Economic situation of value chain actors in urban slums of Bandung: A case of Kiaracondong

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Abstract. This research project aims to develop a mechanism of sanitation value chain for people living in urban slums of Bandung City, Indonesia. These are generally low-income areas with poor hygienic environment. In order to grasp their actual living conditions, field surveys were conducted in August, September and November 2016. With regard to the findings of the surveys, household income and educational levels of people living in the urban slum are obviously low compared to the national average levels, especially in income. Among them, however, even women with lower academic backgrounds can support their families and maintain a certain level of living. In terms of the priority of spending money, it is placed on family healthcare and education for their children. As for borrowing and lending money, these activities are not common for the residents on a daily basis. On the other hand, when it comes to savings, they use not only banks but also local financial services managed by communities such as schools and cooperative societies. The results suggest that sanitation value chain involving economic activities should incorporate with family healthcare, child education and saving service in their local community.

1. Introduction

For many reasons, sanitation system is essential for human lives, especially in modern urban areas. It helps to promote public health, prevent environmental pollution, conserve ecosystem functions, be able to recycle resources, and achieve many other benefits. Due to the importance of sanitation system, there have been many studies reported on the system. Among the latest studies, Funamizu (2017) performed the analysis of value chain from people's sanitation. His analysis shows that activities of composting human feces, using urine as a liquid fertilizer and re-using treated gray water as irrigation water are to increase the cash income of people [1]. A study by Ushijima *et al* (2015) proposes a sanitation business model, which can create value chain of local residents and contribute to improving both their sanitation and income [2]. Scott *et al* (2017) identify the importance of opportunities to support activities of small and medium-sized enterprises in sanitation including innovative finance,

training and business development assistance, and reinforcement of representative associations in low-income urban communities [3].

The purpose of our research project is to develop a mechanism of sanitation value chain for people living in urban slums of Bandung City, Indonesia. The slums in the city have been facing many difficulties, such as low-income and poor hygienic environment, and that is why the area was selected as the research site. On the basis of a number of previous studies, we define the concept of sanitation value chain as a chain of health, nutrition, food, income, and better life environment in this project entitled "The Sanitation Value Chain: Designing Sanitation Systems as Eco-Community Value System", which has been promoted by Research Institute for Humanity and Nature (RIHN). In order to carry out the research project successfully and sustainably there, the local residents' cooperation and participation are essential. They should be key actors to create and maintain value chains in their communities. Based on the aspects, it is necessary to grasp and understand their actual living conditions before planning to put the project into action. In this case study as a pre-research, we examine an effective means for the development of sanitation value chain in their community while taking advantage of their local characteristics.

2. Methodology

The research methods were questionnaire and interview targeting local residents living in low-income area. Focus group discussion was also utilized to understand better the residents' common values and opinions on their community life, because it is a useful research method to clarify and explore sensitive and personal issues. Due to the limited length of stay and schedule of the research team, we had to conduct the field surveys twice between August and November 2016 in an urban slum in Indonesia. The research area was Kecamatan Kiaracondong located in the central part of Bandung City. The target area was Rukun Warga No.2 (RW2) in Kelurahan Sukapura as shown in Figure 1. The population of RW2 area is 1,291 as of August 2016. This paper focuses on the survey results of local residents' economic situations mainly concerned with income level, spending and handling money, and the relationship with educational background. More details on the respondents of each field survey will hereinafter be described in section 3.1 and 3.2.
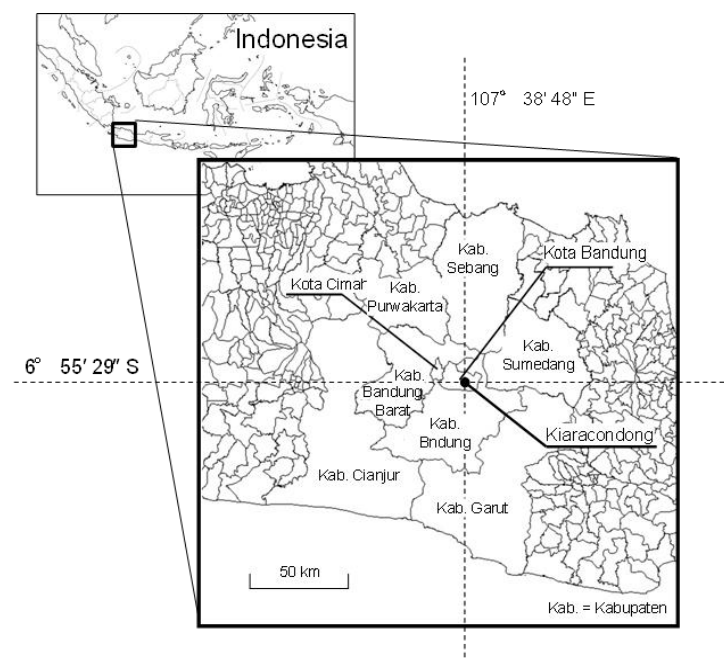

Figure 1. Research area.

3. Research results

### 3.1. *Field survey with randomly selected men and women*

One of the two field surveys was performed in November 2016. In this survey, questionnaire and interview with local residents were carried out. The respondents were over 20 years old who have a good understanding of their family situation, and they were randomly selected by the local research assistants who belong to a community-based youth organization (Karangtaruna). The total number of respondents was 234 that consisted of men and women with fifty-fifty ratio. The average age of respondents was 49.5 years (youngest: 22 years, oldest: 81 years). The questions of the survey were about household composition, income, expenditure, durable possessions, educational background, and so on.

With respect to the survey results on the respondents' educational status, there was no one who has no schooling. The pie chart in Figure 2 shows percentages by educational background in total respondents. The percentages of Primary (Sekolah Dasar: SD), Middle (Sekolah Menengah Pertama: SMP), Secondary (Sekolah Menengah Atas: SMA, and Sekolah Menengah Kejuruan: SMK), and Post-Secondary (Sarjana: S1, University, or Diploma) are 22%, 23%, 44%, and 11%, respectively. According to UNDP report (2016), Indonesia's gross enrolment ratios of Primary, Secondary, and Post-secondary were 106%, 82%, and 31%, respectively [4]. When we consider the UNDP data and the compulsory education system in Indonesia, it illustrates that the respondents' education levels are obviously lower than the national average.

Figure 3 shows the respondents' monthly household income. Most of them are less than 3,000,000 Indonesian Rupiah (IDR). Based on the data reported by World Bank on gross national income (GNI) per capita in 2016, the average monthly income per capita (not per household) in Indonesia can be calculated as approximately 3,538,000 IDR (about 0.00008 US dollars to the IDR) [5]. The respondents' average number of household members is 3.6 people, which is almost the same size as the national average of 3.9 people [6]. Taking into account this data, the survey result illustrates that the residents' incomes are significantly lower than the country average. This information will help us understand residents' economic burden of future project in their community.
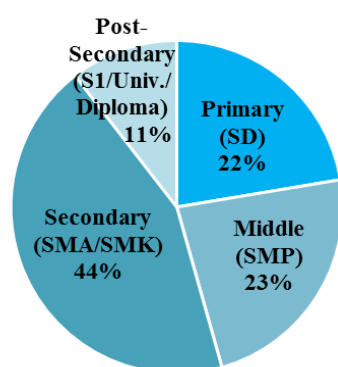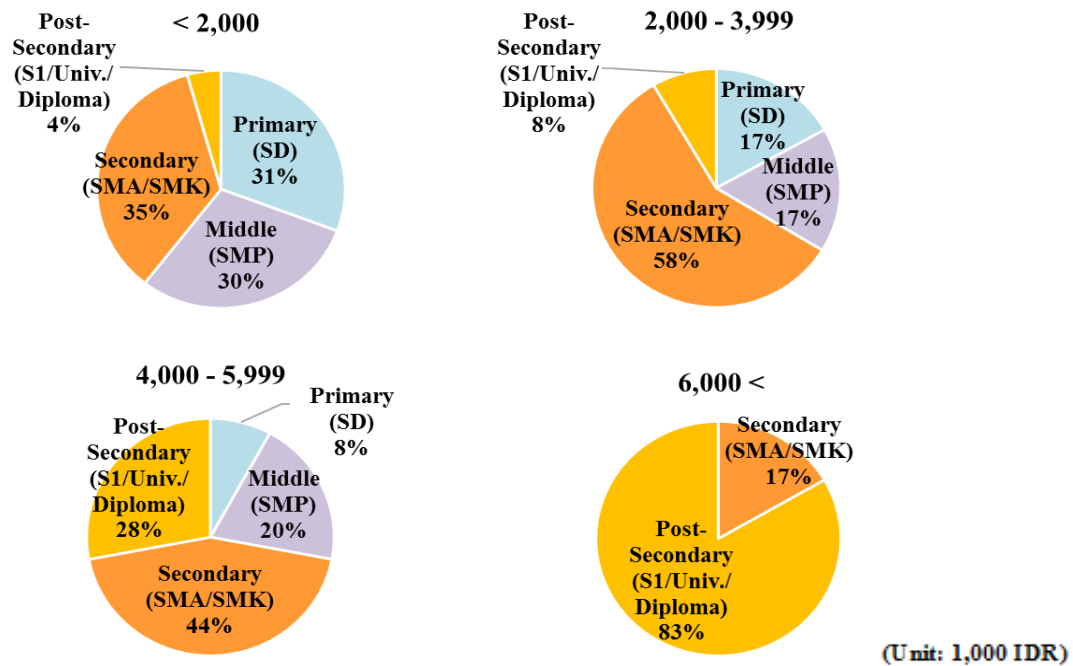

**Figure 2.** Educational background.
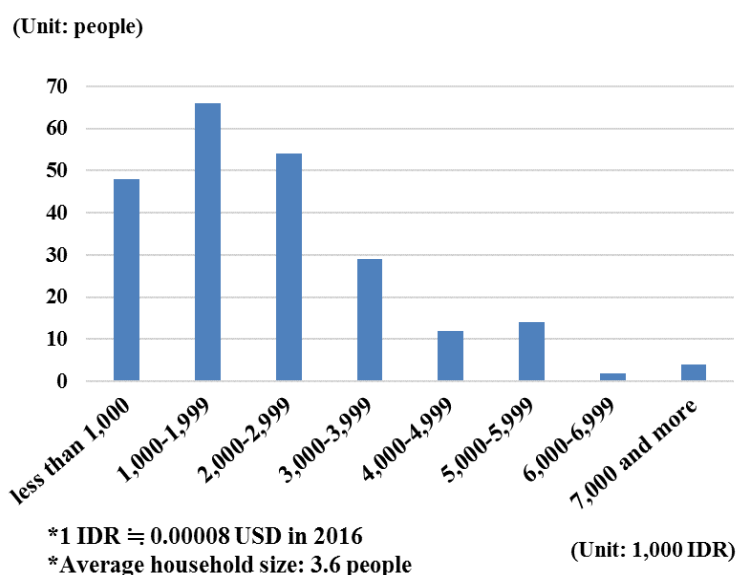
Figure 3. Monthly household income.

Figure 4 represents the relationships between income levels and educational backgrounds. The respondents' monthly household income levels are divided into 4 groups, "less than 2,000,000 IDR", "from 2,000,000 to 4,000,000", "from 4,000,000 to 6,000,000", and "6,000,000 or more". The results demonstrate that, the higher their income level is, the larger ratio of higher educational backgrounds. It means that higher educational group (Secondary or Post-Secondary) earns more income than lower educational group (Primary or Middle).

Figure 4. Composition of educational background par income level.

Figure 5 shows the average number of their durable possessions per household. TV and motorcycle are possessed at least one or more in each household. Refrigerator ownership is nearly one per household, however, laundry machine and PC are owned by nearly one in two households. As for car, only one in ten households possessed it.
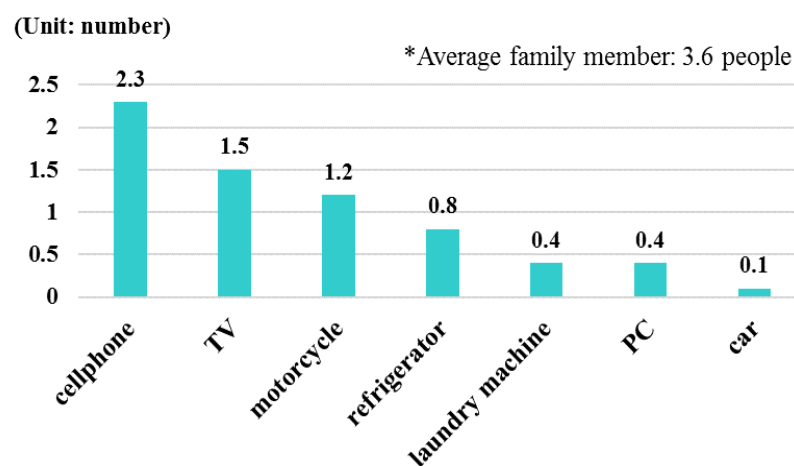
Figure 5. Average number of durable possessions per household.

From the aspect of water and sanitation, the situation of septic tank installation in their house was investigated. To the question "Does your house have a septic tank?", 60% (140 people) of total respondents said "yes", and 40% (94 people) said "no". To show the relationship between the level of income and possession of a septic tank, the percentages of respondents of each income level with and without a septic tank are displayed in Figure 6. When it comes to percentages of residents in the lowest income level (less than 2,000,000 IDR), the percentage among the residents who have a septic tank (45%) is less than the percentage among the residents who do not have a septic tank (57%). However, when focusing on relatively higher income levels (4,000,000 IDR or more), there is only 2% difference between those percentages of having a septic tank (15%) and having no septic tank (13%).
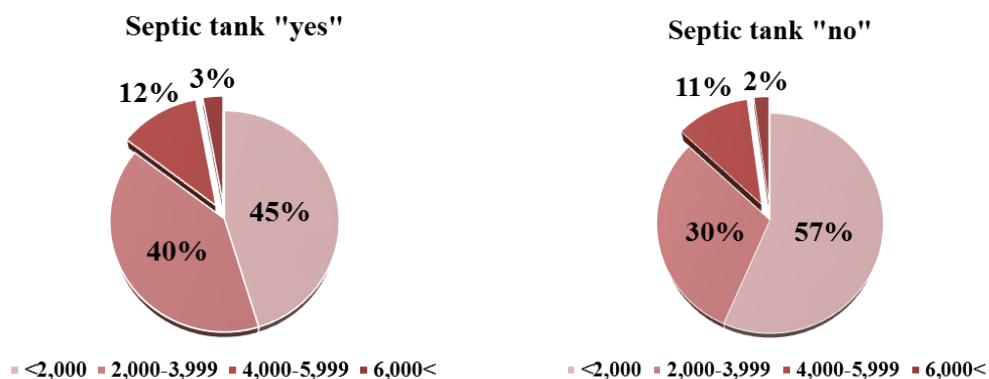
Figure 6. Comparison of income levels between having and not having a septic tank.

3.2. Field survey with married women

There was another field survey carried out in August and September 2016. It was conducted earlier than the survey introduced in Section 3.1., but these two surveys are mutually independent with different respondents. The methods in this survey were questionnaire, interview, and focus group discussion targeting married women. The total number of respondents was 30 and the average age was 44.4 years (youngest: 26, oldest: 67). The contents of the survey were household composition, income, expenditure, durable possessions, priority of spending money, borrowing and saving money, educational background, awareness and values for living conditions, and so on.

Most of the respondents are members of a women's community group called Pembinaan Kesejahteraan Keluarga (PKK) which means "family welfare movement". The PKK has been practiced to mobilize female participation on the national development policy since the late 1960's under the Soeharto administration [7]. The PKK members can be regarded as key residents who have leadership potential and ability to play an important role in sustainable development of urban slums in Indonesia. They are also expected to be main actors who create and expand value chains in their local communities through both sanitation improvement and income increase.

Regarding the composition ratio of respondents' educational backgrounds, Primary (SD) is 17%, Middle (SMP) is 30%, Secondary (SMA/SMK) is 33%, and Post-Secondary (S1/Univ./Diploma) is 20%. It is worthwhile to mention that the respondents are not over-concentrated within a group of educational background (highest: 33%, lowest: 17%). In other words, female residents living in the slum area have diverse educational achievement.

Table 1 shows the relationship between their educational backgrounds and monthly household income. The people with higher educational level (Secondary or Post-Secondary) have relatively higher income than lower educational level (Primary or Middle). It is similar to the result of previous survey discussed in section 3.1. However, some of them with lower educational level have even higher income than the people with higher academic background. It implicates that even women with lower

academic backgrounds can somehow gain money (with financial support by their husband, parents, children, etc.) to maintain a certain level of living and support their family.

Table 1. Relationship between educational backgrounds and monthly household income.

					(Unit: people)
(Unit: 1,000 IDR)	Primary	Middle	Secondary	Post-Secondary	Total
less than 1,000	1	0	0	0	1
1,000-1,499	0	4	0	0	4
1,500-1,999	0	0	2	0	2
2,000-2,499	2	1	3	1	7
2,500-2,999	1	0	1	1	3
3,000 and more	1	4	4	4	13
Total	5	9	10	6	30

Concerning the frequency of borrowing money, more than 80% (25 people) of the respondents answered "once a year or less". Among the rest of respondents, three women selected "never", one selected "almost every month", and the last woman indicated "no answer". The conducted interview revealed that there are few people who have the custom of borrowing or lending money in their living area. Especially on the activity of borrowing money, it is a common belief among interviewees that even if a person borrows money, it must be a secret. Figures 7 and 8 show the results of answers on the two questions: "From whom you borrow money?" and "For what you borrow money?". According to their responses, most people borrow money from a bank or cooperative society. This implies that even the residents living in urban slums can have access to formal financial services with relative ease. The most common purpose of borrowing money is for healthcare. Capital stock (such as entrepreneurship), education, and home renovation follow the healthcare for the purposes of borrowing money.
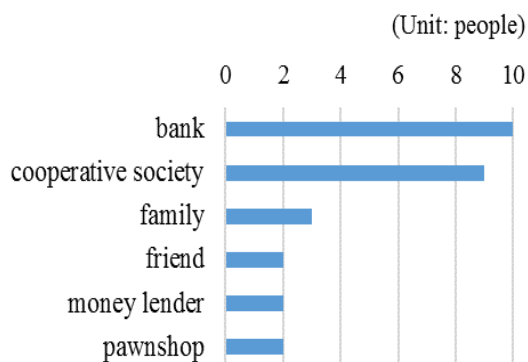

Figure 7. From whom do you borrow money?
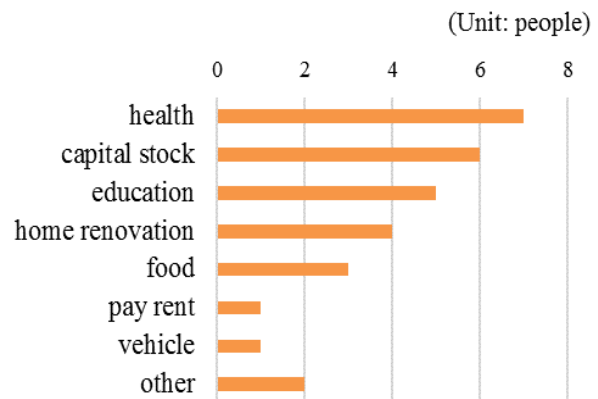
Figure 8. For what do you borrow money?

On the question of whether they save money, 9 out of the total 30 respondents answered "No, I don't.", and the rest of 21 answered "Yes, I do". Among the respondents who save money, half of them use a bank to store their money as shown in Figure 9. The other half of them use local financial services provided by communities and resident organizations other than banks such as schools, cooperative society, Rotating Savings and Credit Association (ROSCA), and so on.

(Number of people: 21)

*ROSCA: Rotating Savings and Credit Association
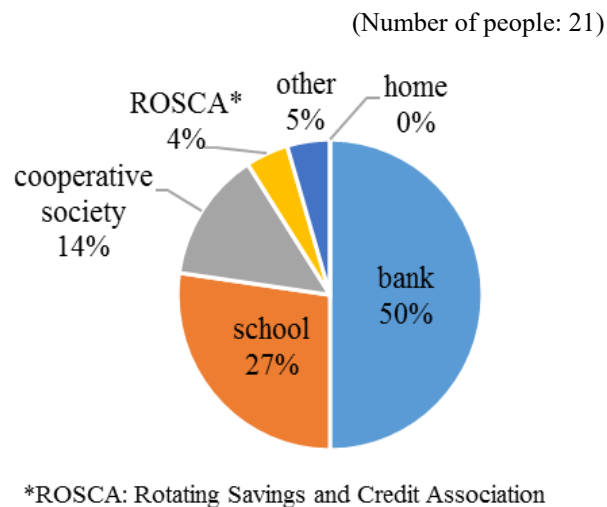
Figure 9. Where do you save money?

With respect to expenditure, the average monthly expenditure per person is 461,000 IDR with the minimum of 25,000 IDR and the maximum of 1,500,000 IDR. Figure 10 shows the respondents' priority order on expenditure items. Almost all the respondents gave the first rank to food, but education was also perceived as of most importance by two people. As for the second rank, most of them selected healthcare, education and utilities as the next most important expenditure items.

(Unit: people)
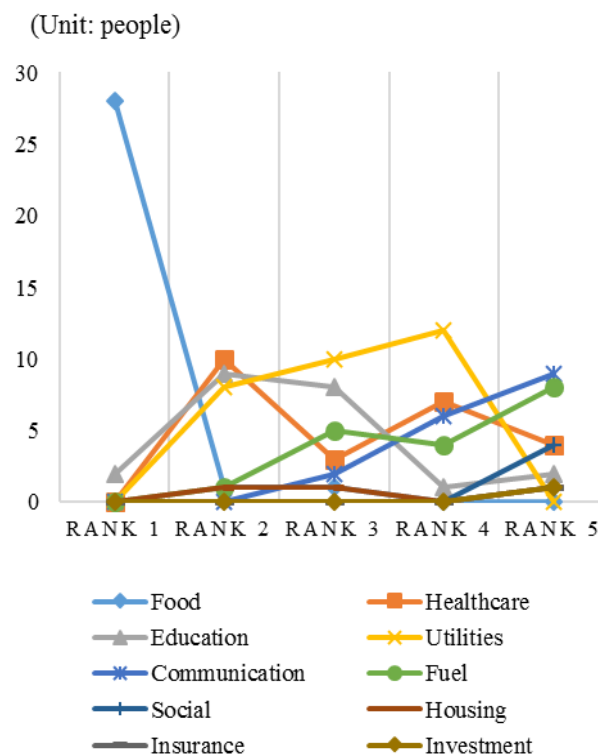
Figure 10. Importance of expenditure.

According to interview and focus group discussion surveys, food purchases accounts for the majority of their daily expenditures. They purchase daily meals and other grocery at a market or at a street stall (or kiosk) called "warung" which is a small shop generally managed in the owner's house. They go to a market about once a week on average, but they go to "warung" almost every day since the food is fresh, cheap, and nearby their home. They sometimes go to a supermarket in downtown about once a month to make a bulk purchase of groceries and food with a long shelf life. Nevertheless, they recognize that going to the market and supermarket leads to waste of money caused by impulse purchase. In contrast, the stall does not provide many choices. It normally provides the food items that residents most need to buy. Doing grocery shopping at a "warung" is more economical and better to save time. They also indicated that what to buy and where to buy would be decided by not only the price but also the food safety and sanitation.

Concerning positive aspects of living in their residential area, they said that "living costs are not high," and "location is convenient." They also indicated "easy access to hospital," "schools are within walking distances" and "kindergartens and universities are also close to the area." As for the negative aspects, most respondents indicated overpopulation in the area.

4. Discussion and summary
In this paper, we introduced and discussed economic situations of low-income people residing in an urban slum area of Bandung City, through the case study of Kiaracondong. In summary, the results of the first survey show that compared to the national average levels, income and educational levels of residents in the slum area are quite low, especially in income. Regarding their water and sanitation situation, among the residents who do not have a septic tank, more than half of them are in the lowest income level (less than 2,000,000 IDR). However, among the residents who have a septic tank, the ratio of residents in higher levels of income (4,000,000 IDR or more) is not that significantly different from that of among the residents who do not have a septic tank.

According to the results of the second survey, even women with lower academic backgrounds can support their families and maintain a certain level of living. The priority of spending money is placed on family healthcare and education for their children. Regarding borrowing and lending money, these activities are not common for the residents on a daily basis. Even if they borrow money occasionally, the main reasons are related to healthcare, education, and capital stock for small business. When it comes to savings rather than debts, they use not only banks but also local financial services managed by communities such as schools and cooperative societies.

In conclusion, we emphasize that it is crucial to consider local residents' needs for the development of sanitation value chain in their community, especially with their strong motivation and sustainable participation which no-one can tell unless the local residents show them by themselves. From the point of view, this study can suggest that sanitation value chain involving economic activities should be incorporated with family healthcare and child education for the participants because the results of our research show their high interest on them even if their economic condition is difficult.

References
[1]   Funamizu N 2017 *Sanitation Value Chain* **1** 3-13
[2]   Ushijima K, Funamizu N, Nabeshima T, Hijikata N, Ito R, Sou M, Maiga A H and Sintawardani

N 2015 *Water Policy* **17** 283-98

[3]   Scott P, Forte J and Mazeau A 2017 *Barriers and Opportunities for Sanitation SMEs: A Study of the Wider Market System in Ghana* (London: Water & Sanitation for the Urban Poor (WSUP))

[4]   United Nations Development Programme (UNDP) 2016 *Human Development Reports 2016 Human Development for Everyone* (New York: UNDP)

[5]   World Bank 2016 *The World Bank Data: GNI per capita, Atlas method (current US$): Indonesia* https://data.worldbank.org/indicator/NY.GNP.PCAP.CD?locations=ID (Accessed on September 5, 2017)

[6]   ArcGIS 2016 *Indonesia Average Household Size* (data source: Michael Bauer Research) http://www.arcgis.com/home/item.html?id=33ad793233cd47d885f8c126b51389af (Accessed on September 6, 2017)

[7]   Hirano K 2005 *F-GENS Journal* **3** 261-8