Community of Practice (COP) on Waste Management Learning Activities: Case Study on Kawasan Bebas Sampah (KBS) Bandung

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Abstract. *In order to handle municipal waste problems, Bandung City government launched a program called KBS (Kawasan Bebas Sampah), an area where decentralized waste management through residents' active participation be encouraged. Because residents' willingness to participate and proper skill to manage waste are pivotal, KBS has a number of social learning activities through direct interactions to intensively share knowledge and skill, such as why they should manage waste and how they can manage it properly. The program contains official cadres concerning to their environment, local leaders and residents in the area, guided with a mentor as the expert. They conduct learning activities through various interactions for the members to get educated. As learning activities are important to support KBS program successfulness, it is crucial to evaluate the learning activities system using a suitable concept. We hypothesized that Community of Practice (CoP) concept fits the learning activities system in KBS program since collective learning concerning shared problem for better practice is the core activity in the program. Using interview technique for data collection, we concluded that learning system in KBS program we chose as case study can be considered as a CoP with some problems identified. Some suggestions are given for improvements.*

Keywords: *KBS Program, kawasan bebas sampah, community of practice (CoP), waste management, collective learning activities*

Abstrak. *Untuk menangani masalah sampah kota, Pemerintah kota bandung meluncurkan sebuah program yang disebut KBS (Kawasan Bebas Sampah), sebuah wilayah yang dipilih untuk menerapkan sistem desentralisasi pengelolaan sampah dengan melibatkan partisipasi aktif masyarakat. Karena pentingnya kesediaan masyarakat untuk berpartisipasi secara sukarela dan memiliki keterampilan yang dibutuhkan untuk pengelolaan sampah, KBS memiliki berbagai aktivitas belajar masyarakat melalui interaksi langsung yang ditujukan untuk membagi pengetahuan dan keterampilan intensif, terkait pengetahuan yang dibutuhkan, seperti misalnya alasan mengapa harus melakukan pengelolaan sampah dan bagaimana pengelolaan dilakukan. Program tersebut terdiri dari kader-kader lokal yang peduli lingkungan, pimpinan wilayah, warga, dan seorang mentor yang berperan sebagai ahli. Terdapat berbagai aktivitas belajar yang diadakan melalui bermacam interaksi yang ditujukan untuk para anggotanya. Karena aktivitas belajar penting untuk mendukung kesuksesan program KBS, perlu dilakukan evaluasi pada sistem aktivitas pembelajaran menggunakan konsep yang sesuai. Dalam penelitian ini digunakan hipotesis bahwa konsep komunitas praktis (CoP) sesuai dengan sistem aktivitas pembelajaran yang dilakukan karena aktivitas kunci didalamnya adalah pembelajaran bersama yang berfokus pada permasalahan yang sama bagi anggota untuk peningkatan praktik. Menggunakan teknik wawancara dalam pengumpulan data, disimpulkan bahwa sistem pembelajaran dalam program KBS yang dipilih sebagai studi kasus dapat dianggap CoP dengan beberapa permasalahan teridentifikasi. Terdapat beberapa saran yang diberikan untuk perbaikan.*

Keywords: *Program KBS, kawasan bebas sampah, komunitas praktik (CoP), pengelolaan sampah, aktivitas pembelajaran bersama*

Introduction

Municipal waste has been one of the hardest problems to solve for every city in the world, including in Indonesia. Municipal waste production is increasing from year to year due to continuous population growth, economic and technological development (BPS-Statistics Indonesia, 2017). The increasing waste production in Bandung City has led to other various issues, such as overfull landfill (Sari, 2017) and increased operational cost (Nurulliah, 2019). Realizing this situation, the local government puts waste problem to be the priority (humas.bandung.go.id, 2018).

The government expects that Bandung residents starting to apply waste management from their house and making this behavior to be the new culture of Bandung residents (Amanda, 2018). To reach this goal, the government launched a movement called KANG PISMAN (*Kurangi, Pisahkan Manfaatkan*), a local tagline representing 3 R (Reduce, Reuse, Recycle). The tagline is implemented through a number of programs, one of which is KBS, *Kawasan Bebas Sampah* — Zero-Waste Area (humas.bandung.go.id, 2018).

KBS program's core mission is to campaign KANG PISMAN representing 3R which is considered as the most prevailing methods to handle waste in every country (UN-HABITAT, 2010). The main purpose of the program is to encourage active participation from the households to segregate their waste at home in order to be recycled in communal level inside the KBS area. However, it seems hard to change the daily habits of the residents from mixing their household waste to segregating ones (Rahardyan, Hadiana, & Sukandar, 2007). The reasons are because they lack of awareness toward waste issues, lack of information related to waste segregation and also lack of infrastructure support to accommodate the segregation process (Sari & Rahardyan, 2011; Brigita & Rahardyan, 2013).

Toward learning activities in KBS program along with recycling infrastructure support, it is expected that the awareness and waste segregation skill of Bandung residents improved which eventually can change their behavior toward their household waste. The Head of Cleanliness Department in DLHK (*Dinas Lingkungan Hidup & Kebersihan*—Service Office of Environment & Cleanliness) of Bandung City, Sofyan Hernadi stated that all residents are expected to segregate their waste in the next two years as what obliged in the new-released local regulation about waste management, PERDA No.9 Year 2018 about Waste Management. To address this goal, an important agenda in the KBS program is on the line. KBS program have arranged a number of learning activities to enable knowledge sharing among residents. The primary goals are to encourage the residents to have willingness to separate their waste, to improve their skill in segregating waste and make it to be their new behavior.

In order to change people's behavior toward waste management, there are a lot of things to do by KBS program in the learning activities system. Besides planning iterative learning and arranging learning activities scenario for effective knowledge sharing in societal-based community, the type of knowledge being shared in the learning activities is also important to pay attention. The residents should understand why waste management is important and required to be implemented from their house (Zahra, Majeed, Mahmood, & Asad, 2012; Navykarn & Muneenam, 2015). They should understand what effects of waste for human health & the environment (Mamady, 2016; Yang, Ma, Thompson, & Flower, 2018). Giving real stories about disasters occurred due to waste is also important to do, especially because Bandung residents have experienced horrible waste slide disaster in Leuwigajah landfill causing hundreds death and 70s houses got buried (Lavigne, et al., 2014). In addition, technical skills in managing waste have to be mastered as well (Ulhasanah & Goto, 2018).

Capturing knowledge about those mentioned terms are able to improve personal norms and beliefs toward waste management (Zahra et al., 2012; Sukholthaman & Shirahada, 2015) and also improve their required waste management skill which eventually lead to their willingness to participate in the waste management actively (e.g. Zahra et al., 2012; Elayan & Ibrawish, 2017; Wang, Guo, Wang, Zhang, & Wang, 2018; Kattoua, Al-Khatib, & Kontogianni, 2019). Thus, it is imperative to make sure knowledge sharing occurs successfully to all members involved. For that reason, implementing Knowledge Management (KM) in the learning activities system is strongly suggested (Sukholthaman & Shirahada, 2015).

KM facilitates knowledge and skills dissemination consistently and intensively among the members of the learning group so that it is applicable for the society (Sukholthaman & Shirahada, 2015). A *Community of Practice (CoP) is* a kind of concept or platform where KM can be applied. CoP is a human-centric approach focusing on community establishment to support continuous learning and the process of knowledge sharing in which the people become the main source of knowledge (Nazim & Mukherjee, 2016). We argue that Community of Practice (CoP) concept fits the learning activities system in KBS program since collective learning highly concerning on shared problem intended to improve the practice of the members, as what pointed out by learning activities system applied in the KBS program.

CoP is a knowledge sharing community platform established based on members' shared problems, in that intensive interaction activities are facilitated to build bonding and shared identity (Wenger, McDermott, & Snyder, 2002). CoP contains people with common interest on certain issues, they intensively share knowledge related to the issues among the members and they become the expert on the issues (Ghazali, Tretiakov, Pringgabayu, Muhammad, & Ramdlany, 2017).

CoP allows straight-forward interaction for tacit knowledge sharing which tends to be more difficult to be shared (Bolisani & Scarso, 2014). KBS which becomes main tool for resident learning platform is expected to become a facilitator to improve resident performance in communal-level waste management. Therefore, conceptualizing KBS using CoP concept will be able to effectively spread knowledge among residents to improve their performance in dealing with waste management from home.

Even though KBS has been one of the most notable tools in Bandung City for society learning purpose, the study related to KBS is limited especially in the learning activities term and the problems found in the KBS for societal learning system (Siswantini & Lestari, 2018; Syahli & Sekarningrum, 2017; Wahyudi & Kustiwan, 2019). Thus, analyzing learning activities in the KBS program is important especially to analyze the potency of the learning activities to reach the goal. Using CoP as the approach is helpful to identify the interaction among learners and educators and analyze the effectiveness of the activities.

Furthermore, most studies using CoP approach are mostly in organizational context (Li, et al., 2009) (e.g. health (Ghazali et al., 2017), tourism (Cooper, 2015), IT sector (Sztangret, 2014), government (Deakin, Lombardi, & Cooper, 2011), oil company (Scarso, Bolisani, & Salvador, 2009) and so forth. Meanwhile it is found limited studies in societal context, for example a CoP created by a milk farm community (Silva, Rados, & Selig, 2014) and a grassroot community related to environmental issues (Bradbury & Middlemiss, 2016). Therefore, this study is intended to fill the identified gap by analyzing waste management learning activities conducted in KBS program using Community of Practice (CoP) approach. The objectives of the study are to analyze the learning activities in KBS program and determine whether this learning activity system can be considered as a CoP; to analyze the effects of the learning activities toward the residents; and to identify

the problems faced by KBS in the form of CoP platform. Finally, the findings are expected to be insightful to the effort of educating residents for improved behavior on waste management in household level.

Knowledge Management
Knowledge Management (KM) is a systematic method of managing knowledge in order to create values and competitive excellence (Tjakraatmadja & Lantu, 2006). It enables acquisition, organization and knowledge nexus and then implement the knowledge for more effective and productive performance (Alavi & Leidner, 1999). Polanyi in 1966 distinguished knowledge into two categories: tacit knowledge and explicit knowledge. Tacit knowledge is from actions, personal experiences, skills and integration of person-performance interaction, on the other hand, explicit knowledge is to indicate digital knowledge, codified or documented in written words, numbers, data, manuals, databases, archives, library and so forth (Alavi & Leidner, 2001).

The process of knowledge sharing for both tacit and explicit knowledge can occur directly between one person to person, but to implement KM for organized group or team or community, there is required a platform that allows reciprocal interaction intensively to give place for knowledge sharing among people in the group in a way that the knowledge flows within the group and from inside to outside the group, or vice versa. The platform can be formed in Communities of Practice (CoP) as the place where KM process are conducted (Nazim & Mukherjee, 2014). CoP is the one option of platform can be applied when the group is focusing on knowledge sharing in specific of shared problem to improve their practice when dealing with the problems in their daily task (Venkatraman & Ramanathan Venkatraman, 2018).

Community of Practice (CoP)
CoP is defined as a group of people who learn together about the certain problems as their concern or passion in regular interaction together for better performance (Wenger et al., 2002). As the interaction is conducted intensively, they become experts on the problems they are dealing with (Ghazali et al., 2017). CoP was firstly introduced by Lave & Wenger in 1991 to discuss learning process in societal context. CoP is treated as a tool to examine knowledge transfer occurring in it (Roberts, 2006). CoP sometimes refers to informal or virtual groups for knowledge sharing platform maintained by an organization (Cox, 2005). However CoP is different from completely informal group since it needs to be designed, guided, financially supported (Bolisani & Scarso, 2014). The establishment can be spontaneously by a group of individuals and it can also be intentionally cultivated in a formal group form (Bolisani & Scarso, 2014); (Archer, 2006); (Wenger et al., 2002).

CoP provides in-depth interaction and various informal learning activities to overcome knowledge sharing barriers (e.g. awareness, access, application (Lesser & Fontaine, 2004). Besides, it is proven that CoP is able to increase individual skills & personal productivity while also increase knowledge sharing, resource and expertise, collaboration in order for solving problems they are facing (Venkatraman & Ramanathan Venkatraman, 2018), (Bolisani & Scarso, 2014); (Fontaine & Millen, 2004). The value created by CoP can be obtained either by the members or by the organization itself (Wenger et al., 2002). Value creation is something that bonds the members to always come back to the community. Thus, CoP is not only facilitating knowledge sharing but also creating value in short-term or long-term, either for the members or for the organization where the CoP belongs to (Wenger et al., 2002).

CoP is the best way to combine both tacit and explicit knowledge conversion in the learning process (Wenger et al., 2002). In fact, CoP is considered as the powerful device for knowledge sharing by KM Scholars (Bolisani & Scarso, 2014), therefore CoP is called as a KM tool (Roberts, 2006). In order to determine whether a learning group is considered as CoP, it is required to identify the characteristics of CoP to distinguish it from other groups.

The Characteristics of CoP
Wenger has defined key characteristics of CoP in his study in 1998 (Wenger, 2000), and was developed in further study (Wenger et al., 2002). From the characteristics of Wenger et al (2002), there are three core elements which become a basic structure of variety of forms of CoP: domain, community and practice. The three characteristics are not only able to detect CoPs but also able to be a guideline to design a new CoP (Bolisani & Scarso, 2014). Defining the three core elements will clarify the CoP definition and also distinguish it from other type of groups (Wenger et al., 2002). The domain element refers to shared interest determining the commitment and identity of the community, shaping the body of knowledge, defining value creation and behavior, guiding the learning process, and affecting the practice development (Wenger et al., 2002). The domain consists of key common problems the members dealing with that are complex, long-term so that needs sustainable learning (Wenger et al., 2002).

The Community refers to joint activities including learning together, discussion, information sharing and help each other (Wenger-Trayner, & Wenger-Trayner, 2015). It is such a crucial element which determines the potency of the knowledge structure. There should be interaction, group learning, relationship establishment, sense of belonging development and mutual commitment among members which occur routinely to learn about issues related to their domain (Wenger et al., 2002). Reciprocal interactions also encourage value creation toward the members in which the members sense the benefit of the participation for them (Wenger et al., 2002).

Practice refers ways, approaches, perspective, understanding of the shared problems, thinking style and even ethical stances which takes time and continual interaction to reach it (Wenger-Trayner & Wenger-Trayner, 2015). It is related to ways, standards and approaches that create baseline to do an action, performance, communication, problem solving and also accountability (Wenger et al., 2002). Balance between reciprocal activities including explicit as well as tacit knowledge interaction and also informal everyday interaction determines the successfulness of the practice development (Wenger et al., 2002).

As the notion of CoP has been widely applied in various disciplines and areas, it seemed lack of similar concept due to different interpretation of the CoP concept (Bolisani & Scarso, 2014). Therefore, Scarso, Bolisani & Salvador (2009) offered a framework which can be utilized to detect any new or existing CoP using a kind of check list grouped into 4 internal elements (organizational, cognitive, economic and technological) and 2 external elements (Context & Its Implication to KM and Knowledge Strategy). The framework is able to analyse the core factors of CoP implementing Knowledge Management. However, the framework offered by Scarso, et al., (2009) is based on organizational context. Furthermore, a study that criticized the concept of CoP from Wenger (Li, et al., 2009), suggested focusing on the term "Community" as the core characteristics of CoP, especially in the area of mechanism of member interactions in sharing knowledge and the mechanism of building sense of belonging among members and infrastructure to support the interactions.

The culture that supports knowledge sharing is the most crucial learning enabler to encourage members' participation within the CoP (Bradbury & Middlemiss, 2016). Thus, this study determined whether learning activities system conducted in KBS program is CoP or not based on the "community" term as the core characteristic mentioned by Li, et al., (2009) Nevertheless, the three characteristics of CoP (Domain, Community & Practice) are still explored in this study to get in-depth insight.

In addition, we argue that the framework from Scarso, et al., (2009) contains key dimensions which can explore more deeply about three characteristics of CoP especially in the "community" point of view as what suggested by Li, et al., (2009). Therefore, in this study, the analysis is focused on the elements from Scarso's framework (Scarso, et al., 2009): Context of the program and implication for KM, knowledge Strategy, Organizational Dimension) and also three core characteristics of CoP from Wenger (2000): Domain, Community and Practice dimension. The combination of Wenger's concept and Scarso's framework is intended to enrich the recognition of CoP characteristics on KBS.

Research Methodology

This study is intended to explore the characteristics of learning activities system implemented in KBS program using CoP concept in order to evaluate mechanism of knowledge sharing and the effectiveness in reaching the goals, to identify the learning effects to the members and to figure out what problems existing that affect the achievement of the program.

The data is important to give comprehensive insights about the learning activities implemented and the result has been achievement so far. In order for that, it was used qualitative approach for a case-study and use interview technique to gather the data. The location of the study was in KBS Sukaluyu, considering the fact that KBS Sukaluyu has become the role model of other KBSs in Bandung City since its first emergence (as what stated by the Vice Mayor of Bandung City – Oded M Danial, published in the Bandung government official website). The data in this study was collected from in-depth interview using open ended questions, lasting between 30 minutes – 3 hours. The interview has been conducted since August 2019 – October 2019, to 6 informants as presented in the Table 1. The informants were chosen using snowball sampling method (Assarroudi, Nabavi, Armat, & Ebadi, 2018), by applying some characteristics. First, the informants should be actively involved in the program in longer period of time (proven by the recommendation of the committee of the team); second, the informants have crucial and official roles in the learning activities in the program.

Table 1.

Data of Informants in the Study

No	Informant	Position
1	Informant 1	An official mentor of KBS program in Sukaluyu from DLHK, and also become the educator in all KBS area
2	Informant 2	Official cadre who is representative of Chief of RT, and also become an educator & supervisor on 4 RWs within KBS area
3	Informant 3	Head of RW 9 & the leader of KBS Sukaluyu Program
4	Informant 4	Official cadre who is representative from Karang Taruna officer and also becomes an educator & supervisor on the other 4 RWs within KBS area
5	Informant 5	Voluntary Cadre who is also Representative of PKK Committee
6	Informant 6	The leader of PKK & the core team of KBS Program

The collected data from interview was analyzed using directed content analysis approach (Assarroudi et al., 2018), using NVIVO Pro 12 tool to help the analysis process. The directed content analysis approach is applied to extend the CoP theoretical framework in waste management learning context (Assarroudi et al., 2018). By applying the existing theory combined with prior researches about CoP, it is identified the core concepts as the initial category to code the transcripts. Each category has been defined operationally to ease the categorization process. As the interview texts have been highlighted using predetermined categories, the data was triangulated with direct observation in program location combined with secondary data from KBS database.

KBS program is a collaboration program containing representatives from various level of society-based local organizations in the selected areas including RW managements (*Rukun Warga*— Hamlet), official cadres, RT managements (*Rukun Tetangga*—Neighborhood), PKK members (*Permberdayaan Kesejahteraan Keluarga*—a local-level organization containing housewives), Karang Taruna (local Youth Organization), and all residents in the area, guided with a mentor as representatives of local government department named DLHK (*Dinas Lingkungan Hidup & Kebersihan*—Service Office of Environment & Cleanliness).

KBS is defined as an area covering residentials in the level of urban village (*Kelurahan*) in which it manages its waste independently handled by the residents by holding five principles: independence, resident participation, environmental sustainability, efficiency and integration which is planned, promoted, carried out, managed, capitalized and owned by the residents while Bandung government ratifies the decentralized waste management process (Environmental Management Agency (BPLH), 2015 as cited in (Siswantini & Lestari, 2018). KBS offers decentralized waste management system where it is highly focused on communal waste management. Such a decentralized waste management is able to overcome a lot of problems faced in centralized system (Jouhara et al., 2017). Recently, Bandung City has 8 intensive KBS programs in which Sukaluyu was chosen as the role model of the other KBS programs.

Results and Discussion

In this study, the analysis was focused on six elements, in which 3 elements are derived from Scarso's framework (Scarso, et al., 2009): Context of the Program and Implication for KM, Knowledge Strategy, Organizational Dimension; and 3 other elements are from the core characteristics of CoP from Wenger (2000): Domain, Community and Practice dimension. In the last sub section, it was also given the problems identified in the KBS Sukaluyu. The combination of Wenger's concept and Scarso's framework in the analysis is intended to enrich the recognition of CoP characteristics on KBS while also evaluate the system in order to identify the problems that cause ineffectiveness of the learning to reach the objectives. Notwithstanding the sixth elements being discussed, the determination of whether learning activities system in KBS program is a type of CoP or not is mainly based on "community" elements considering the suggestion from Li, et al., (2009) and (Bradbury & Middlemiss, 2016) contending that the core of CoP is the knowledge sharing culture establishment which is crucially enabling the learning process to reach their objectives.

Context of KBS Program and Implication for KM
There are two governance elements on municipal waste management in Bandung City which have different responsibility toward the waste management system: DLHK ((*Dinas Lingkungan Hidup & Kebersihan*—Service Office of Environment & Cleanliness) and PDK (*Perusahaan Daerah Kebersihan*—Local-Owned Company of Cleanliness). DLHK has responsibility on education in every level of Bandung residents while the technical operation of centralized waste management system is handled by PDK.

The local government has a main target related to waste management, in which it is expected in 2 years since the time when this study being conducted, every resident in Bandung city segregate their waste at home and organic waste from the household is recycled in their community. Organic waste is to be dominant in Bandung municipal waste composition from year to year *("Sistem Informasi Pengelolaan Sampah Nasional (SIPSN). Data Timbulan Sampah kota Bandung,"* 2018). Therefore, focusing on organic waste recycle is expected to be able to reduce municipal waste significantly. Moreover, the most dominant producers of the municipal waste, including organic waste are households.

In order to reach the goals, Bandung City residents are encouraged to segregate their waste at home especially for organic waste. Nevertheless, commonly Bandung City residents do not segregate their waste (Rahardyan et al., 2007) due to lack of information, facilities and awareness toward waste segregation (Sari & Rahardyan, 2011). Therefore, the residents should be educated in order to give them proper knowledge and skill related to waste management, especially waste segregation. And the government provides recycling facilities to support the practice process. Since the target is the whole residents.

The government requires strategy to educate huge number of residents. In addition, type of household waste is so complex that makes segregation process more challenging. Meanwhile, proper knowledge about waste management and skill in doing waste management are crucial (Sukholthaman & Shirahada, 2015) to encourage participation (also avoid other problems including environmental and health issues (Mamady, 2016); (Yang et al., 2018) and also for further process of waste recycle (Kawai, Huong, Yamada, & Osako, 2015). Therefore, Bandung Government takes a step by launching KBS Program as a learning and practice platform for Bandung City residents in communal level. The education should allow knowledge flows from the knowledge owners and knowledge receivers through intensive interaction within the areas of KBS.

Knowledge Strategy

To handle the waste problems as mentioned in the previous subsections, DLHK launched KBS Program which was initially launched in *Kelurahan* Sukaluyu in 2015 which has a main purpose to campaign KANG PISMAN (*Kurangi, Pisahkan Manfaatkan*—Reduce, Separate and Recycle), a local tagline representing 3R which has been commonly known everywhere. KBS is expected to be the practice community about waste management for residents of Bandung City. KBS should be the place where residents can learn more about waste management and effectively participate in municipal solid waste management from the sources. Considerably, KBS Program needs to be able to improve knowledge, skill, awareness about waste problems and positive attitude of the residents towards waste segregation (Navykarn & Muneenam, 2015). KBS is to be the knowledge sharing facilitator between educators and residents.

In order for that, Bandung Government helps the area chosen to get support for organic waste recycling facilities from various parties such as Biodigester, Composter, *Bata Terawang*, etc. Then, it is chosen a mentor from DLHK to be the responsible person for the learning process and implementation of waste segregation. There are also chosen two official cadres within the KBS area to help the mentor to be educators and supervisors in the KBS. The educators have been educated and trained then they have responsibility to share their knowledge related to waste management in various forms of learning activities. They also should make sure all residents have been exposed the knowledge.

Eventually, the knowledge encourages residents to participate in the waste management actively, particularly in waste segregation and educators are obliged to supervise waste segregation practice and re-educate the residents who have not segregated at all or segregated improperly. So, the role of the residents is on the segregation process while the recycling process is handled by garbage men in charge.

Organizational Dimension of KBS

Basically KBS program was intentionally established by an NGO with support from the government representative (DLHK) through society-based organizations, but the primary members are outside of the government body, except, the mentors chosen by DLHK as the government representative in the community. Consequently, they are included in the DLHK organizational structures with the main task as KM enablers in the KBS. They have responsibility to facilitate learning activities, share their experience in dealing with waste and become the connector between residents and the local government. In addition, they also supervise learning activities and resident performance and then report the performance to the DLHK governing body.

The area membership of KBS program is based on geographical reason. KBS Sukaluyu covers 8 RWs out of 12 RWs since 4 other RWs were not willing to join. So the members of KBS include all residents living in 8 RWs in *Kelurahan Sukaluyu,* along with a mentor as the expert in the community and some cadres (official cadres & voluntary cadres) from the coverage area. The mentor is government representative, who has in-depth experiences and knowledge about waste management and also have interest in planting and organic recycling as the Informant 1 stated "*I am here is not only because I got payment form DLHK, but this is my expertise, and I love doing it……………. I am willingly giving anything to support my program, using my own properties…like seeds, pots, etc….*".

The membership of the cadres is mostly from society members who have willingness to be active in their society-based activities and concern to their environment cleanliness, as Informant 5 stated "*(my motivation) maybe because of intensive interactions…..so we get used to it. So, when we find waste everywhere…we'd like to tell to others to clean it to keep the environment clean as what is used to be…*", and Informant 6 supported by saying "*The point is that we just care…care of our environment….*". The official cadres get payment from the government and they are chosen based on their track record in being active in their environment while voluntary cadres are members of local organizational committees who are willingly to involve into the learning activities without any payment.

The individual membership of the residents is according to their RW or RT leader's decision). Since the decision of involvement of the RW is based on the RW leaders, the residents who live under the governance of the RW leaders who decide to join become "encouraged". So, the residents cannot decide themselves. On the other hand, the residents who live under the governance of RW and RT leaders who are not willing to join actively in any activities conducted by KBS program, will be most likely not to join as well even though they probably want to. This membership system is another problem that causes loose bonding between active members and the peripheral members which are mostly dominated by the residents.

Therefore, it is to be another obstacle in reaching effectiveness of learning activities. As what stated by three of the informants (Informant 1, Informant 2 and Informant 3), this finding also confirmed the previous studies arguing that subjective norm from the leader is important factor for the operationalization of household-based waste management program (Syahli & Sekarningrum, 2017); (Zhang, Huang, Yin, & Gong, 2015). When the leader has concern to the waste management, the residents are more likely to follow their leader, and vice versa.

Related to the the coverage area of KBS Sukaluyu which reaches up to 8 RWs, it means the overall member is 5690 households (according to the Kelurahan data). So, the number of members is too huge, considering to the size categorized by Wenger et al (2002) contended that large members are around 150. To handle the large size, Wenger et al (2002) suggested forming subgroups to allow intensive interaction among members. The subgroup division can be determined based on geographical location, variety of expertise, novices-experts diversification and so forth (Wenger et al, 2002).

In KBS Sukaluyu, there are two big subgroups applied in which every single subgroup is handled by one official cadre. It is because there are only two official cadres in charge as what commanded by the local government. In spite of subgroup existence, the community is still away too big. Therefore, voluntary cadres are required who are taken from every RW. Commonly, there are 3 cadres from each RW, but the more active the RW, the more cadres they have (as what stated by Informant 1, Informant 5 & Informant 6).

The voluntary cadres are chosen from PKK members (housewives organization), considering the fact that most of household waste is handled by housewives, so they can approach the lowest members from the community more easily. With the existence of layered subgroup, the level of participation in the CoP learning activities is also different. According to Wenger et al (2002), the degree of participation consists of coordinator, core group, active members and peripheral members). The variety of learning participation level is presented in the Figure 1.
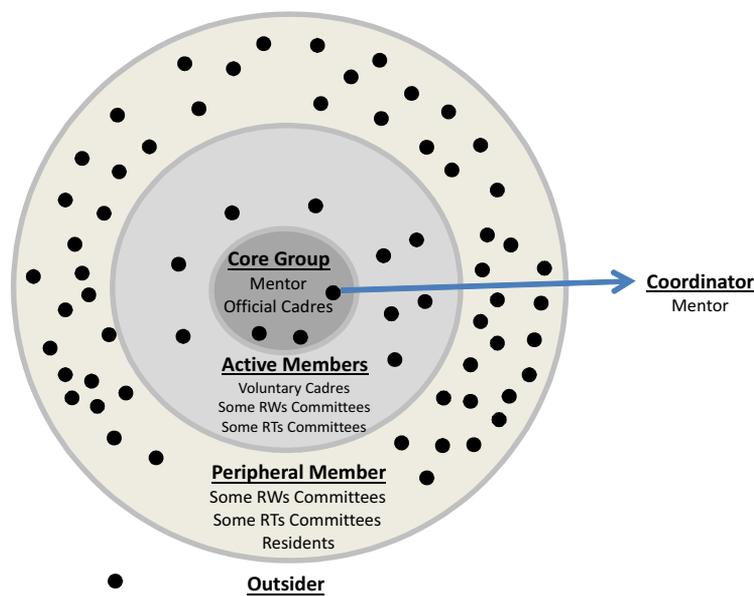

Figure 1.
Variety of Learning Participation Level in KBS Sukaluyu

KBS Domain
Knowledge domain includes key common problems the members facing and also value creation or sense of benefits got by either the members or the organization itself. The key problem faced in Bandung city, specifically in KBS Sukaluyu is that the area can be the place to practice decentralized waste management by bringing the KANG PISMAN tagline. The residents are expected to participate in waste management from their house, through waste separation. However, the participation rate is still low causing low willingness level of the residents to participate and low skills they have to practice waste management.

The target of KBS program is, at least to make all residents willingly segregate their waste, especially organic waste and valuable inorganic waste, meaning that they only need separate their waste at least in 3 baskets: organic, inorganic and residues. Waste recycle technic is not involved in all the knowledge sources because it is the task of the garbage men along with the educators to recycle the waste every day. Therefore, the learning activities are dominated with knowledge sharing about waste separation and encouragement to separated, as like informant 1 stated "….*the point is to encourage the residents to separate their waste…..(by giving fliers about waste separation technique)..*".

There is limited information related to waste issues including the impact of mixed waste to the damage of the environment and body's health, the consequence of mixing waste, accidents or disasters caused by waste (which also have been happened in Bandung City several years ago) because of limited time with huge number of residents to be visited, as informant 1 stated "*..because we have target, each house takes 5 – 10 minutes….if not (short)…it will take so long time to finish….*"

The simplification of knowledge domain is because of time and also budget limited causing difficulty in variety of learning activities and intensive interaction between educators and residents. Whereas, involving knowledge domain especially related to impact of waste is required because it influence their willingness to separate waste toward changing beliefs and norms, improved awareness and attitude toward waste problems and increase their confidence in practicing the separate waste properly (e.g. (Zahra et al., 2012); (Elayan & Ibrawish, 2017); (Wang et al., 2018); (Kattoua et al., 2019); (Meng et al., 2019). When there is lack of awareness and positive attitude toward waste management, external motivation will take over (Maulina, 2012) such as monetary (Abbasi, 2018; Premakumara, Abe, & Maeda, 2011) or policy reinforcement as stated by two informants (Informant 1 & Informant 2). However, monetary tends to burden the government and it works temporary, so that it cannot be the best solution. As a result, the educators are now also focusing on disseminating new regulation (PERDA No.9 Year 2018 about Waste Management) for the external motivation. The informants believe that knowing the regulation will encourage residents to do segregation.

Community Dimension of KBS
Community dimension is related to joint activities that allow knowledge sharing among members. So, there should be opportunity of interaction for each other. The joint activities representing Community dimension of CoP within KBS are varied. There are some different types of activities: Regular Interaction, Irregular Interaction and Online Interaction. Each type of activity is further explained in the following subsection. Documentation of learning activities is presented in Figure 2.

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Figure 2.
Waste Segregation Training program (Up-Left); DTDE Activities (Up-Right); Waste Segregation Socialization (Bottom)

Regular Interaction

There are some scheduled activities that allow intensive interaction between educators and residents in which each of it has different participants involved. Scheduled activities are such as DTDE (Door To Door Education), *Jum'at Bersih* (Friday Clean Day) and *Ahad Bersih* (Sunday Clean Day), *Arisan*, and supervising activities. DTDE (Figure. 2) is the primary learning activity in KBS. It is a formal-setting learning activity that provides intensive interaction between an educator and the house owners. This activity is scheduled regularly by visiting different houses every day and gives them a flier containing technical instruction of waste segregation. Each house takes 10 - 15 minutes for the knowledge sharing because the coverage are huge while the educators are so limited (only three persons) to handle all households. Therefore, the cycle period of DTDE is long and the content discussed within the available minutes is limited. The learning process is also too fast for the residents to internalize the knowledge. Besides, the iterative learning process in the same house is rarely happened. Moreover, the cadre tends to focus on supervising activity, checking whether the households separated their waste or not.

Friday and Sunday Clean Day (Figure. 4) are the day where all residents are supposed to involve into cleaning activities together while also interacting, sharing and talking informally. Despite for all residents, most of the time, it is only leaders, cadres and officers from every local organization who are willing to involve. Thus, active members are dominated by group leaders while residents are mostly on peripheral participation, meaning that their involvement is mostly passive in these two activities. Low participation of residents in the learning activities will weaken connection between residents and the CoP that eventually causes lack of value creation on residents side (Pemberton & Stalker, 2006).

Arisan is an event conducted by PKK every week 1 every month consisting of all PKK members within an RW area. This is a regular activity that allows regular interaction for learning. However, learning activity is not the primary activity in this event. The meeting is mostly dominated by discussing their specific task programs, instead of sharing about waste management. Furthermore, educators are not the members because PKK is women-based local organization, so the active educators in this activity are voluntary cadres. The involvement of voluntary cadres which is also from their community (housewives) has the upsides and downsides in the same time. The upside is that there has been bonding relationship between the active members and the peripheral members. There is possibility to allow peripheral members to feel to be the full members (Wenger et al., 2002). There is also semi-private reciprocal contact to build a bridge from sidelines to encourage more active participation. However, the downside is that sometimes the cadre is taken for granted by the peripheral members because they have been in contact almost every day.

Supervising activities are conducted to make sure the residents practice the waste segregation. The supervisor collect data of residents who have segregated waste and remind the households who have not segregated yet (Figure 3). Since each cadre handles 4 RWs containing about 2800s households, the supervisors should manage their path to supervise different area in every trip. Therefore, they cannot supervise each house every day. Once the cadre meets residents who do not segregate their waste, they will reeducate the residents and give instruction directly to practice it in a correct way. Unfortunately, supervisors stated that some residents were unwilling to be reproved. Some others cannot be met because they have been living home to go to work in the morning when supervisors are collecting the data. Then, one supervisor decided to give reeducation at afternoon when the residents probably have been at home.

Figure 3.
Supervisor is Collecting Data of Segregation Practice (Up-Left); Garbage Man Resegregate Waste on the spot (Up-Middle & Right) and in the Collecting Point (Bottom)

Figure 4.
Sunday Clean Day (Up-Left); Data Collection of Segregation Practice (Up-Right) One of Fliers used (Bottom-Left); Organic Recycling Training (Bottom-Right)

Three informants stated that the local leaders within the area (such as Leader of RWs or leader of RTs) should be active to help the educators encouraging residents because the residents tend to follow the leader's instruction instead of the educators. But most RW leaders do not follow this rule because of some reasons such as have no spare time to do it. As what Wenger et al (2002) stated that leaders have crucial roles in making the CoP more functional and effective. So, the absences of the leaders affect the segregation performance. In relation to increase the effectiveness of regular learning activities, it is encouraged subgroup interaction in order to build personal relationship among members in a smaller group within the community and while still keep the bonding to the community (Wenger et al., 2002).

- Irregular Interaction

Irregular interactions consist of two main types of learning: formal learning such as KANG PISMAN socialization events, Takakura training and KANG PISMAN training (See Figure 4). The informal learning is for instance embedded discussion in the local organizational meetings (PKK, Karang Taruna, RT and RW) and informal talk between cadres and residents. KANG PISMAN socialization events are intended for communal learning, conducted when there is NGOs initiated the events. It could be a campaign event that invites all residents in the same place. Meanwhile, Takakura training and KANG PISMAN training are usually conducted by Kelurahan or DLHK, targeted for certain local organization members, such as TAKAKURA training for Karang Taruna members or KANG PISMAN training for RWs committee and for PKKs. The socialization event cannot be conducted regularly. It is depending heavily on NGOs initiation while conducting trainings is mostly time and budget consuming. Moreover, the trainings depend on the government budget to hold the event and the participants are only limited for the KBS crews (RW committees, official & voluntary cadres, PKK committees).

On the other hand, embedded discussion in local meetings is also depending heavily on the local organization agenda. Commonly they conduct it when they have specific events or problems to discuss. Moreover, the spare time for discussing KBS domain is also limited because it is mostly directed to the events or problems. Informal talks can be a good option to allow bonding building with peripheral members, but mostly the cadres do it when they found the residents not segregating their waste. So it tends to be warning conversation instead of knowledge sharing, as what stated by Informant 5 "*When there is garbage man, they (residents, mostly housewives) will come bringing the waste….so we can see (what they did to their waste), and I will tell them (to separate the waste)…..*"

- Online Interaction

There is no specific technological-based tool to support the interaction for knowledge sharing among members. Commonly, the interaction involving technology is only through Whatsapp Group either for direct message or Whatsapp group. The Whatsapp group is available only for local organizations like RTs, RWs, PKK, and Karang Taruna mainly for their coordination tool. Direct message is often used to contact targeted residents when it is not possible to meet directly. Nevertheless, the interaction on Whatsapp tends to be one-way interaction. Most of the time, the residents did not try to contact the member of the local organization members. Instead, the PKK members who will arrange time to approach them. There is no other technological support to facilitate more intensive interactions and knowledge repositories to allow members to the group knowledge easily whereas it is required to make the purpose of the CoP as the learning platform working successfully (Li, et al., 2009). Thus, it can be stated that even though KBS program has a lot of learning activities that allow reciprocal interactions between novices-experts, mostly the residents as peripheral members are passive. Sometimes there is active participation but it is rarely to happen.

In almost every joint activity conducted in KBS including regular interaction, irregular interaction and online interaction, the core group and active members dominate the interaction when it comes to interact with the residents as peripheral members, making it less reciprocal. As a result, the peripheral members may not feel as the full members in the program. It is lack of sense of belonging and trust is not well established. Consequently, external motivation such as law enforcement approach is applied and supervising activity is highly required (Fukuyama, 1995). This is clearly seen from the statement of informants 4 who stated "*We are more into the regulation. Because the regulation stated that we should separate waste….automatically, the residents should obey the rules. ….*" and informant 6 who stated that "*There has been the law (about waste separation obligation), but many people do not know……Later we are going to report you…sometimes (I said) like that....*".

Moreover, the improvement on knowledge, skills, beliefs and norms that affect the awareness and attitude toward waste management is not significantly improved as well. As a result, the willingness to separate waste is low, presented through improper waste segregation found in the field that made the garbage man should re-segregate their waste (Figure 3). Furthermore, the active participation in waste segregation is relatively low, except RW 3 which is much higher than the others as shown in the data in Table 3.

It is because RW 3 is the place where KBS program was started in the beginning since 2015. But, the stagnant number of participation in the RW 3 also becomes the indicators that the learning activities are not effective enough in improving their willingness to participate. The low participation could be because the residents tend to feel burdened with the task of doing waste segregation as stated by one informant who said that some residents complained for doing segregation. It showed that their attitude toward waste segregation is negative, while positive attitude is another pivotal factor to run the KBS (Syahli & Sekarningrum, 2017).

Practice Dimension
Practice dimension is related to the ways, standards and approaches as the baseline of the activities (Wenger et al., 2002). Most baseline of activities in KBS Sukaluyu are from the knowledge of educator and supervisors, fliers or posters which are placed everywhere, such as in public places and in front of every residential and manual books owned by the educator and official cadres. The way of behaving toward organic waste especially on waste recycling technic is mastered mainly by mentors, official cadres (supervisors) and garbage collectors because they are the actors who recycle the organic waste everyday while peripheral members referring to residents only present waste segregation behavior, though not all of them present it perfectly.

Table 3.
Data of Participation of Sukaluyu Residents on Waste Segregation

RW	Total of Househ	Months (in 2019)					
		Jan	Feb	Mar	Apr	May	Jun
2	673				61	83	91
3	679				31	41	54
4	595						
5	824				61	71	69
6	611		70	70	70	85	85
7							
8	555		72	72	85	96	85
9	389	179	179	179	179	179	179
10	730						
11	634		49	66	83	82	69
Total	5690	179	370	387	570	637	632
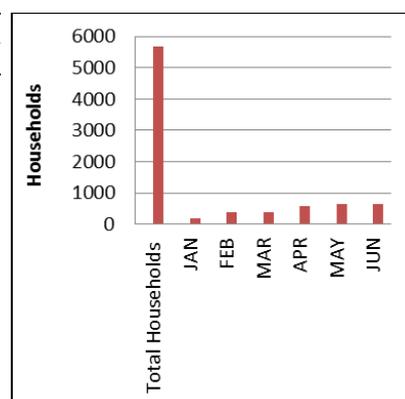
Source: Secondary Data from Educator Database

The educators and official cadres of waste segregation activities have clear perspectives on waste, specifically organic waste and some recyclable inorganic waste, as valuable resource while on residents' perspective, their intention to segregate their waste is mainly to ease the task of the garbage man to separate the waste in the collecting point (according to observation and interviews with some informants). Also, proper way of thinking and ethical stances towards waste is only from the leaders including educators and it is not transferred successfully yet to the residents because of limited time and events to give more in-depth interactions between leaders as active members and peripheral participants.

This gap of perspective could be another reason of relatively low participation on residents toward various activities in KBS program. Knowledge and skill gaps toward waste issues and waste management are supposed to be solved through intensive interaction between active members which are dominated by core members and peripheral members which are dominated by residents. Furthermore, active interaction should be reciprocal (residents-active members, instead of only active members) to make peripheral members have sense of benefits from the KBS program (Wenger et al., 2002).

Thereby, residents need to get chances to share their own knowledge and experience they got after doing the segregation themselves in every learning activity. Balance in interaction plays significant role in practice development successfulness (Wenger et al., 2002). Finally, it can be concluded that knowledge sharing activities found in KBS programs can be considered as a CoP, regardless several problems identified that makes the achievement is below the expectation. The learning activities such as informal interaction in *Arisan*, DTDE, Friday Clean Day and Sunday Clean Day, local organizational meetings (rapat RT, RW, etc) can still be considered as a CoP because there is still found knowledge flows around the members (See Figure 5), intensive interaction between them,

and existing value creation from the learning group, proven by the existence of interactive interaction during the learning activities (based on field observation). But, the activities either have limited time for longer reciprocal interaction (as what happened in DTDE) or the topic is broader and out of KBS domain (*Arisan* & Meetings) that makes the value creation is also not maximum causing weak bonding between members. It requires such informal and interactive interactions in a longer time, with theme focusing only about knowledge related to KBS domain without any mixture to other topics to make the audiences focusing on the domain to be shared.

Indeed, KBS Sukaluyu still has such knowledge sharing activities focused on the waste management as the topic, such as organic training or KANG PISMAN socialization. Unfortunately, the training is mostly dominated only by the core group and active members due to limited budget and space. On the other hand, KANG PISMAN socialization often covers too wide of public, so it is lack of reciprocal interaction between knowledge sharers and knowledge receivers. Finally, it can be concluded that there is mechanism to support the intensive interactions in KBS Sukaluyu but every interaction is either not well executed because of less optimum of the sharing chance from the bottom-up or not conceptualized to focus on the KBS domain. Furthermore, unavailability of technological tool to support knowledge repositories affects the growing scope of knowledge due to the absence of group knowledge retrieval. As a result, the same knowledge can be shared over and over because of being forgotten.

Problems in KBS Sukaluyu
According to the in-depth analysis of learning activities in KBS Sukaluyu using CoP concept, it is identified several problems presented in Table 2, some actions can be applied to solve the problems so that objectives of learning activities in KBS Sukaluyu program can be achieved successfully.
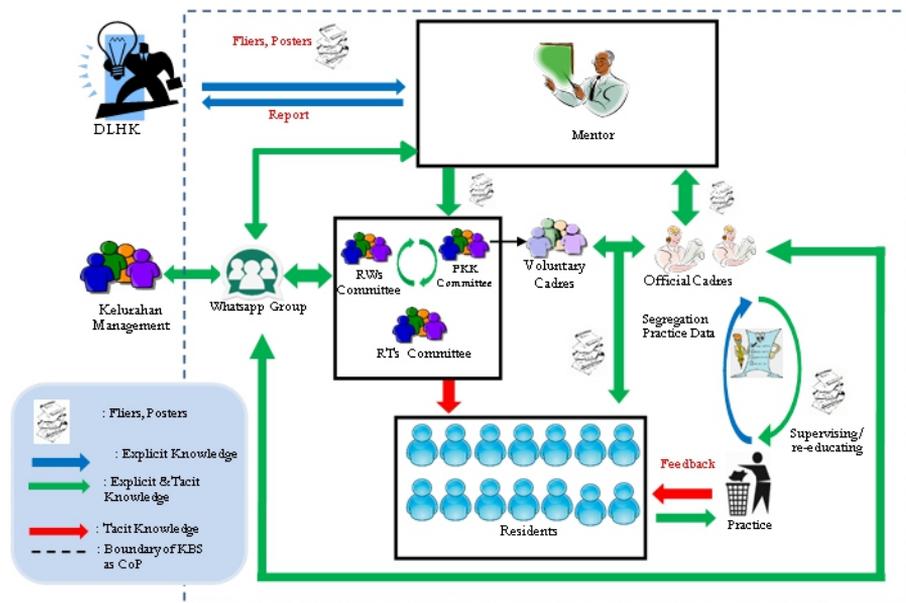
Figure 5.
Knowledge Flow in KBS Sukaluyu Program

Table 2.
Problems identified in KBS Sukaluyu Program

No	Term	Problems Identified
1	Size of the program	The member is reaching 5690 households, while there are only one mentor and two official cadres in charge officially by the government
2	Domain of KBS	The shared knowledge is mostly about technical instructions of waste segregation while other crucial knowledge topics which are required to strengthen the knowledge domain has less attention
3	Routinity of the learning activities	A lot of learning activities are conducted not routine, causing non iterative interaction with the same members (DTDE, KANG PISMAN socialization, trainings, etc)
		Some routine activities where learning process is integrated got less spare time due to mixed with other topics to discuss (Arisan, local org. meetings)
4	Irregular learning activities	Some irregular learning agenda which are intended specifically to explore KBS domain cannot be conducted iteratively to the same members because of limited budget, time and educator resources (DTDE, training, socialization)
5	Technological Involvement	It is lack of the use of technology to be functioned as knowledge repositories or online interaction support among members
6	Practice dimension	The standard and baseline of the activities in waste segregation is mostly from core group while it is lack of opportunity for residents to be more active in sharing their knowledge
7	Effect of Learning Activities	Due to huge size of the group, less variety of KBS dom ain and lack of time availability makes the learning effects not significant enough to improve critical knowledge which influence their willingness to participate actively in the waste management practice

For example, maximize the utilization of the existing layer subgroups and conduct regular interaction activities focusing on knowledge sharing of KBS domain could be the solution to avoid marginalities and non-participation (Córdoba, 2006). To encourage the peripheral members involving actively in the activities, and willingly spare their time to do it, it needs high perceived sense of benefits as the value creation from the activity. Integrating economic-based knowledge into the KBS domain which is still related to waste management is possible to try. The goal is to increase the perceived sense of benefits toward the programs.

The knowledge being shared is for instance the exploration about inorganic waste recycling for economic purpose, or utilizing compost products to build urban farming business or gardening. Sense of benefits in monetary perspective is proven to be the effective ways to encourage residents especially in low and middle income communities to participate actively in waste management (Bakri, Hammami, & Mohammed, 2017); (Ulhasanah & Goto, 2018); (Kattoua et al., 2019), However, it is not recommended to use financial incentive for sustainable participation. Instead, encouraging valuable creativity through waste management to get monetary benefits is more promising. Another suggestion is to utilize friendly technology that enables knowledge repositories and knowledge sharing through online, such as KBS app or online library. Thus, the members can be easily trace the KBS knowledge anytime and can be more freely to discuss anything about waste problems using the online platform.

This study is able to identify the problems in KBS so the finding is insightful to improve the performance of KBS as a CoP which is intended to share knowledge among the members inside KBS area in the future. The solution offered can be applied not only for KBS Sukaluyu but also other kind of societal-based CoPs which face the similar problems.

The study is based on qualitative method to gather the data. It is required empirical data to support the statement that implementation of KM in KBS program through CoP approach is able to maximize the knowledge sharing in the learning activities. It is also important to measure the recent learning effects in order to get the empirical data of the learning activities impact toward resident participation in waste management. So that it can be useful insight for evaluation on the learning activities.

Conclusion

Based on thorough analysis toward learning activities in KBS Sukaluyu, it can be stated that basically the learning activities can be considered as CoP but it needs some improvement to make the knowledge sharing activities achieving the expected goals.

The consideration of the learning activities as a CoP is based on the facts that it is found: knowledge flows among the members, value creation through the learning group even though it is not sensed by all members and intensive interaction activities supported by the programs conducted regularly even though it is not well executed. If the suggested improvements are applied, it is more likely for the KBS program to achieve its goals to improve participation rate in the waste management process. The CoP concept might be not the only concept that fits the learning activities in KBS program. But the capability to identify crucial problems in the program can be taken into consideration for future improvement.

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