environmental literacy, in which members of forums have extensive knowledge of human interaction with their environment, routinely evaluates the impact of human actions on the environment. They also actively collect and evaluate information about the environment and waste problems, decision-making challenge and organize advocacy, and are willing to invest for the environment, and consistently implement a zero waste lifestyle.

Education And Collaboration In Comprehending Zero Waste City. One of the themes containing educational elements is the discussion of biopore holes. Biopore hole is one of the required concepts in the accompanied area, as a pilot area of a zero waste area. Moreover, the discussion initiates with a member's question about the capacity of the biopore hole. This question is answered by one of the coordinators who have an experience. Additionally, the discussions thrive on other waste reduction themes, especially for the reduction of non-organic waste. The messages containing educational content and information are supported by the presentation of photographs of practical activities in the field.

In addition to waste management issues, the discussion forum also discussed other theme related to waste topics, such as excessive water suctioning. The messages that are not directly related to waste management as well as education part for other members who do not have technical competence in the areas discussed. The educational content in this forum is represented in messages that contain new information that raising knowledge and member awareness to act in developing zero-waste city. However, although members of this group are individuals who have the social and technical competence of waste problem, there is still some information that is new and not shared by other members before. For example information about the development of waste management regulation in the Philippines which or waste management in Depok. The information could become an input to the government as a strategy of integrated waste management. Such schemes outside the forum often impact to a real collaboration among forum members and the government or fellow forum members. Generally, educational information is generally a critical thought of members belonging to the category of insiders, where the messages they make are referred to by other members. Such as the exposure of plastic waste contaminating the sea or refill system for various household needs.

As result the construction of meaning of zero waste city in the BJBS discussion forum could be summarize as figure 1:

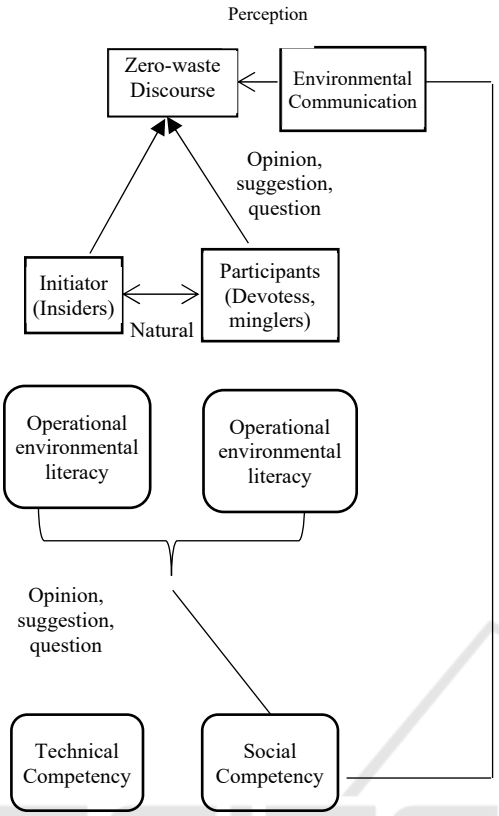

Figure 1. The result of the construction of meaning of zero waste city in the BJBS discussion forum.

3.5 Discussion

The zero waste city discourse discussed in the BJBS forum is a visionary discourse, as suggested by Zaman in various studies (2011, 2013, 2015). According to Zaman (2011), zero waste city is a city that performs 100% recycling and reprocessing of various waste types. The public participation contributes a suggestion for evaluations at each stage of the existing waste management as well as to environmental health policy. The discussion result has shown that individuals involved in the BJBS discussion forum, intentionally want to actualize the vision of Bandung zero waste city. The creation of this forum cannot be separated from the process of its members' perceptions of environmental conditions, especially about the waste problem. The participants' perceptions are reflected in messages that are exchanged on each group's dialog that is not separated from environmental problems, especially about waste. While the construction process of the zero waste discourse that took place in the discussion forum is in line with the concept of environmental communication proposed by Milstein (2009) which suggests that environmental communication as a social process that has the power to construct, produce and facilitate human relationships with nature. Practically what is discussed in the BJBS forum is aimed at facilitating the understanding of participants in handling environmental and sustainable waste issues.

Moreover, the results of the analysis of the discussion process at the BJBS online forum found the existence of the members' categories based on the opinions and/or the proposals conveyed in the conversation. The categories insiders and devotees of group discussion participant represent the homogenous of the group member, however every member still benefits from the discussion theme. The ideas construction of zero waste city, represent by the message categories in innovation and education and collaboration. The innovation ideas, are noteworthy with the regulation of Bandung waste management regulation which offer the opportunity to community participation. Furthermore, the education and collaboration among participants ensued by the message exchange and, its accordance with the literacy event. Consequently, the WhatsApp discussion forum managed by BJBS converted as media of sharing information and raising knowledge, awareness and action, as well as in the classroom or seminar activity. Therefore, this online forum could become a new model of environmental education, mediated by an information technology.

Figure 1, describes how the participants' perceptions based on their competencies apply the concept of environmental communication in perceiving zero waste discourse. Both the initiators of discussion (insider) and discussion participants (devotees, minglre's), have the right to cast opinions, suggestions, and questions about creating a zero waste city idea. Among the two categories of participants during the discussion there was also an educational process that ran in the corridor of extreme framing.

The diagram also shows that interpersonal relationships between forum participants represent the role model interaction where each member is required to play a role in accordance with his position in reality or position in their institution. In interacting through social media WhatsApp, competency categories also appear namely technical competencies and social competencies based on the opinions they make. Technical competence and social competence can appear on both sides, initiators, and participants. These technical competencies and social competencies do not change for each participant, the changes only on participants position, from insider to

participant and vice versa, according to the theme discussed.

Furthermore, the finding show that the zero waste city concept serving as a holistic vision to build a sustainable city. The zero waste concept, create value added from waste (waste as a resource). As such it aims to separate waste into a high quality of waste streams for re-use, recovery and recycling. The concept require an active cooperation among stakeholder, and the discussion forum could become a locus of a resilient joint cooperation development.

4 CONCLUSION

This paper presents the literacy event conducted in WhatsApp BJBS discussion forum that analysed with netnography techniques. This method is commonly used for online research marketing, however, is open to another on online communities research. The communities formed in the WhatsApp group are generally homogeny and are often familiar with each other. Nevertheless, some communities with specific goals, often formed since there is a common interest, although among its members do not know each other. The BJBS WhatsApp group has a special purpose to realizing Bandung zero waste city. The Members of this group originally homogeny alumni of ITB, on the development of this community consists of people with different background, then have the same vision and mission in supporting the development of Bandung zero waste city.

The construction of zero waste discourse of online discussion forums managed by BJBS is one of social innovation form in handling solid waste problems. The construction of zero waste discourse at the forum is built on suggestions, opinions or questions from participants who are the initiators of the discussion. These questions are responded to by other participants with opinions, suggestions or other questions that lead to the development of a broader discussion theme. The forum participants have the autonomy to choose to participate or not. This condition is in line with the concept of self-directed learning that upholds the autonomous behaviour of individuals in representing themselves. The participants who are involved in the discussion can be classified into two types: the insiders or members whose opinions, suggestions and criticism are referred to by other members, especially for a practice of zero waste lifestyle in their daily activities. Secondly, devotees, are members who have a keen interest in the themes discussed. This position is not a permanent thing but alternates according to the theme being discussed. Each member in this forum contributes through opinions, and criticisms to comprehend the zero waste city in accordance with their respective competencies. The member competency can be grouped into social competence and technical competence. The Social competence is seen from the messages that always lead to social innovation to encourage community participation, while technical competence is involved from messages that emphasize technical and technological aspects in solving waste problems. Furthermore, the theme of the discussion as a whole can be categorized based on the theme of innovation and education and collaboration, the theme category is reflected from the messages exchanged among participants. The zero waste discourse in this forum is packed into extra-textual framing, wherein the message of the discussion initiator is used as a reference to develop the discussion in a broader direction, and it produces innovation, education or collaboration. The construction of zero waste discourse also illustrates the diversity of symbolic interactionism implementation on a macro scale where self-groove, interaction and interpretation are represented.

REFERENCES

Baron, C., Bruce, N., & Nunan, D. (2002). *Knowledge and Discourse: Towards an Ecological of Language*. Hongkong: Pearson Education Limited.

Bogdan, R., C., & Biklen, S., K. (2003). *Qualitative Research for Education*. Boston, MA: Allyn and Bacon.

BPLH. (2015). *Petuntuk Teknik Kawasan Bebas Sampah Kota Bandung*. Bandung: BPLH Bandung.

Breen, M., Louden, W., Barratt-Pugh, C., Rivalland, J., Rohl, M., Lloyd, S., & Carr, T. (1994). *Literacy in its places: An investigation of literacy*. Canberra: DEETYA.

Chan, K. (1998). Mass Communication and Pro-environmental Behaviour: Waste Recycling in Hongkong. *Journal of Environmental Management*, 52, 317-325.

Chung, S., S., & Lo, C.W.H. (2004) Waste Management in Guangdong Cities: Waste Management Literacy and Waste Reduction Preference of Waste Domestic Generators. *Environmental Management*, 33(5), 692-71

Colon, M., & Fawcett, B. (2006). Community based household waste management: lesson learnt from EXNORA's, zero waste management, scheme in two South Indian Cities. *Habitat International*, 38, 916-931

Fujita, K., & Hill, R. C. (2007). The Zero Waste City: Tokyo's Quest For A Sustainable Environment. *Journal of Comparative Policy Analysis*, *9* (4), 405 – 425.

Gille, Z.G. (2001). *Critical Ethnography in the time of globalization: Toward a new concept of site*. Illinois: University Illinois

Glaser, B. G., & Straus, A. L. (1967). *The Discovery of Grounded Theory*. New York, NY: Routledge.

Heat, S.B. (1983). *Ways with Words: Language, Life and Work in Communities and Classroom.* Cambridge: Cambridge University Press

Jurin, R. R., Roush, D., & Danter, J. (2010). *Environmental Communication: Skills, and Principles for Natural Resource Managers, Scientist and Engineer*. London: Springer

Kozinets, R.V. (2010). *Netnography; Doing Ethnographic Research Online*. London: Sage Publication.

Malcolm, I., & Rochecouste, J. (1998). *Australian Aboriginal Students in Higher Education, Center of Applied Language Center*. Sydney, Australia: Macquarie University, National Centre for English Language Teaching and Research.

Marshall, R. E., & Farahbakhsh, K. (2013). Systems Approach to Integrated Solid Waste Management in Developing Countries. *Waste Management,* 33, 988-1003.

Mason, I. G., Brooking, A. K., Oberender, A., Harford, J. M., & Horsley, P. G. (2003). Implementation of a zero waste program at a University Campus. *Resource, Conservation and Recycling, 38*, 257-269.

Millstein, T. (2009). *Environmental Communication Theory Encyclopedia of Communication Theory*. . Los Angeles, CA: Sage, 344-349.

Mocker, D. W., & Spear, G. E. (1982). *Lifelong learning: Formal, nonformal, informal, and self-directed*. Columbus, OH: ERIC Clearinghouse for Adult, Career, and Vocational Education, Ohio State University.

Morrissey, A.J., & Browne, J. (2004). Waste management models and their application to sustainable waste management. *Waste Management,* 24 (3), 297–308.

Murphy, S., & Pincetl, S. (2013). Zero waste in Los Angeles: Is the emperor wearing any clothes?. *Resource, Conservation and Recycling,* 81, 40-51

OECD. (2010). *PISA 2009 Framework-key competencies in reading, mathematics and science*. Paris, Perancis: OECD

Okamoto, T., Kayama, M., Cristea, A., & Seki, K. (2001). *The Distance Ecological Model to Support Self/Collaborative-Learning in the Internet Environment Proceedings of IEEE International Conference on Advanced Learning Technologies (ICALT2001)* ed T Okamoto, R Hartley, Kinshuk and J P Klus. Retrieved from http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=7507

Palmer, P. (2004). *Getting to zero waste.* Sebastopol, CA, USA: Purple Sky Press.

Pauline, D., & Froztick, L.E. (2009) Reconciling Policy, Practice, And Theorizations Of Waste Management. *The Geographical Journal*, 75(4), 247-250

Sadlin, J. A. (2007). Netnography as a consumer education research tool. *International Journal of Consumer Studies*, *31*, 288–294.

Searle, J. (2003). *Developing literacy Developing Vocational Expertise* ed J Stevenson. Crows Nest, NSW: Allen and Unwin, pp 51–80

Tremblay, C. (2013). Toward inclusive waste management: participatory video as a communication tools. *Waste and Resource Management*, 166, 177-184

Tukahirwa T., Mol, A. P., & Oosterveer, P. (2010). Civil Society Participation in Urban Sanitation and Solid Waste Management in Uganda. *Local Environmental Journal*, 15 (1), 1-14.

Zaman, U. A., & Lehmann, S. (2011). Urban growth and waste management optimization towards 'zero waste city.' *Journal City, Culture and Society*, *2*, 177-187

Zotos, G., Karagiannidis, A., Zampetoglou, S., Malamakis, A., Antonopoulos, I. S., Kontogianni, S., & Tchobanoglous, G. (2009) Developing the Holistic Strategy for Integrated Waste Management within Municipal Planning: Challenges, Policies, Solutions and Perspectives for Helenic Municipalities in Zero Waste, Low Cost Directions. *Waste Management Journal,* 29 (5), 1689-1692