



“CIRCULAR ECONOMY PRACTICES IN AN ECOVILLAGE” (An Overview of Circular Economy Practices in Bendungan Village, West Java, Indonesia)

<http://jurnal.universitaskebangsaan.ac.id/index.php/ensains>

Email: ensains@universitaskebangsaan.ac.id / ensainsjournal@gmail.com

ENSAINS: Vol. 1 Nomor. 2 September 2018

Dafi Dinansyah Wiradimadja¹, Erri N. Megantara², Teguh Husodo², Sunardi²,
Raden Ayu Mutiara³, Tri Mulyani³

¹Environmental Science Magister Program, Universitas Padjadjaran, Bandung, Indonesia

² Universitas Padjadjaran's Institute of Ecology, Bandung, Indonesia

³ Universitas Kebangsaan Republik Indonesia

E-mail : dafikido@gmail.com

Abstract: Environmental problems have been increasing globally, especially after the industrial revolution as S.Barles stated. One of the problem in Indonesia that has become an international concern in plastic waste. Based on World Bank statement, Indonesia in 2018 has become world's second largest plastic waste producer in the world. Borgen Project also stated that Indonesia is estimated to contribute roughly 200,000 tons of waste from its rivers and streams. Bendungan Village, the location of this research is passed by Ciliwung River. The location of this village has made the West Java Government distress concerning the Ciliwung River, the government is afraid that the river will worsened by the plastic waste, thus the government made the ecovillage program to solve the problem. One of the program that can solve the plastic wastes problem in this village is through circular economy. This research used Mixed Methods approach as it research methods. Based on the existing problems, one of the ecovillage program relating to the improvement of environmental issues are through the method of circular economy. Parameters of the circular economy are: the role of garbage bank to the circular economy input; community's income through garbage bank; utilization of agricultural waste into new commodities such as an organic fertilizer; the use of plastic waste for the village's economic benefit. The result shows that the program has helped the village people to gain economic benefit from wastes and also has helped to clean the environment.

Keywords: Circular Economy, Ecovillages, West Java, Ciliwung River, Bendungan Village, Waste

Abstrak: Masalah lingkungan telah meningkat secara global, terutama setelah revolusi industri seperti yang dinyatakan S.Barles. Salah satu masalah lingkungan di Indonesia yang telah menjadi perhatian internasional dalam limbah plastik. Berdasarkan pernyataan Bank Dunia, Indonesia pada tahun 2018 telah menjadi penghasil sampah plastik terbesar kedua di dunia. Proyek Borgen juga menyatakan bahwa Indonesia diperkirakan menyumbang sekitar 200.000 ton limbah dari sungai dan sungainya. Desa Bendungan, lokasi penelitian ini dilalui oleh Sungai Ciliwung. Lokasi desa ini telah membuat Pemerintah Jawa Barat tertekan dengan Sungai Ciliwung, pemerintah khawatir sungai akan memburuk oleh sampah plastik, sehingga pemerintah membuat program ecovillage untuk menyelesaikan masalah. Salah satu program yang dapat menyelesaikan masalah sampah plastik di desa ini adalah melalui *circular economy*. Penelitian ini menggunakan metode *Mixed Methods* dengan metode penelitian. Berdasarkan permasalahan yang ada, salah satu program ecovillage yang berkaitan dengan perbaikan isu lingkungan adalah melalui metode ekonomi lingkaran. Parameter *circular economy* adalah: peran bank sampah dalam *circular economy*; pendapatan masyarakat melalui bank sampah; pemanfaatan limbah pertanian menjadi komoditas baru seperti pupuk organik; penggunaan sampah plastik untuk keuntungan ekonomi desa. Hasil penelitian menunjukkan bahwa program tersebut telah membantu penduduk desa untuk mendapatkan manfaat ekonomi dari limbah dan juga telah membantu membersihkan lingkungan.

Kata kunci: Circular Economy, Ecovillages, Jawa Barat, Sungai Ciliwung, Desa Bendungan, Limbah, Sampah

PRELIMINARY

According to Brundtland Report from the UN, 1987. Stated that, one of the factors that must be faced to accomplish sustainable development is figuring out the means to mend the environment without sacrificing the need for economic development and the community and its social systems. A report from the 2005 World Summit, which summaries sustainable development as comprising of three mutually dependent and strengthening pillars (economic, social and environmental).

UNESCO in 2001 further explaining this on The Universal Declaration of Cultural Diversity further explores the concept of sustainable development by stating that "... cultural diversity is important to humans as the importance of biodiversity to nature"¹. Thus "development is not only understood as

¹ Matsura, Koichiro. UNESCO Universal Declaration of Cultural Diversity. Diogenes Journal. February 1st, 2005.

economic development, but also as a tool for achieving intellectual, emotional, moral, and spiritual satisfaction". In this view, cultural diversity is the fourth policy of the scope of sustainable development policy.

The European Union on try to integrate this on their study as stated on Sustainable Development in a Diverse World (SUS.DIV)². This documents stated that the EU will integrate multidisciplinary capacity and translate cultural diversity as a key or new strategy for sustainable development. The study done based on this framework will be used for their policies for sustainable development.

This document also shows that the important of multi-disciplinary approach to achieve sustainability of a nation. One of the concept to achieve sustainability is through a concept called ecovillages. According to *the Global Ecovillage Network (GEN)*, ecovillage is an intentional or traditional community that use local participation process to integrate the holistic dimension of ecological, economic, social, and cultural sustainability in order to regrow or to regenerate the social and natural environment³.

The location of the research is located in Bendungan Village, Bogor Regency, Ciawi Sub-district, West Java, Indonesia. This village is passed by Ciliwung River, this river is the second river in West Java (beside Citarum river) that had become the main concern of West Java Environmental Agency (DLH JABAR). The DLH JABAR wanted to maintain and upgrade the quality of its water and its tributary through their ecovillage program.

In the development of Ecovillage in Bendungan Village, Ciawi District was started with Assistant Field Training Program facilitated by West Java Environmental Agency /DLH, which held in Bandung. The Local Assistant who has received training accompanied by facilitators from DLH, in realizing the development of Ecovillage in Bendungan Village. One of the aspect in ecovillage is economy, in the case of Bendungan Village the economy program is mainly based on circular economy concept.

LITERATURE REVIEW

Understanding Ecovillage

According to *the Global Ecovillage Network (GEN)*, ecovillage is an intentional or traditional community that use local participation process to integrate the holistic dimension of ecological, economic, social, and cultural sustainability in order to regrow or to regenerate the social and natural environment⁴. Furthermore, Global Ecovillage Network explained that the ecovillage is a concept that transcends the dichotomy of rural and urban areas definition, that means this concept is basically a way of organizing society. It was established from the lower level and is based on the "bottom up" paradigm. It is important in the ecovillage is that the design milieu and lifestyle is determined by the people who live in their respective communities.

According to Bang on 2005, the ecovillage is defined as a human settlement (usually with population consisting between 50 and 500 people, although there are exceptions) that able to provide food, manufacturing, recreation, social opportunities, and trade aimed to integrating human activity into the environment that supports human physical, emotional, mental and spiritual development, and sustainability in the future⁵ (Bang, 2005, 27).

Changes In the Economic Value From the Environmental Problems That Exist to Be An Economic Potency

Based on West Java DLH, there are environmental problems in the Bendungan Village. Some of them are matter of household waste and waste from agriculture. This practice is called *circular economy*. According to Ellen McArthur Foundation, *circular economy*. According to Ellen McArthur Foundation, *circular economy* is an approach that can offer a real opportunity to develop new products and services using waste materials⁶, adopting new manufacturing techniques to enhance the product life cycle and reduce costs, and develop new business models founded on reusing and recycling products and services⁷.

Based on the existing problems, one of the ecovillage program relating to the improvement of environmental issues into an economic potency is the developing of garbage bank, making briquettes and plastic blocks from plastic waste and composting activities. Based on the existing problems, one of

² Clergeau, Philippe and Flavie Mayrand, Green Roofs and Green Walls for Biodiversity Conservation: A Contribution to Urban Connectivity?, MDPI Sustainability Journal, March 27th, 2018.

³Hall, Robert, The ecovillage experience as an evidence base for national wellbeing strategies, Intellectual Economics Volume 9, Issue 1, April 2015, Pages 30-42

⁴ Ergas, Christina ,A Model of Sustainable Living: Collective Identity in an Urban Ecovillage, Sage Journal,First Published February 16, 2010

⁵ Bang, Jang Martin. Ecovillage s: a practical guide to sustainable communities, New Society Publishers (1 September, 2005) p. 27

⁶Kirchherr, Julian Denise Reike Marko Hekkert, Resources, Conservation and Recycling Journal, Volume 127, Conceptualizing the circular economy: An analysis of 114 definitions, December 2017, Pages 221-232.

⁷ Ellen McArthur Foundation, 2010.

the ecovillage program relating to the improvement of environmental issues into an economic potency is the developing of garbage bank and composting activities.

Parameters of the economic value of the existing problems in the environment into the potential that can be developed are: the existence of garbage bank; community's income through garbage and trash bank; utilization of agricultural waste into new commodities such as an organic fertilizer.

RESEARCH METHODOLOGY

The research design used in this study is mixed methods (quantitative and qualitative) (Creswell, 2010⁸). The qualitative data are used to support the quantitative data to describe the results of the quantitative data collection.

The technique of collecting data on a quantitative approach are through interviews using a questionnaire by the selected sample. A questionnaire was used to obtain the main data, which are the data about how and to evaluate the ecovillage program on the village. The random nature of the respondents is assumed to have been represented through random techniques, thus making the questionnaire have sampling error of 10% ($d = 0.1$). The level of confidence or precision of the data by 90%⁹. The total sample are **99 people**.

The qualitative data are gathered through in-depth interviews and focus group discussions. The informants for interviews were selected with the consideration of which they understand the problems and the issues. Key Informants in this research are West Java province Environmental Agency / DLH, Bendungan Village community leaders, local facilitators, and the elder of Bendungan Village.

The results of the questionnaire's answers are processed through checking stage, the process of identification (*coding*) and disclosure (*tabulating*). The data that has been tabulated are analyzed and described to illustrate the characteristics of the respondents related to the issues to be discussed (Bungin, 2008¹⁰). Data are grouped based on the variables, tabulation and results that are going to be obtained are shown in the form of table or graph / histogram form of the percentage value that describes the results of the ecovillage program.

RESULTS AND DISCUSSION

Overview of Research Site

The research was conducted in Bendungan Village, Ciawi Sub-district, Bogor Regency, West Java, Indonesia. The widest area on Bendungan Village is outdoor / Fields / Moor / Rice Fields which covering 58.850 Ha or 39.19% of the village, the second widest is the human settlement, which consist Settlement and Housing Complex areas which both covering 51,066 Ha or 33.99% of Bendungan Village, while the smallest land covering is worshipping places that cover 0.441 Ha or 0.29%.

The percentage of Outdoor / Fields / Moor / Rice fields in this village means that this village have 58.850 Ha of area that need to be conserve for ecological conservation and also food security, also the wide of human settlement on the area (33.99%) means that this village have problems for waste problems from the human activities and consumptions.

Furthermore, the highest percentage is 19-55 years old age group, which consist of 6,287 people. This number indicates that the majority of the population in Bendungan Village are in the productive age category (19-55 years old). This indicates that a large productive age population can be one of the drivers of the development of the Bendungan Village's Ecovillage.

Next, the main income source / occupation of the Bendungan Village people is private company employee, or blue collar worker, also because of the low income of the village people, that means it need other income source that can help their economy.

Table 1. Bendungan Village's People Family Income / per month

No.	Income (IDR)	Frequency	Percent (%)
1.	< 500,000	4	4,0
2.	500,000-1,000,000	17	17,2
3.	1,000,000-2,000,000	37	37,4

⁸ J. W., Creswell, & Plano Clark, V.L. Designing and conducting mixed methods research (2nd ed.). Thousand Oaks, CA: Sage, 2010.

⁹ With regard to the level of accuracy, we used a confidence level of 90% as suggested by Kothari C.R (2008) research methodology, New Delhi, Publisher New age international ltd, in (THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT Effect of Credit Management System on Financial Performance of Development Bank in Rwanda: Case Study of Development Bank of Rwanda) this means that there are 90 chances in 100 (or .90 in 1) that the sample results represent the true condition of the population within a specified precision range against 5 chances in 100 (or .05 in 1) that it does not.

¹⁰ Bungin, Burhan. Penelitian Kualitatif : Komunikasi, Ekonomi, Kebijakan. Publikdan Ilmu Sosial lainnya. Jakarta: Kencana Prenada Media Group, 2008. p. 17.

4.	> 2,000,000	41	41,4
Total		99	100,0

Source: Primary Data, 2017

Based on the above figure, it shows that most of the people in this village have income under Rp.2,000,000 (58%). Because of the increasing price of substantial goods in Indonesia, the people will need every extra income they can get. The ecovillage program gives alternatives income source for the people. This source of alternative income is designed on sustainability and to make the people depends more on the environment so they can aware more about the important of the environment.

Circular economy practices of this village is started by the implementation of ecovillage program by the west java Environmental Agency. The circular economy is based on ecovillage's aspect on economy beside environment, social and spiritual. The circular economy in this village has been only based on the marketing of compost and crafts based on waste which failed to be profitable. The problem is related to sales / marketing of recycled products, where compost and handicraft products less desirable by the community. So it is needed the increase in the capacity of the community training such as training for recycling craft the resulting product is more interesting and attention in demand by the community.

In Bendungan Village, the thick block and briquettes for fuel have its own market and are easy to sell, especially to factories. But the same with craft, which is hard to sell, the same problem with Citarum Ecovillage, but the the government still insisted the people to make it. Funds for the briquettes and composting machine itself came from private donations. Recently, the world's fuel prices have increased rapidly. This garbage briquettes can be a solution of the problem of handling waste as well as a cheap alternative fuel and does not burden the government. Easy-to-obtain raw materials, easy manufacturing methods and great benefits are an important point in this regard.

The use of environmental friendly technology and the potential of briquettes as renewable energy is implemented, on the other hand because the briquettes are mainly sold to outside the village, the renewable energy is still only a potency.



Figure 1. Briquettes and Plastic Blocks Maker as Zero Waste Program in Bendungan Village

Source: Researcher's Documentation, 2017

Commencing the same machine, it is also possible to make plastic blocks for pavement, construction purposes and furniture from all kind of plastic thrash. From this point, the Bendungan village people wanted to make the village become zero waste by utilizing this machine and composting machine.

The economic benefit of the briquettes based on the interview is as follow:

1. Average organic waste input per week is 200 Kg per community / RW
2. Briquettes output on average is 50% of input, therefore per week / community will produce 100 Kg of briquettes
3. Based on the lowest briquettes from waste price is Rp. 1,600, therefore 100 Kg of briquettes will produce revenue up to Rp. 160,000
4. Operational cost for the machine is Rp. 20,000

5. it means that each week each community can obtain Rp. 140,000 that they can use for community activities or community building.



Figure 2. Composting Machine in Bendungan Village
Source: Researcher's Documentation, 2017

Another technology that they use is composting machine. This machine help this village making compost The economic benefit of composting is relatively big, based on the interview that each person can generate up to Rp. 300,000 per month for composting. But because of relatively small market demand for composts, the people are less attractive to contribute. Today only 20 people still actively contribute for composting although without any revenue from this activity.

Although the amount of money from this practices are too low for real economic benefit, nevertheless the people of Bendungan Village are now voluntarily willingly to separating their garbage, as shown on the table below:

Table 2. Respondents' Habit on Separating Plastic Waste after the Program

No.	Participation	Frequency	Percent (%)
1	Participate	66	66,7
2	Not Participating	33	33,3
Total		99	100,0

Source: Primary Data, 2017

Based on table above, it can be seen that the majority of Bendungan Village people is participating on separating their garbage (66.7%). It means that the circular economy has change the people behavior. Now they regularly separate garbage, from organic and inorganic, and also regularly distribute their waste to the bank. This change is meant to change the habit of the people from dumping the waste directly, into separating waste and dump or distribute it accordingly.

An additional circular economy practices that is practiced in this village is craft production, In Bendungan Village, the thick block and briquettes for fuel have its own market and are easy to sell, especially to factories. But the same with craft, which is hard to sell, the same problem with Citarum Ecovillage, but the government still insisted the people to make it. This crafts are currently not for sale because the market are too saturated, nevertheless the village people are still doing crafts for their activity, mainly for social benefit interacting with other villagers.

CONCLUSION

The economic benefit from briquettes machine, composting and garbage bank has made people that once have low environmental awareness are willingly to involve in the program. They voluntarily clean the environment and separating plastic waste from their home and environment, they wanted to upkeep the environment because it have economic benefit. Through recuperating value from waste and objects was unusable or will be thrown out, the circular economy improves the objects and resources benefit for productivity and competitiveness, for example cheap briquettes from waste.

The circular economy practiced in this village has shown that the benefit for this type of economy is not only economic benefit, but also social benefit. The community still making crafts from garbage although

there is no economic benefit at all. They practicing craft making solely for their own enjoyment and to maintain good social connection between the Community.

The main problem from the circular economy practices of this village are the amount of plastic garbage made by the villagers are too low for real economic benefit. This low economic benefit can be a threat for the sustainability of the ecovillage program as a whole. Nonetheless with the operation of briquettes, thick block machine will help to increase the village people income from circular economy. The reason that the machine increase their income is because the machine will accept any type of plastic (not only PET) for thick block making and organic wastes for making briquettes.

Circular economy system itself in Indonesia still faces several obstacles, among others due to limited land, mindset, perception, and behavior towards waste. So, regulations are also needed to regulate and control, but mainly to introduce and to start the program in a community / communities.

BIBLIOGRAPHY

Bungin, B. *Penelitian Kualitatif : Komunikasi, Ekonomi, Kebijakan. Publik dan Ilmu Sosial lainnya*. Jakarta: Kencana Prenada Media Group, 2008.

Bang, JM. *Ecovillage's: A Practical Guide to Sustainable Communities*, New Society Publishers September, 2005.

Circular Economy, Ellen McArthur Foundation, 2010.

Moleong, Lexy J, *Metodologi Penelitian Kualitatif, Edisi Revisi*, Bandung: Remaja Rosdakarya

Clergeau, Philippe and Flavie Mayrand, *Green Roofs and Green Walls for Biodiversity Conservation: A Contribution to Urban Connectivity?* MDPI Sustainability Journal, March 27th, 2018.

Ergas, Christina *A Model of Sustainable Living: Collective Identity in an Urban Ecovillage*, Sage Journal, First Published February 16, 2010

Hall, Robert, *The ecovillage experience as an evidence base for national wellbeing strategies*, Intellectual Economics Volume 9, Issue 1, April 2015

J. W., Creswell, & Plano Clark, V.L. *Designing and conducting mixed methods research* (2nd ed). Thousand Oaks, CA: Sage, 2010.

Kirchherr, Julian Denise Reike Marko Hekkert, *Resources, Conservation and Recycling Journal*, Volume 127, *Conceptualizing the circular economy: An analysis of 114 definitions*, December 2017.

Kothari C.R (2008) *research methodology*, New Delhi, Publisher New age international ltd, in the *International Journal of Business & Management*

Matsura, Koichiro. *UNESCO Universal Declaration of Cultural Diversity*. Diogenes Journal. February 1st, 2005.