

INNOVATING ENGANGEMENT & Sustainbility for Society Inclusive Welfare



The 1st ICCEESD INTERNATIONAL CONFERENCE ON COMMUNITY ENGAGEMENT AND EDUCATION FOR SUSTAINABLE DEVELOPMENT

November 7-8th **2018**

Directorate of Community Services Universitas Gadjah Mada



INNOVATING ENGANGEMENT & Sustainbility for Society Inclusive Welfare



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PREFACE



Prof. Irfan Prijambada

Director of Community Services -Universitas Gadjah Mada Indonesia

Assalamualaikum warahmatullahi wabarakatuh

I t is my great pleasure to serve as steering committe chairperson for the first time for the International Conference on Community Engagement and Education for Sustainable Development (ICCEESD). The Directorate of Community Services Universitas Gadjah Mada, my home institution, is proud to be a hosting. I attended the first conference were lively event where education researchers and practitioners came together to discuss a wide array of important issues in ESD.

This year promises to be equally stimulating. The theme around Innovating Engangement and Sustainability for Society Inclusive Welfare is purposely broad so that we could have a vehicle of papers ranging over a variety of themes including such topics as community cervices, people, community empowerment, education for sustainable development, and more.

I would like to thank to the steering committee, scientific committee members and senior reviewers for your all thoughtfulness. I also want to thank ICCEESD team for organizing the conference and for attending to all the logistical details including the program, hotel, meals, and all aspects of conference planning.

I hope during your time at the conference that you take the opportunity to engage with your peers to discuss your ideas for research and practice and that you ask questions of the presenters. There will be plenty of opportunities for collaboration. We will all benefit from our combined participation at this first International Conference on ESD.

Thank you and warm regards,

Wa'assalamualaikum warahmatullahi wabarakatuh

PREFACE



Nanung Agus Fitriyanto, Ph.D.

Scientific Committee Chairperson of 1st ICCEESD 2018 Assalamualaikum warahmatullahi wabarakatuh

t was nice to get to be involved in The 1st International Conference on Community Engagement and Education for Sustainable Development (ICCEESD) wich was held in Yogyakarta on 7 – 8 November 2018. Over one hundred and thirthy distinguished researchers gathered for this conference and forty-two well qualified papers were presented. Two keynote speakers from Universitas Gadjah Mada and two keynote speakers were invited from outside the UGM education for sustainability development (ESD) community. Their presentations provided a good balance between the implimentation and the experimental aspects of ESD.

For the first time in ICCEESD conference, several parallel sessions were held. Even so, many good papers had to be rejected. A special sessions for group discussions was arranged to allow extend interchange of idea among the specialists and to deepen knowledge of ongoing research. It was the paper committee's position that the validation of the ESD dynamics was of primary importance. Thus, the committee asked all the authors as a matter of policy to carry out an accucary analysis with respect to review. It was realized that this would entail additional expense and extra work for the authors, but the committee believed that the resulting papers would reflect a higher academic standard.

The success of the conference was due to the collective efforts of large number of invididuals. Grateful acknowledgements are also extended to all of team members for their devoted assistance. This includes brainstorming sessions, setting goals and making assignments with all of team members whom be involded in the early planning meetings and activities where essential elements of a plan are forming. Special thanks go to Ms. Rika Fatimah, Ph.D. for her invaluable organizing efforts. Without her skills the conference could not have been such a technical success and a very preasant experience.

Thank you and warm regards,

Wa'assalamualaikum warahmatullahi wabarakatuh

Assalamualaikum warahmatullahi wabarakatuh

The 1st International Conference on Community Engagement and Education for Sustainable Development (ICCEESD 2018) is held under the auspices of the Directorate of Community Services Universitas Gadjah Mada, at the Jogja Plaza Hotel, Yogyakarta. The conference, held 7th November through 8th, 2018 and the theme around Innovating Engangement and Sustainability for Society Inclusive Welfare. This year's ICCEESD conference was highly competitive, with 66 long and short paper submissions. Of these, 18 were accepted as full papers and 41 accepted as short papers. All total, the combined acceptance rate of long and short papers is 39 %. The acceptance rate for long papers is 32%. An additional 26 papers were accepted to the poster track.

This year's conference features five invited talks: Asae Sayaka, Ph.D., Halal Business and Society Development Institute, Songklha, Thailand; R. Rachmat A. Sriwijaya, Ph.D., Senior Lecturer of Department of Mechanical and Engineering UGM; Saroja Dorairajoo, Ph.D Senior Lecturer of Department of Sosiology National of Singapore; Dr. Puji Astuti, Secretary Directorate of Partnership, Alumni, and Global Initiatives at UGM; Prof.Dr. Sunyoto Usman, Professor at Faculty of Social and Political Sciences UGM; and Eko Agus Suyono, Ph.D., lecturer of Faculty of Biology UGM.

Together with the Journal of Community Engagement (JPkM) UGM, Journal of Indonesian Economy and Business (JIEB) UGM, Journal of Technology and Operations Management (JTOM) Universitas Malaya Malaysia, The Indonesian Journal of Biotechnoly (IJBiotech) UGM, Journal of Tropical Biodiversity and Biotechnology (JTBB) Faculty of Biology UGM and The Asian Journal of Social Science, Journal of Indonesian Economy and Business (AJSS), the ICCEESD 2018 conference supports an ESD track that provides researchers a venue to deliver more substantial mature work than is possible in a conference proceeding and to present their work to a live audience. Six such papers are featured this year and the papers submitted to this track followed the JPkM peer review process, with only four submissions total, all of which were accepted and submitted to the JPkM UGM partners.

I would like to thank the sponsors of ICCEESD 2018 for their generous support: Directorate of Community Services Universitas Gadjah Mada. I convinced The ICCEESD conference continues its tradition of providing opportunities for young researchers to present their work and receive feedback from their peers and senior researchers. I am also thankful to the steering committee, scientific committee members and senior reviewers, without whose expert input this conference would not be possible. Finally, I would like to thank the entire organizing team and all authors who submitted their work to ICCEESD 2018.

Best Regards,

Wa'assalamualaikum warahmatullahi wabarakatuh

PREFACE



Rika Fatimah P.L., Ph.D.

Organizing Committee Chairperson of 1st ICCEESD 2018

BEST PAPER SELECTION



The two program chairs selected five best paper nominees based on the reviews and meta-reviews for each of those papers. The nominees were then sent to the members of the best paper awards committee. Each committee member read and ranked each one of the nominees. Ranking was compiled and the Best Paper Award was attributed to the most highly ranked paper. All of best papers are published in JPKM (Indonesian Journal of Community Engagement) Universitas Gadjah Mada, Indonesia.

Best Paper Award Committee:

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- Dr. Ir. Ambar Kusumandari, M.ES.

Best Paper Nominees:

• Theme for Community Services, People, and Local Food Security:

Simbolic Motivation as Education Tourism Capital of Pra Mangkunegaran, Solo. *Suryo Ediyono, Setyo Budi, and Sahid Teguh Widodo.*

• Theme for Training, Marketing, Appropriate Technology, and Design:

Design of Packaging Prototype as Visual Identity: Image Branding of Chocolate Drink Product as A Mile Stone on Developing "Desa Kakao" Banjaroya, Kulon Progo.

Satria Bhirawa Anoraga, Sri Wijanarti, Iman Sabarisman, and Ika Restu R.

• Theme for Community Empowerment and Social Access:

Empowering Economic of SME with Handicraft Product in Jedong Sekarputih Balongpanggang Gresik by Creating Eco – Product.

Radius Setiyawan and Sri Lestari.

• Theme for Student Community Services:

Building Synergy in the Application of Bio Fertilizer and Sludge Biogas in Chili Farming to Develop he Integrated, Organic Arming in Wukirsari Village.

Dwi Umi Siswati, Utaminingsih, Melinda Fajar, and Hamdian.

• Theme for Education for Sustainable Development:

Education on Sustainable Development Goals (ESD): A Best Practice of RCE Asia Pasific – Youth Movement on SDGs Goal 13 and 14 (Climate Action and Life Below Water).

Emmy Yuniarti Rusadi and Brittany Hardiman

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Table of Content

PREFACE	ļ,
---------	----

Director of Community Services UGM	iii
Scientific Committee Chairperson of 1st ICCEESD 2018	iv
Organizing Committee Chairperson of 1 st ICCEESD 2018	ν
BEST PAPER SELECTION	
Best Paper Award Committee	vi
Best Paper Nominees	vii
CONFERENCE COMMITTEE	viii
TABLE OF CONTENTS	x

CONFERENCE PAPERS

THEME FOR COMMUNITY SERVICES, PEOPLE, AND LOCAL FOOD SECURITY

01	DIGGING THE WOMEN POWER FOR SUPPORTING CACAO FARMING ACTIVITIES IN GIRIPURWO VILLAGE, KULON PROGO REGENCY, INDONESIA	
	Ratih Ineke Wati, Ani Widiastuti, Fatkhiyah Rohmah, Desi Utami, and Alia Bihrajihant Raya	2
02	INFLUENCING CHARACTERISTICS FOR BUYING DECISION AND THE POTENTIAL FOR SUCCESS OF SALAK FRUIT BASED PRODUCTS IN SUPPORTING THE CULINARY TOURISM AT PURWOBINANGUN VILLAGE	
	Pujo Saroyo, Nafis Khuriyati, Guntarti Tatik Mulyati, and Anjar Ruspita Sari	10
03	ANALYSIS TREND OF LANDUSE CHANGE AND SETTLEMENT DISTRIBUTION TO ASSES LAND PRIORITY MANAGEMENT USING SPASIAL DISTRIBUTION ANALYSIS	
	Ratih Fitria Putri and Sunu Wibirama	16
04	BUSINESS MODEL CANVAS (BMC) AMONG HOME INDUSTRIES IN KULON PROGO REGENCY	
	Pinjung Nawang Sari, Jumeri, and Filigon Adiguna Puspoyudo	28

THEME FOR TRAINING, MARKETING, APPROPRIATE TECHNOLOGY, AND DESIGN

05	IMPROVING GOATS REPRODUCTION PERFORMANCE BY APPLIED OF A RECORDING SYSTEM IN SENTRA PETERNAKAN RAKYAT KEBON WULANGREH, JOGONALAN, KLATEN	
	Bayu Andri Atmoko, I Gede Suparta Budisatria, Nono Ngadiyono, Endang Baliarti, Panjono, Tri Satya Mastuti Widi, M. Danang Yulianto, and Regita Aisyah Nirmala	42
06	GCONNECT2: DISASTER-RESILENCE AREA DEVELOPMENT THROUGH CONVERGENCES IOT-CLOUD AND COMMUNITY RESILENCE	
	Mardhani Riasetiawan and Bambang N. Prastowo	49
07	IMPLEMENTATION OF BATIK MACHINE TO IMPROVE HAND- DRAWN BATIK PRODUCTION TIME	
	Andi Sudiarso and Rindi Kusumawardani	55
08	REDUCING STRESS AND INCREASING THE CONFIDENCE OF THE BLIND THROUGH GO-BLIND (GAMELAN FOR BLIND) AS AN INCLUSIVE EDUCATION	
	Muhamad Ali Irham, Dinar Sakti Candra Ningrum., Fadil Fajeri,	
	Sapnah Rahmawati, and Musfira Muslihat	63

THEME FOR COMMUNITY EMPOWERMENT AND SOCIAL ACCESS

09 AN OVERVIEW OF INITIAL ESTABLISHMENT OF KARANG TENGAH TOURISM VILLAGE, IMOGIRI, BANTUL THROUGH ROLE OF INDEPENDENT AND SUSTAINABLE TECHNOPRENEURSHIP AND DYNAMIC SUSTAINABLE ENTERPRISE BASED ON SMALL AND MEDIUM ENTERPRISES (SMES)

Widodo, Suparna, Joni Tri Wibowo, and Isnaini

72

82

10 DISASTER RESPONSE RECONSTRUCTION PROGRAMS IN TINATAR, PUNUNG, PACITAN

Aida Mardiana, Ahmad Agus Setiawan, Hadafi Farisa R, RR Salma Fitri Kusumastuti

- 11 YOUTH AND HEALTH CARES EMPOWERMENT TO INCREASE THE NUMBER OF YOUTH VISITS TO POSBINDU Prima D. Ratrikaningtyas, Lastdes CF. Sihombing, and Abdul Wahab 91
- 12 A NEW APPROACH OF COMMUNITY ENGAGEMENT FOR HARLEY DAVIDSON CLUB INDONESIA (HDCI) DIY: BUILDING A NON-COMPETITION BASED MARKET FOR VILLAGE BY USING GLOBAL GOTONG ROYONG (G2R) TETRAPRENEUR MODEL

Ivan Lanovara and P.L. Rika Fatimah

98

THEME FOR STUDENT COMMUNITY SERVICES

13 ESTABLISHING HOMESTAY IN GIRIKERTO VILLAGE TO CONSERVE MOUNTAIN FLORA OF MOUNT LAWU, NGAWI REGENCY, EAST JAVA.

Atus Syahbudin, Dina Dwi Ratnasari, Dyah Ayu Wulandari, Eka Fitriani, Herdina Primasanti, Nekkyoo Meishi Sugureta, Noviyanti Listyaningrum, Ratris Kurnia P., Tiara Dwika Andini 108

14 COLLABORATIVE ALUMNI – STUDENT COMMUNITY SERVICES IN LOMBOK EARTHQUAKE AFTERMATH: A NEW DISASTER RESPONSE AND RECONSTRUCTION PERSPECTIVE

Ahmad Agus Setiawan, Stefani DR Pudyanti, Angelina SDPutri, Adam Chaesar, Muhammad R Aziz, Rezky P Harisanti, M.Hanafi, Ervina Kurniasari, Madina D. Panuntun, Angga Prayogo,Muhamad AFN, Muhammad A. Arifianto, and Dita M. Sufiatun115

15 EDUCATION FOR SUSTAINABLE DEVELOPMENT THROUGH STUDENT COMMUNITY SERVICE PROGRAM FOR ENVIRONMENTAL AND TECHNOLOGY IMPROVEMENT IN JEPARA WETAN, CILACAP

Nevy Ardianto, Jannatiyana Suwinda, Adetia Alfadenata, Irfan Fahmuddin Ma'ruf, and Ahmad Agus Setiawan 133

THEME FOR BORDER REGION, LESS DEVELOPED REGION

16 GAMA RAIN FILTER INSTALLATION TO MEET THE NEEDS FOR CLEAN WATER AND IMPROVE THE QUALITY AND QUANTITY OF GROUNDWATER IN BANJARARUM VILLAGE, KULON PROGO REGENCY, YOGYAKARTA

Agus Maryono, Adhy Kurniawan, and Agus Prasetya

144

THEME FOR EDUCATION FOR SUSTAINABLE DEVELOPMENT

17 THE IMPLEMENTATION OF EDUCATION FOR SUSTAINABLE DEVELOPMENT IN THE LOCAL ECONOMIC RESOURCE DEVELOPMENT COURSE: TOWARD SMART VILLAGE FOR AGRICULTURE IN SLEMAN REGENCY.

Rini Rachmawati, Luthfi Muta'ali, and Abdur Rofi

168

176

18 EMPOWERMENT OF GREEN CHEMISTRY COMMUNITY FOR TRANSFER TECHNOLOGY OF PATCHOULI OIL PROCESSING TO MSMES IN SLEMAN AND KULONPROGO.

Karna Wijaya, Mokhammad Fajar Pradipta, Widi Kurniawati, Farida, and Nasih Widya Yuwono

Theme for COMMUNITY SERVICES, PEOPLE, AND LOCAL FOOD SECURITY



DIGGING THE WOMEN POWER FOR SUPPORTING CACAO FARMING ACTIVITIES IN GIRIPURWO VILLAGE, KULON PROGO REGENCY, INDONESIA

Ratih Ineke Wati*, Ani Widiastuti, Fatkhiyah Rohmah, Desi Utami, Alia Bihrajihant Raya

Faculty of Agriculture, Universitas Gadjah Mada, Indonesia, email: ratihinekewati@ugm.ac.id

ABSTRACT Cacao is one of the main commodities cultivated in Giripurwo Village of Kulon Progo Regency. Its average productivity has reach 6.7 ton/ha in 2016. So far, farming activities of cacao commodity has been conducted by men who are supported by farming group. One of our community service programs since 2017 has been developing an incorporated women farming group that can support cacao farming activities, especially in marketing area. We found that actually women have potency for supporting cacao farming activities because: (1) women play the important roles in cacao marketing decision in one farming household since their decision affects where and how much money the cacao will be sold; and (2) women have more social activities than men thus their information access is wider. Our community service programs to accommodate the potency include: (1) assisting the establishment of women farming group and (2) facilitating comparative study in "Sari Mulyo" farming group and "Rumah Cokelat Nglanggeran"

Keywords women, cacao, women farming group

A. INTRODUCTION

The market of processed cacao keep rising along with the increase of global consumption. Euromonitor International Limited reported that the consumption number of chocolate candy in markets of developing countries, including Asia, Latin America, Middle East, and Africa have reached to 5% per year in the last five years (Maruto, 2015). As one of cacao exporting countries, Indonesia has contributed 14.7% of cacao bean production whole the world. The average of cacao production in Indonesia from 1994 to 2016 was 602,475.96 tonnes. This achievement put Indonesia as the second cacao producer country on the world after Cote d'Ivoire (FAO, 2018).

Kulon Progo is one of regencies in Special Region of Yogyakarta which is potential cacao producer area reaching 2,345.7 Ha. The average of cacao bean production was 1,043.38 ton per year (Sutarmi, 2018). Girimulyo District contributed 259.45 ton or 25% of cocoa bean to Kulonprogo (BPS, 2016). Mostly cacao bean quality of Kulonprogo was categorized as grade C and grade B. Farmers commonly sell the dry bean in near market. Those beans have not been fermented yet thus the selling price is low.

In the case of Giripurwo Village located in Girimulyo District, the traders in near market buy at the same price both dry and fermented beans. However, farmer and his family do not try to look for other markets to get the competitive price because of the accessible location as well as the fast cash flow. This condition influences their decision and builds their habit in bean processing. Dry bean became the final product of cacao farmers in Giripurwo Village so far.

The aims of our community service is to increase the farmer income and prosperity through the quality improvement of cacao farm as well as farmer group in Giripurwo Village. Heretofore, the previous target of community service programs both from colleges or from company were farmers as the main actors who directly go into farm activities. In order to achieve the goals, we involve not only the farmers but also all society including women. We try to dig their potency and create the programs to optimize their role in supporting cacao farming activities at Giripurwo Village.

B. PROBLEMS

Although the cacao productivity in Giripurwo Village had reached 6.7 ton/ha on average (BPS, 2016), the bean quality had competed difficulty in international markets. Mostly farmers do not treat their farm well thus pests and disease easily attack the plants. Cacao farms are wet because the branches and fallen leaves have not been managed. Finally, a lot of cacao fruits are infected by *Phytoptora, sp.* The less maintaining effort of farmers is influenced by the unfair price decided by the market.

Digging the women potency to support cacao farming activities has been conducted since 2017 when our program was started. The location was chosen purposively in Nglengkong District, Giripurwo Village, Girimulyo District, Kulon Progo Regency, Special Region of Yogyakarta, Indonesia because the farmers tend to do less effort for improving the quantity and quality of cacao beans. The investigation used qualitative research with descriptive approach. In order to collect the data, deep interview and Focus Group Discussion was conducted with the informants, i.e. head of Nglengkong district, head of farmer group, head of each women developed in Nglengkong, community and the representative of women in each neighbourhood (*Rukun Tetangga* – RT).

Besides investigating the potency of women, we also conducted several meeting with women in Giripurwo Village with the intention of:

a. Education, we educated the women about the importance of: (a) cacao as the main commodity which increase the village income; (b) market choice for selling cacao beans to get the good price; and (c) women farming group to support the activities of cacao post-harvest as well as looking for the suitable market for cacao beans. Those activities were conducted together with FGD three times on 27 February 2017, 22 May 2017, and 15 October 2018.

- b. Training, we invited the women to do comparative study in "Sari Mulyo" farming group and "Rumah Cokelat Ngalnggeran" located in Gunungkidul Regency on 8 October 2018. The women studied about post-harvest of cacao and processed cacao products, i.e. chocolate pasta and *dodol cokelat*.
- c. Mediation, together with agriculture extension agents of Ngelengkong Hamlet, we support the women to make an incorporated farming group which can support cacao farming activities in this location. This activities was conducted on 5 and 10 July 2017 to collect information about incorporated farming group in the office of agricultural extension in Nglenggong Village and on 1 and 15 October 2018 to get information about administration books and articles of association (AD/ART).
- d. Advocacy, we keep the communication with the head of women farming group and agricultural extension agents via chatting application to monitor the activities of women farming group.

C. RESULTS AND DISCUSSION

1. Social Mapping

In order to understand the problem and dig the potency in the field, social mapping were conducted at the first time through deep interview and forum group discussion with the informants as well as observation. The result shows that mostly previous community service programs have not involved all society when the goal is the improvement of quality and quantity of cacao beans or the increase of cacao farmer income. The target was only the farmers as the main actors. The interesting finding is women actually have potency to support the cacao farming activities. Although cacao cultivation is conducted by men, the selling management mostly is controlled by women. They play the important roles in cacao marketing decision in one farming household since their decision affects where and how much money the cacao will be sold. The near market is the most popular location to sell the beans. There are two reasons behind that: (1) the near market buys the beans in cash and (2) women need short time for going to the markets as well as spend low cost for transportation. Although there is a farming group, the activities only focus on the cultivation. Thus the members are only men who own and work on cacao farm. However, the collective activities between the farming group members are rarely found in the field because farmer tends to work with his own family to take care the cacao farm.

Involving women in cacao farming activities collectively have not been conducted before. One of our programs is to form a women farming group to support the cacao farming activities. The women farming group will focus on marketing and processing cacao bean. Women who have more social activities inside and outside the hamlet are able to expand the marketing networks for cacao beans. Women in Nglengkong Hamlet actively join as members of arisan (social gathering), PKK (Pendidikan Kesejahteraan Keluarga program in village level to educate women on various aspects of family welfare), Posyandu (Pusat Pelayanan Terpadu - Maternal and Child Health Services). They gather once per week for Posyandu and once per month for arisan and PKK.



Figure 1. Forum Group Discussion with the women representative in Nglanggeran Hamlet

2. Women Farming Group

After finding the potency of women to support the cacao farming activities, we persuade the women to develop a women farming group. First of all, we approach the women who can influence the others to make a new group in agricultural sector. Second, we ask the women to choose the committee as the representative of women farming group. Third, we facilitate the women to meet the agricultural extension agents in order to get their support. Agricultural extension agents will also accompany to achieve the legal entity of women farming group. The legal status is the main requirement to submit government subsidies. Forth, we assist the women to prepare all requirements for registering incorporated women farming group. So far, we have helped them to prepare article of association (AD/ART) and administration books, i.e. cash book, book of principal an voluntary savings, member list book, incoming mail book, outgoing mail

book, activity logbook, activity plan logbook, minute book, inventory book, attendance book, and guest book.

According to Regulation of Agricultural Ministry No. 67/Permentan/ SM.050/12/2016, farming group has the role as: (1) learning unit, a place to improve knowledge and skill in farming activities; (2) cooperation unit, a place to develop collaboration among farmers inside and outside the group; and (3) production unit, a place to improve the ability to make decision in determining the product development. Women can increase their capability in expanding the networking and marketing, especially for cacao beans by maximizing the role of women farming group. They can get new information from experts, get new relations, and create new various products easily when joining in farming group. External parties will also easily come to give support when a group have been run cohesively.



Figure 2. Facilitating women farming group to get legal status

3. Comparative Study

Comparative study is conducted to educate women the management of post-harvest and the processed cacao bean products. We facilitated women to visit "Sari Mulyo" farming group and "Rumah Cokelat Nglanggeran" in Gunungkidul Regency. "Sari Mulyo" farming group is located in Gambiran Hamlet, Bunder Village, Patuk District, Gunungkidul Regency. This farming group is led by Mr Paryano who is the outstanding cacao farmer in 2017. At first, Prof. Dr. Ir. Supriyanta from Faculty of Agricultural Technology, Universitas Gadjah Mada opened this program by presenting the management of cacao post-harvest and the processing cacao beans to be cacao pasta. Mr Paryanto then continued with giving motivation speech to the participants to strengthen the role of farming group. Gambiran Hamlet can produce chocolate products called "Gun-Kid" because of cohesive farming group. The women then were invited to learn the processing of cacao beans to be chocolate pasta in the Mr Paryanto's kitchen.



Figure 3. Comparative study in "Sari Mulyo" farming group

The second location of comparative study is "Rumah Cokelat Nglanggeran" located in Nglanggeran Village, Patuk District, Gunungkidul Regency. It is managed by women community called KUBE PURBA RASA (Kelompok Usaha Bersama Purba *Rasa*) which was developed by Department of Industry and Commerce of Gunungkidul Regency on 25 October 2015. In 2011, this community got the assistance from CSR Program of Bank Indonesia (BI) to improve the products. Nowadays, we can meet various products in Griva Cokelat Nglageran, such as instant beverages (Chocomix, Chocomix-Classic, Chocomix-FFEE, Chocomix-Tawa, Chocomix-Ice); chocolate bar (Chocomix-Bar, Chocomix-Coconut Milk Praline, Chocomix-Peanut Milk Praline, Chocomix-Dodol Milk Praline); chocolate powder; dodol cokelat (sweet sticky toffee-like candy); and salut pisang cokelat (banana covered by chocolate). Here, the women of Nglengkong Hamlet were learned to make dodol cokelat as a product of processed cacao beans. Dodol cokelat is the simplest product taught in Griya Cokelat Nglanggeran because using the tools and materials which can be found easily in traditional markets.

The community of those two locations successfully engage the member to work together for achieving the common interest. By conducting comparative study in there, the women farming group can learn not only post-harvest of cacao and the products of processed cacao bean, but also the important of farming group in running the agricultural activities from cultivation to marketing.



Figure 4. Comparative study in "Griya Cokelat Nglanggeran"

4. The Importance of Empowering Women through Farming Group

Women farming group is formed finally not only to support the cacao farming activities especially in marketing or processing postharvest of cacao beans, but also to support the development of agricultural sector in Nglengkong District. The activities of women farming group will be evolved with the assistance from agricultural extension agents who will bring various programs. Based on potency mapping, the social activities of women can be source to develop the network as well as market for agricultural products. When women are gathered in a farming group, they can learn and create new products as well as work together to expand the marketing and networking. Women farming group automatically will support the agricultural activities in Nglengkong Hamlet. They can also support household income by selling vegetables, fruits, spices, or livestock which is maintained in their yard. Based on Figure 5, our two year programs have already gained to second level. Women have worked together to frame the article of association (AD/ART), learn the administration of farming group, and improve knowledge and skill in cacao post-harvest through comparative study in "Sari Mulyo" farming group and "Rumah Cokelat Nglanggeran"



Figure 5. The goal of empowering women in agricultural sectore

D. CONCLUSION

Women have potency to support the cacao farming activities. By forming the women farming group, they will have a place to improve knowledge and skill as well as develop network and market for cacao beans. Our community service programs have already facilitated women to gather and establish a women farming group. In order to register the legality of this group, we work together with agricultural extension agents. Although the legal status is on the process, the role of women farming group is able to be felt by the members. The next program for women farming group is the introduction of yard utilization for produce the agricultural product.

E. REFERENCES

- FAO (2018) (http://www.fao.org/faostat/ en/#data) (accessed on 29 October 2018).
- Maruto, Dikto (2015) Permintaan Kakao Global Terus Naik (http:// www.pikiran-rakyat.com/ ekonomi/2015/05/16/327440/ permintaan-kakao-global-terus-naik) (accessed on 2 November 2018).
- Sutarmi, (2018) Pemkab Kulon Progo Kembangkan Kampung Kakao Kalibawang (https://jogja.antaranews. com/berita/352042/pemkab-kulonprogo-kembangkan-kampung-kakaokalibawang) (accessed on 1 November 2018).
- BPS (2016) Produksi Perkebunan Tahun 2016 (https://kulonprogokab.bps.go.id/ dynamictable/ 2017/07/25/120/ produksi-perkebunan-tahun-2016. html) (accessed on 1 November 2018).
- Regulation of Agricultural Ministry No. 67/ Permentan/SM.050/12/2016(http:// perundangan.pertanian.go.id/admin/ file/Permentan%2067-2016%20 Pembinaan%20 Kelembagaan%20 Petani.pdf) (accessed on 5 November 2018)

INFLUENCING CHARACTERISTICS FOR BUYING DECISION AND THE POTENTIAL FOR SUCCESS OF SALAK FRUIT BASED PRODUCTS IN SUPPORTING THE CULINARY TOURISM AT PURWOBINANGUN VILLAGE

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ABSTRACT Purwobinangun is one of the villages located around the tourist area of Mount Merapi. Each family of the villagers on average has 500 salak trees which can produce approximately 10 kg of fresh salak fruit per day. Unfortunately, the selling price of salak fruit is often very cheap, dropping around IDR.1,000, - IDR. 2,000 per kg. Therefore, the housewives of Purwobinangun who get joined in the group of woman farmers (KWT) have set up a number of small-scale industries that produce salak fruit based products with the hope that in the future they will support their village to become a culinary tourism village for salak fruit based products. This research was conducted to find out the characteristics of salak fruit based products which most influence consumers in buying the products and to know the potential for success in selling salak fruit based products. The study was made by conducting market survey, taking 176 respondents who attended the exhibition at the Jakarta Fair 2018, Sleman Expo 2018 and visitors of Merapi Park. The results showed that among the 9 characteristics of salak fruit based products that were measured, Taste, Expiry Date and Halal Information became the main reason for purchasing the products with the percentage responses of 40%, 28% and 10% respectively. Size, Color and Packaging of the products were not the main reason for purchasing consideration. Of the four types of salak fruit based products (Sarisa Salak, Geplak Salak, Dodol Salak and Krupuk Salak) which their performance were compared to those of well-known competing products, only Dodol Salak performed better in terms of consumer preference, price per unit and taste. Therefore, improvements in the characteristics of salak fruit based products still need to be conducted in order to increase the attractiveness of Mount Merapi tourists as their target of consumers.

Keywords Salak, Purwobinangun, Merapi, KWT, Yogyakarta

A. INTRODUCTION

Purwobinangun is one of the villages located around the tourist area of Mount Merapi. Each family of the villagers on average has 500 salak trees which can produce approximately 10 kg of fresh salak fruit per day. Unfortunately, the selling price of salak fruit is often very cheap, dropping around IDR.1,000, - IDR. 2,000 per kg. Therefore, the housewives of Purwobinangun who get joined in the group of woman farmers (KWT) have set up a number of small-scale industries that produce salak fruit based products with the hope that in the future they will support their village to become a culinary tourism village for salak fruit based products.

They have already marketed their products either through stalls and shops at the surrounding areas or through the Ramadhan afternoon market activities at the Gapoktan stall. Nevertheless, members of KWT still feel that the salak fruit based products they sell are still not well received by the market.

Based on the preliminary survey, it is believed that marketing of salak fruit based products is a major problem in the KWT Purwobinangun association. The solution to this marketing problem is not solved by improving the ability to make products but must begin by understanding the needs of their consumers. Market does not always want good quality or cheap price of products, but wants products that have quality characteristics that comply with the characteristics of their customers. In order to make the salak fruit based products of KWT Purwobinangun association be accepted by consumers as a superior product in culinary tourism around Mount Merapi, an assessment/ evaluation of existing products

needs to be carried out. This study aims to determine the quality characteristics of salak fruit based products required by consumers and to determine its potential success in supporting culinary tourism programs in Purwobinangun village, Sleman, Yogyakarta.

B. LITERATURE REVIEW

In general, small-scale industry development programs always require different ways when compared to those of large industry development. This is due to constraints related to the source of capital and limited human resources. In addition, the development of small-scale industries can also take advantage of the existing tourism potential in the surrounding area. (Saroyo et.al, 2015) explains that in general the main attraction of a tourism place is the natural condition of the area itself. However, other factors such as accessibility, cleanliness, availability of playgrounds, shopping areas, toilets, place for worships, parkings, security and hospitality of tourism service providers can also increase tourist attraction.

Small-scale industry development in principle can utilize the existing tourism potential. Small-scale industries that produce food can be developed as a supporting industry for culinary tourism, considering that according to Green et al. (2009), culinary tourism is an effort to combine unique and memorable eating and drinking experiences with experiences during travel. Therefore, the emphasis on product uniqueness and the authenticity of the products produced will also attract consumers (Wijaya et al, 2016).

One of the things that needs to be developed especially by the growing small-scale

industries is the marketing aspect. According to Peter Drucker quoted by (Kotler and Keller, 2016), marketing is not just a way or art of selling goods that have been made or owned. The ultimate goal of marketing is to make consumers want to buy products offered through an understanding of consumer behavior itself. Marketing efforts must involve consumers and produce profitable relationships (Kotler et.al, 2018). According to (Burger et al., 2011), besides following Maslow's Hierarchy of needs, consumer behavior is also influenced by Friends, Culture, Media, Economic Upbringing, Environment, Role Models, Influences of certain Groups. In principle, in order to make the marketing effort be conducted successfully, the effort to find out what is required by consumers, both articulated and hidden, must be identified and transformed into the characteristics of the quality of products desired by consumers.

C. METHOD, DATA AND ANALYSIS

This research was conducted to find out the characteristics of salak fruit based products which most influence consumers in buying the products and to know the potential for success in selling salak fruit based products. The study was made by conducting market survey, involving 176 respondents who attended the exhibition at the Jakarta Fair 2018, Sleman Expo 2018 and visitors of Merapi Park. Most of the respondents were women (64%), working in private sectors/ entrepreneurs/non-government employee (85%) and had disposable incomes of less than IDR 5 million (93%). The respondents were required to give response or opinion about

the quality characteristics of salak fruit based products that were deemed to be important in determining their buying decisions. The quality characteristics consisted of Color, Size, Texture, Shape, Packaging, Expiry Date Information, Halal Information, Taste, and Nutrition information. The importance level of a quality characteristic was measured on the basis of percentage of respondents who considered it significant in affecting them to buy the products. In order to evaluate the performance, four different types of salak fruit based products were also selected and their performances were compared with non-salak fruit based products that have established in the market.

D. RESULT AND DISCUSSION

Based on the results of the research to find out the characteristics of salak fruit based products which most influence consumers in buying the products, it can be seen that in determining the level of acceptance of salak fruit based products being offered to them, consumers were considering or prioritizing Taste (with a level priority of 40%), followed by Information on Expiration Dates (28%) and Halal Information (10%), Other quality characteristics were not the main factors for determining whether or not they would purchase salak fruit based products being offered.

Of the 7 salak fruit based products surveyed, namely Sarisa Salak Merapi, Dodol Sarisa Salak, Geplak Salak, Dodol Salak 2S, Krupuk Salak, Wajik Salak and Stik Salak Olsa, only Krupuk Salak, Geplak Salak, Dodol Salak 2S and Stik salak Olsa had a problem of Taste (with score below 3 or not acceptable). With regard to product's Expiration Information, almost all the products were acceptable since they have included such information except for Krupuk Salak. In terms of Halal Information, only products of KWT Kemiri Edum that fulfilled the requirement i.e. Sarisa Salak and Dodol Salak Sarisa. To further analyze the performance of salak fruit based products in the market, four types of products were compared to wellknown similar products (no-salak fruit based products) that already have stable market shares.

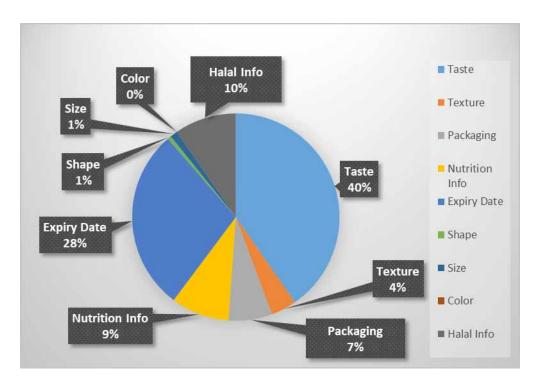


Figure 1. Importance level of quality characterisrics of Salak fruit based products

Sarisa Salak was compared to Carica Papaya from Wonosobo. Geplak salak product was compared to Geplak gula jawa 35 bu Tini (Coconut Sugar based Geplak). Dodol salak product was compared with Dodol/Jenang Mubarok and Kerupuk salak was compared to Kerupuk Tahu Harapan. The example of comparison results can be seen in the following figures (score 0 is the worst, 10 is the best).

Based on Figure 2 above, Sarisa Salak's performance when compared to the Carica Papaya was not better. Of the nine characteristics that were asked, it turned out that Sarisa Salak only outperformed Carica Papaya on its packaging. In terms of Taste, Shape, Sweetness, Hardness, Size, and Color, Carica Papaya was still considered better.

For Geplak Salak products, its performance can be said to be almost the same as Geplak Coconut Sugar. Although on overall consumers preferred Coconut Sugar based Geplak, Geplak Salak had few advantages in terms of shape, size, color and packaging.

Interesting things were found in comparing Dodol Salak with Dodol/Jenang Mubarok. Salak Dodol turned out to have advantages in terms of Price per unit, Taste and Overall likeness. This showed that Dodol Salak has the potential to be developed better.

Different from those 3 other products, the performance of For Kerupuk Salak still required a lot of improvement. This product only excelled in its shape, hardness and packaging.

From the other characteristics 's point of view, it turned out that the competitor's performance (Kerupuk Tahu Harapan) was still better.





Figure 2. (a) Dodol Salak vs jenang Mubarok and (b) Sarisa Salak vs Carica Papaya

E. CONCLUSION

From the results of the research in can be concluded that the members of the group of woman farmers (KWT) who produce salak fruit based products manage their small-scale industries on the basis of production orientation, instead of market orientation. They produce their products based on their ability to make products, without considering quality characteristics of salak fruit based products that consumers want. As a result, their products are not well accepted by the market. It is true that on overall, their products need lots of improvements. Nevertheless, in order to effectively conduct development program in supporting the small-scale industries in Purwobinangun that produce salak fruit based products, the first step to conduct is not to improve the production technology or management. Instead, giving education to the owners for understanding consumers and develop market opportunity would be the appropriate one.

F. REFERENCES

- Green.G.P and Michael Dougherty. (2009). Localizing Linkages for Food and Tourism: Culinary Tourism as a Community Development Strategy. Journal of the Community Development Society. Community Development Society. Vol. 39 no.3. pp 148-158
- Philip Kotler and Kevin Lane Keller. (2016). Marketing Management, 15th Global Ed. Pearson Education Limited
- Philip Kotler and Gary Armstrong. (2018). Principles of Marketing. 17th Global Edition. Pearson Education Limited.

- R. Burger, S.Els, J. Riekert, F. Rutaha. (2011). Consumer Behavior. NQF Level 4. Student's Book. Troupant Publisher. Mc Millan.
- Saroyo. Pujo and Guntarti T.M. (2015). Analysis of Prospect of Agrotourism Attractivenessbased on Location Characteristics.pp.72-77. International Conference on Agroindustry: Sustainable and Competitive Agro-industry for Human Welfare. Agriculture and Agricultural Science Procedia. Volume3. Elsevier.
- Wijaya, Serli., Alison Morrison, Thu-Huong Nguyen, Brian King. (2016).
 Exploration of Culinary Tourism in Indonesia: What Do the International Visitors Expect?. Asia Tourism Forum 2016. The 12th Biennial Conference of Hospitality and Tourism Industry in Asia (ATF 16). Published by Atlantis Press. Pp 0374-0379.

ANALYSIS TREND OF LANDUSE CHANGE AND SETTLEMENT DISTRIBUTION TO ASSES LAND PRIORITY MANAGEMENT USING SPASIAL DISTRIBUTION ANALYSIS

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ABSTRACT Kebumen Regency is one of the regions in Province of Central Java. Overall, the population of Kebumen Regency tends to decline every year. This dynamic population condition can also changes land use trends. Based on this background, identification of trends in land use change is quite interesting to study which aims to facilitate land use planning for stakeholders in the relevant region. The objectives of the study include (1) analyzing the dynamics of the population of Kebumen Regency, (2) analyzing the pattern of land use change, and (3) analyzing population pressure on agricultural land. Image interpretation through GIS information systems (GIS) can be done to identify land use changes. Analysis of changes in land use / land cover through GIS can be done by creating a matrix of land use / land cover changes. The results showed that (1) Kebumen Subdistrict is an area with the highest population among other sub-districts and always has population growth during that period, (2) Mixed gardens each year tend to have a decrease in area quantity, while settlements and rice fields have an increase. Settlement patterns in the central part of Kebumen Regency tend to centralize and form a block. These conditions indicate influence of population growth in the area, (3) increase in population and population density in some districts are directly proportional to the level of pressure on agricultural land which is also high.

Keywords Landuse change, Settlement Distribution, Dynamic population, GIS.

A. INTRODUCTION

Kebumen Regency is one of the regions in Province of Central Java, Indonesia, which is astronomically located at 7°27' - 7°50' South Latitude and 109°22' - 109°50'East Longitude. Geographically, Kebumen Regency borders with Banjarnegara and Wonosobo Regencies in the North; Indian Ocean in the South; Cilacap and Banyumas Regencies in the West; and Purworejo Regency in the East. Kebumen Regency consists of 26 Districts, with a total area of 1281, 12 Km². The Smallest District area is Gombong Subdistrict with 19.48 Km2 and has 8% of the total area of Kebumen, while the largest area is Karanggayam with 109.29 km2 or 8.53% of the total area of Kebumen Regency.

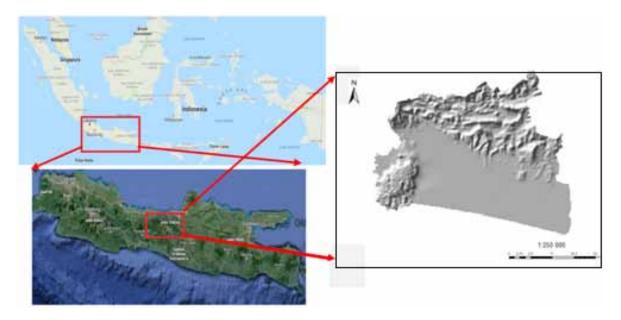


Fig. 1 Administrative Location of Kebumen Regency

Overall, the population of Kebumen Regency tends to decline every year. It was proven in 2005 that the population of Kebumen was 1,212,274 people and decreased in 2017 to 1,192,007. This condition is caused by the habits of several regions, some people used to migrate out of town with economic factors as a main reason [1]. However, if reviewed more specifically, the increase in population also continues to occur in several districts, such as in Gombong, Karanganyar and Kebumen. For example in Kebumen District in 2005 [2] had a population of 120,524 people and became 123,567 in 2017 [3]. This dynamic population condition can also changes land use trends [4].

Based on this background, identification of trends in land use change is quite interesting to study which aims to facilitate land use planning for stakeholders in the relevant region. Land use change is driven by a combination of socioeconomic, political and biophysical factors, the so-called land use drivers [5]. Furtheremore, main causes of land use change are hypothesized because of population growth, and development of construction activities. Changes in land use also occurs in watersheds close to the center of development growth [6].

Spatial analysis of land use changes can help to produce patterns of land use change over time and see areas that have different spatial dynamics of land use [7][8]. That also can help to develop a safeguard strategy for land availability [9]. The objectives of the study include (1) analyzing the dynamics of the population of Kebumen Regency, (2) analyzing the pattern of land use change, and (3) analyzing population pressure on agricultural land. The results of the study will provide information related to the influence of population's dynamics conditions in Kebumen Regency, especially on land use (agricultural land) around it which is further used as a basis for assessment to determine the level of land priority of each region in conducting proper management

B. The Material and Method

Image interpretation through GIS information systems (GIS) can be done to identify land use changes that can be integrated with spatial information. Analysis of changes in land use / land cover through GIS can be done by creating a matrix of land use/land cover changes [10]. Matrix of Land cover changes can be seen as major changes occur every year.

Collection data used as a basis for analysis comes from secondary data. These data include DEM data, information on population changes in 2005, 2014 and 2017, administrative area of each sub-district, area of agricultural land in each sub-district, and landuse image of Kebumen Regency in 2006, 2011 and 2016. Each data is further processed to answer each research purposes. Data related to population combined with area is used as basic data to produce population density information [9,10,11]. Furthermore, the number of population every year, 2005-2017 which is elaborated with the area of agricultural land, produces information related to population pressure on agricultural land, and the land use image series is processed to specifically identify the trend of land use change in Kebumen District in several years (2005-2017) and knowing settlement patterns in each sub-district (for more detailed description of the characteristics of the area). The results of each core processing are used to support descriptive analysis of land use changes that are primarily associated with the dynamic conditions of Kebumen population.

Furthermore, the research method used is a mixing method between quantitative and qualitative. Some of the methods used later include

a. Population density

The amount of population density can be counted through the following mathematical formulas

$$PD = NP / A \tag{1}$$

Where :

PD : Population Density

NP : Number of Population

A : Area size

b. Percentage of land use change

The amount of land use change is obtained from the interpretation of the series image (2005-2017). Furthermore, interpretative results of land use change data also identifies a large percentage of the change. The percentage of each land use can be known through the following formula, Percentage of land use change:

wide area of each land use total area of various land uses X 100%

(2)

c. Population pressure on agricultural land

Population pressure on land is a comparison between the total population and the minimum land area to be able to live properly [12,13]. In this model, the population is considered to live only from cultivated agricultural land. The population pressure formula on this model is,

TP = Z X ((f X po (1 + r) t) / L) (3)

Where

Tp = population pressure

- Z = Minimum land area for decent living
- f = Faction (%) of farmers against population

Po=number of population in the beginning of the year

- r = Population growth rate
- t = Duration
- L = total area of agricultural land

d. Minimum Land Size for Decent Life (Z)

The value of Z is obtained by using a formula

(4)

Where

Z = Minimum land area for worth living

- LSI2 = area of irrigated rice fields> 2x / year
- LSI1 = area of irrigated rice fields harvesting 1x / year

LST = the area of rainfed rice fields

LLK = area of dry land

e. Population Growth Rate (r)

The growth rate formula used is a geometric formula, which is mathematically

$$Pt = Po(1 + r)t$$
 (5)

Where

Pt = Total population in year t

Po = number of population in the beginning of the year

r = population growth rate

t = Duration, stated in years.

f. Settlement patterns

the settlement pattern descriptively is produced from the interpretation of the image.

The settlement pattern determines the characteristics of the region, the longitudinal pattern characterizes urban areas and the patterns spread as well as centralize characterize rural areas as well as people living in mountainous areas. Initially, people choose the area for settlements in their areas with their needs and ensure them lives. However, due to the increasing population growth and economic limitation for people to choose places to live, it results unsuitable areas that are their residence [14,15,16].

C. Results and Discussion

1. Condition Dynamics of Kebumen Regency's Population

Population dynamics in each district of Kebumen tend to vary. Periodically, there are several conditions in the population in each region, there are areas that tend to experience a decline, fluctuations and also experience an increase in population. The discussion is only focused on the condition of the region that has increased population. The background of it is an increasing population is hypothesized to affect changes in land use patterns, it will also affect the increasing pressure on land, especially on food crops, namely rice fields.

Based on the bar diagram related to the periodic population in 2005-2017 shows that Kebumen Subdistrict is an area with the highest population among other subdistricts and always has population growth during that period. Gombong and Petanahan are sub-districts with regional categories designated as urban residential areas [13] which subsequently also have an increase in the population in that period. This condition certainly occurs as general, an area that is an urban area also tends to be the center of the economy, government, education and other strategic activities. Thus it produces a pulling factor [14] for people around the area.

Same with Kebumen District, the area is the capital of Kebumen Regency which is the center of government, economy and education. Thus the existence of these conditions certainly affects various portions of each land use.

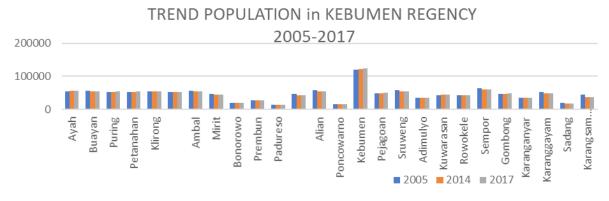
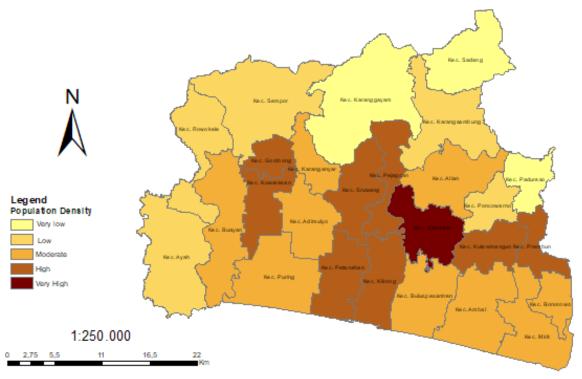


Fig. 2 the Pattern of Population in Kebumen Regency

Furthermore, an analysis of population growth can be strengthened through the results of calculating trends in population density. The mapping results on population density indicate that Kebumen District has the largest density compared to other regions. The presence of new migrants from other areas around the sub-district is indicated to be the cause of the high population density

in Kebumen District. Thus, these conditions have an impact on the pressure on the land, because the character of the land area that tends to be static. Pressure on land as a result of an increase in population density can be in the form of building new buildings such as buildings or settlements or other uses which are predicted to produce economic benefits.



AVERAGE POPULATION DENSITY IN KEBUMEN REGENCY 2005-2016

Fig. 3 Spatial Distribution of the average population pressure of Kebumen Regency

More specifically, the characteristics of population density can also be reviewed through the mean in the period 2005-2017. Based on the calculation results of the average population density, it is known that Kebumen and Gombong sub-districts also always have an increasing population density. Thus the condition is relevant to the average distribution of population density, namely categorizing Kebumen District as an area with very high population pressure, while Gombong District is categorized with high population pressure.

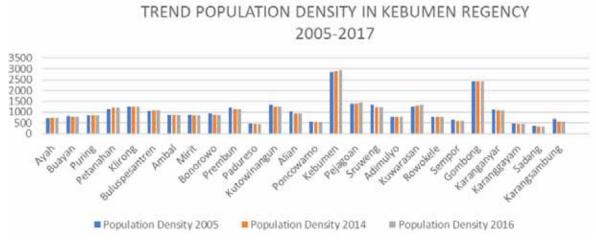


Fig. 4 Pattern of population pressure in Kebumen Regency

2. Trend of land use change in Kebumen Regency

The pattern of land use change can be identified through delineation of land use

series in an area. The results of identification of land use changes in 2006, 2011 and 2016 in Kebumen Regency are presented as follows,

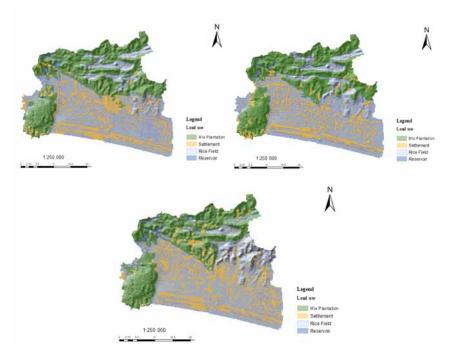
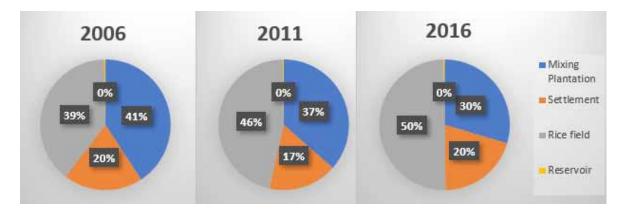


Fig. 5 land use change in 2006, 2011, 2017



Fig. 6 Fluctuations in land use change in Kebumen Regency



Picture 7 Presentation between Kebumen District land use

Based on identification result of land use in series, it can be known the trend of land use changes every year. Mixed gardens each year tend to have a decrease in area quantity, while settlements and rice fields have an increase. This condition further strengthens the fact that there is an influence between an increase in the number of population which in turn has an impact on the increase in the number of settlements and further impacts on land conversion, namely gardens. There is a decrease in the area of the garden every year, maybe in several things, those are converted gardens into rice fields or converted into settlements and other buildings.

Identification related to the relationship of population growth with the needs of land designated as settlements, one of which can be approached through an analysis of the distribution patterns of residential settlements. Based on delineation result of land use as a settlement in series, it shows that settlement distribution tends to increase and is concentrated in the central part of Kebumen Regency, compared to the other side. This condition is certainly influenced by several factors, among physical factors in the form of geomorphological aspects that tend to be slope and flat, making it easier for all access. Other conditions that also support the geographical location are also strategic, so that both conditions attract the community to then live around the area. There is a centralized settlement pattern, spreads and also extends (linearly) following roads, rivers and beaches

The analysis result of settlement patterns found in Kebumen Regency can also be used to further strengthen the pattern of land use change due to population growth. Settlement patterns in the central part of Kebumen Regency tend to centralize and form a block. These conditions indicate a possibility, that in previous conditions the settlement pattern was still linear following the road or river, but with the influence of population growth in the area, it was possible to convert the land into settlements, and eventually the demand for the settlement also increased, resulting in availability of land also increasingly limited. Thus other alternatives can be chosen, namely establishing settlements with limited land even though they do not meet the criteria of a decent living community, thus forming a pattern of settlements that seem to centralize and form large blocks.

A little bit different from settlement blocks in the central part of Kebumen Regency, settlement patterns in coastal areas are more linear (longitudinal) and seem parallel to the coastline. These conditions certainly occur because the land area is still large so that it is possible to build settlements linearly. The existence of settlements around the coast also shows that the area is developing, especially in terms of the economy in the agricultural and tourism sectors. Generally, people who live around the coast also have links with their work, such as fishermen, pond owners, coastal farmers and service providers to support coastal tourism. Settlement patterns in hilly areas such as Karanggayam Subdistrict, Karag Sub-District, Sempor Subdistrict are clustered and spread. This condition is the same as the pattern in general which represents settlement patterns in hilly or mountainous areas. This condition is due to the fact that the topography in the area certainly has more varieties (not flat), thus the community indirectly forms a settlement block that is considered to have sufficient strategic and environmental conditions that can support their lives.

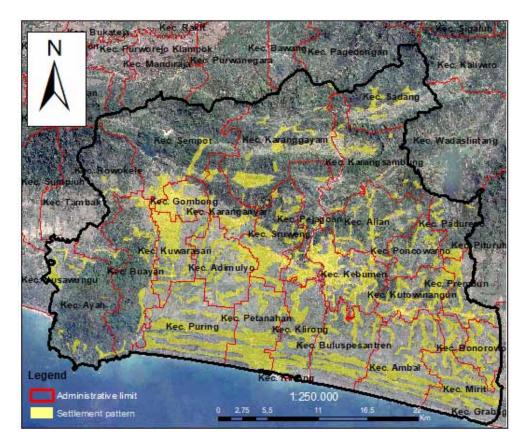


Fig. 8 Population Settlement Pattern of Kebumen Regency

Furthermore, if reviewed on a district scale, the graph shows that there is no population pressure on agricultural land. This condition is proven by the increase in the amount of rice fields along with the increase in the area of settlement in each year. This condition is possible because of the increasing number of people who own and manage agricultural land (rice fields). Nevertheless, these conditions need to be reviewed through identification of population pressure on agricultural land at the scale of each district, to get more detailed results.

3. Population Pressure on Agricultural Land

Whether there is an influence of population growth or not on agricultural land pressures, it can be more specifically proven through the calculation of population pressure on agricultural land. The results show that an increase in population and population density in some districts, such as Kebumen and Gombong sub-districts are directly proportional to the level of pressure on agricultural land which is also high. Thus it can be concluded that there is a significant influence between population growth on agricultural land conversion. Increased population pressure has led to a paradigm shift in shifting cultivation into continuous cultivation in Kalimantan in general. This perception then develops into the application of massive land conversion to meet the needs of the population. The existence of this increasing population is certainly also possible to increase the need for land, namely for residential land, economic use and other supporting land uses.

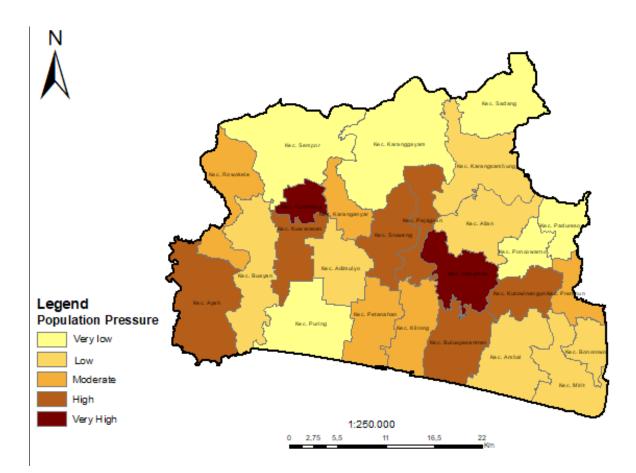


Fig. 9 Distribution of Level of Population Pressure on Agricultural Land

Based on comprehensive identification results related to population conditions which include increasing population numbers and densities that are elaborated with patterns of land use change and also pressure on agricultural land, then it can be determined in areas that are prioritized to optimize management of the availability of land in it. Management can be done through various policies from the Kebumen Regency government, such as regulations governing new buildings, determining the ideal portion of land use and other more. These efforts need to be carried out from now foe anticipation of future conditions, which are increasing population and later it can be more difficult to control, as has happened in other areas, such as Jakarta, Surabaya, Semarang and others.

D. Conclusion

Kebumen Subdistrict is an area with the highest population among other subdistricts and always has population growth during that period. Furthermore, Mixed gardens each year tend to have a decrease in area quantity, while settlements and rice fields have an increase. Settlement patterns in the central part of Kebumen Regency tend to centralize and form a block. These conditions indicate influence of population growth in the area. Increase in population and population density in some districts are directly proportional to the level of pressure on agricultural land which is also high. Based on comprehensive identification results related to population conditions which include increasing population numbers and densities that are elaborated with patterns of land use change and also pressure on agricultural land, then it can be determined in areas that are prioritized to optimize management of the availability of land in it.

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F. References

- Benjamin Neimark, Camilla Toulmin & Simon Batterbury, "Peri-urban land grabbing? dilemmas of formalising tenure and land acquisitions around the cities of Bamakoand Ségou, Mali", Journal of Land Use Science, DOI: 10.1080/1747423X. 2018.1499831, 2018.
- BPS, "Kebumen Regency in Figure", Kebumen, Badan Pusat Statistik Kabupaten Kebumen, 2014.
- BPS, "Kebumen Regency in Figure", Kebumen, Badan Pusat Statistik Kabupaten Kebumen, 2018.
- Putri, R.F., Bayuaji, L., Sumantyo, J.T.S., Kuze, H., "Terrasar-X DInSAR for land deformation detection in Jakarta Urban area, Indonesia", Journal of Urban and Environmental Engineering. Vol 7 (2), pp. 195-205. Doi: 10.4090/juee.2013. v7n2.195205, 2013.
- Sitompul, R., Brouwer, R., Sopaheluwakan, J., van Beukering, P., "Farm Household Preferences and Evaluation of Land Use Change Policies for Agro-Forestry Plantations in Central Kalimantan, Indonesia : a Choice Experiment," International Journal on Advanced Science, Engineering and Information Technology, Vol. 6 No. 2, 2016.
- Edwin., Amrizal Saidi., Aprisal., Yulnafatmawita., and Ita Carolita., "Spatial and Temporal Analysis of Land Use Change for 11 years (2004-2014) in Sub-Watershed Sumpur Singkarak," International Journal on Advanced Science, Engineering and Information Technology, Vol. 5 No. 5, 2015.

- Marcio Roberto da Silva Melo, Jansle Vieira Rocha, Victor Danilo Manabe & Rubens Augusto Camargo Lamparelli, "Intensity of land use changes in a sugarcane expansion region, Brazil", Journal of Land Use Science, DOI: 10.1080/1747423X. 2018.1499829, 2018.
- Putri, R.F., Wibirama, S., Giyarsih, S.R., "Population condition analysis of Jakarta land deformation area", *IOP Conf. Ser.: Earth Environ. Sci.* 148 012007, 2018.
- Putri, R.F., Wibirama, S., Sukamdi, Giarsih, S.R.. 2017. Sand dune conservation assessment in coastal area using alos palsar DInSAR technique. Journal of Urban and Environmental Engineering. Vol 11 (1), pp. 9-29. DOI: 10.4090/ juee.2015.v11n1.9-29.
- Putri, R.F., Wibirama, S., Sri Sumantyo, J., and Kuze, H. (2013) Monitoring and Analysis Landslide Hazard using DInSAR Technique Observed with ALOS PALSAR: Study Case Kayangan Catchment Area, Yogyakarta, Indonesia. Journal of Urban and Environmental Engineering, Vol 7, Number 2, pp. 308-322.
- Sri Sumantyo, J.T., Shimada, M., Mathieu, P.-P., Sartohadi, J., Putri, R.F. 2011. Dinsar technique for retrieving the volume of volcanic materials erupted by Merapi volcano. International Geoscience and Remote Sensing Symposium (IGARSS) 6351299, IEEE International Geoscience and Remote Sensing Symposium. (Dynamics of Earth Processes and Climate Change: Geosphere Session, TU1.14: DInSAR Applications, pp. 1302-1305.
- Rafiuddin., Widiatmaka., Munibah, K., "Land Use Change Pattern and the Balance of Food Production in Karawang District", J. Il. Tan. Lingk., 18 (1).p. 15-20, 2016.

- Edwin and Yuzirwan, "Evaluation of Land Use Change in the District Dharmasraya", International Journal on Advanced Science, Engineering and Information Technology, Vol. 6 No.1, 2016.
- Soemarwoto, O., *"Ekologi, Lingkungan Hidup dan Pembangunan"*, Bandung: Djambatan, 1983.
- Pigawati., N, Yuliastuti., and F, H, Mardiansjah., "The Settlements Growth in Mijen District, Suburb of Semarang," IOP Conf. Series: Earth and Environmental Science 123 012034, 2018.
- Bappeda., "Peraturan Daerah Kabupaten kebumen Nomor 23 Tahun 2012: Rencana Tata Ruang Wilayah Kabupaten Kebumen Tahun 2011-2031", Bappeda Kebumen, 2012.

BUSINESS MODEL CANVAS (BMC) AMONG HOME INDUSTRIES IN KULON PROGO REGENCY

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ABSTRACT Business model is a system of resources and activities, which create a value that is useful to the customer and the sale of this value makes money for the company. The purpose of the analysis of business models is to deepen and broaden the knowledge about basic components of a business model. The Business Model Canvas (BMC) is a tool that provides a clear view of what the company needs to achieve and focuses on the strategic elements that matter most and will have the greatest impact to the business. This paper discuss about BMC among home industries in Kulon Progo Regency, based on their products: "pong" tofu, white tofu, traditional snacks, various kind of "peyek", dan various kind of tempeh (soybean, "gembus", and "benguk"). These five home industries compared among the nine building blocks in the BMC: customer segments, customer relationships, distribution channels, value proposition, key resources, key activities, partners, cost structure and revenue streams. BMC helps the home industries in creating their business models based on nine building blocks. Discussion among these home industries in Kulon Progo Regency was being conducted in order to help the entrepreneurs to use these models in the right way, and successfully plan their future business.

Keywords business model, Business Model Canvas (BMC), home industries, snacks

JEL Classification: D1, M2, M3

A. INTRODUCTION

Small Medium Enterprises (SMEs) play an important role for economic growth and social inclusion in Indonesia. Based on data from the Ministry of Co-operatives and SMEs, Indonesian SMEs account for nearly 97% of domestic employment and for 56% of total business investment. SMEs generate jobs and contribute to inclusive economic growth and prosperity of households and communities.

The development of SMEs is pretty rapid. New established businesses appear everywhere;

either it is home industry scale, small and medium-sized businesses. Moreover, the government supports the appearance of these SMEs and a lot of universities also support entrepreneurship. It is proven by the fact that entrepreneurship has included into curriculum study in the universities and it provides chances for the students to make an innovation in creating a business. As a matter of fact, this particular industry scale can be categorized into 4 categories which are home industry, micro industry, secondary industry, and big industry.

Currently, SMEs (including home industry and micro industry) is one of the economic drivers in Indonesia. It is caused by the changing doer of the economy. Now, the SMEs start to dominate the Indonesian economy. The SMEs can stand even in a crisis and critical situation due to the facts that the small business: (1) can produce consumptive goods and services which are truly needed by the society, (2) agent utilizes local resources surround the business location, either the human resources, capital, material or production tools, (3) relies its capital from the personal budget.

However, there are many SMEs gone bankrupt because they cannot compete with the competitor. With the particular competition, it will definitely cause a negative impact because the secondary or big industries have various superiorities that the SMEs don't such as brand of the product owned, trained human resources, better and strategic business location, proper tools and big amount of capital. SMEs encounter many obstacles that prohibit their growth and even threaten their survival. The factors attributed to business success have always been varied and complex and increasingly becoming critical is the role of decision making process and ongoing strategy (Hansen & Hamilton, 2011).

Small business owners lack managerial skill and technical skills to operate their businesses effectively. The perceptions of the small business owners are that the managerial skills they possess, and those that they preferably should have, do not correlate (Scheers & Radipere, 2005). Therefore, small business must have a strategy in facing those competitions, either the competition among the Small Businesses or among the secondary and big ones.

Some common problems in SMEs are marketing, production and finance. In fact, some SMEs have not had their own brand in sales. Production is still done manually and lack of manpower. During this time, the number of weekly production, inventory taking, and total sales were never recorded by SMEs. These become problems because SMEs cannot calculate a total capacity of production and the balance between sales schemes and production. Another major problem is that SMEs often faced financial problems both venture capital and financial bookkeeping.

Due to fast changing external factors, there is an increasing urge for SMEs to innovate their business model to sustain a fit with their business environment. The problem formulation is how SMEs can overcome their lack of managerial and technical skills by business model innovation? This study is aimed to evaluate the business strategy implementation and recommend business model innovations for SMEs especially in food and snacks home industry.

B. LITERATURE REVIEW

So far, people have argued that small business businesses do not need a strategy to improve performance and face competitors, it is important to have sufficient capital and a good business location. But with the increasing number of competitors, it is necessary a strategy that has the ability to improve the performance of this business. The term business model comes from the financial journalist Michael Lewis, who in his articles predicted that future companies will be based on business models connected only with the Internet. Several authors define a business model as a system for making money. In their opinion, business model is an economic concept, which produces revenues and costs. It is a set of activities, which create profit due to the cooperation of processes and technologies. Definitions of authors, who see the business model as the economic concept, are presented in Tab. 1.

Author	Definition		
Allan Afuah	"Business model is a framework for making money. It is the set of activities which a firm performs, how it performs them and when it performs them so as to offer its customers benefits they want and to earn a profit." (Afuah, 2003)		
Henry Chesbrough	"The business model is a useful framework to link ideas and technologies to economic outcomes." (Chesbrough, 2006)		
Don Debelak	"A business model is the instrument by which a business intends to generate revenue and profits. It is a summary of how a company means to serve its employees and customers and involves both strategy as well as an implementation." (Debelak, 2006)		
Alfonso Ganbardella, Anita McGahan	"Business model is a mechanism for transformation ideas to revenues through the acceptable costs." (Fuller & Morgan, 2010)		
Thomas Wheelen, David Hunger	"Business model is a method for making money in the concrete business environment. It is consisted of key structural and operational characteristics of company – how company earn and create profit." (Wheelen & Hunger, 2008)		

Table 1. Economic Business Model

Purely economic view of the business model does not represent a complex view on the company. The business model should (except of production revenues and costs) capture also the other side of the business and it is creating value. The definitions in Tab. 2 present opinions, which see business model as a combination of economic and value view.

Autor	Definition	
David Watson	"A business model describes operations of company, including all of its components, functions and processes, which result in costs for itself and value for customer." (Watson, 2005)	
David J. Teece	"Business model defines how a company provide value to customer and transfer payments to profit." (Teece, 2010)	
Joan Magretta	"Business models are, at heart, stories that explain how enterprises work. Like a good story, a robust business model contains precisely delineated characters, plausible motivations and a plot that turns on an insight about value. It answers certain questions: Who is the customer? How do we make money? What underlying economic logic explains how we can deliver value to customers at an appropriate cost?" (Magretta, 2010)	
Alexander Osterwalder, Yves Pigneur	"A business model describes the logic of how an organization creates, delivers and control value and how money are earned in a company." (Osterwalder & Pigneur, 2009)	
Štefan Slávik	"The business model is a machine for making money, but money is important not only to produce but also to appropriate. Business model visualizes company as a place of decisions and consequences, it is a group of resources and activities in the varying degrees of detail and operational view, which result and serve to offer value to customer." (Slávik, 2011)	

Table 2. Economic and Value Business Model

Business model is a system of resources and activities, which create a value that is useful to the customer and the sale of this value makes money for the company. The purpose of the analysis of business models is to deepen and broaden the knowledge about basic components of a business model. We see the importance of this aim in improving the functionality and economy of the business models, and in discovering and developing competitive advantage, which can be detected by the companies themselves (Slávik, 2011).

Concept of authors Osterwalder and Yves, called Canvas (2009), defines business model using nine components: customer segments, customer relationships, distribution channels, value proposition, key resources, key activities, partners, cost structure and revenue streams. Canvas is a powerful visualization tool and clearly shows all the components and their interconnections.

BMC (Business Model Canvas) consists of nine basic components of a business model. Instead of simply having them in a row, they are put on a canvas so the visualization of the different issues' relation is improved. That helps the user to map, discuss, design and invent new business models. The whole thing can basically be divided in the product on the left side and the market on the right, while the value proposition is obviously divided in half (Maurya, 2010). On the very right we have the 'Customer Segments', all the people or organizations for which you are creating value, including simple users as well as paying customers. For each of the segments we have a specific 'Value Proposition', all the bundles of products and services which create value for your

customers. The 'Channels' describes through which touch points you are interacting with your customers and delivering value, while the 'Customer Relationships' outlines the type of relationship you are establishing with your customer.

Closingtherightpartofthe canvas, the 'Revenue Streams' makes clear how and through which pricing mechanisms your business model is capturing value. Indispensable assets of your business are shown in the 'Key Resources' on the left directly under the 'Key Activities', the things you need to perform well. 'Key Partners' are all those who help you leveraging your business model, since you will not own all key resources nor perform all key activities yourself. And with understanding your business' infrastructure, you will get an idea of its 'Cost Structure'.

For one, the simple visual structure of the BMC and the few number of descriptions (9 in total) make the BMC visually appealing. Also, the BMC's usefulness in mapping and innovating on business systems make it valuable. Consequently, the BMC is being rapidly adopted (King, 2010).

Customer segments are defined by five types of market: mass, segmented, niche, diversified and multi-sided. Mass market represents a large group of customers with similar needs and prob- lems. Segmented type divides customers into groups based on the same characteristics. There are the products and services tailored to the customer in niche markets. Diversified markets are located in two or more industries with different needs and problems. Multisided type uses interdependent segments and connects them (provider of credit cards VISA creates a relationship between three groups banks, cardholders and merchants). The ground of the business is creation of a primary value, which is defined in the mission of the company and describes the core product or service that the firm sells to the customer. The company adds to primary value also "extra value" (or group of extra values) called value added, which increases a sense of the product or service for a customer.

Companies, which are deciding about **distribution channels**, can choose between selling through its own sales network (direct sales: store, salesman, website, application in smartphones) or outsource the sale (indirect: intermediator).

Standard relationship with customers is personal assistance, which is based on human interaction. Customer communicates directly with the salesman during the whole sale process. Modification of this type is dedicated personal assistance, when client has got the only agent, who takes care of him. In self-service type, the company has no contact with the customer, and just provides the service or product. Automated services connect sophisticated customer service with automated processes (internet) and use CRM system that recognizes client and can recommend him the suitable product or service. Enterprises are increasingly using communities to improve connections with customers. This type of relationship provides free quality database of observations directly from the customer. The modern type of relationship is co-creation, which makes relationship beyond the standard and client becomes co-creator of product or service.

A component revenue stream describes cash flows. Among the most used, authors include the sale of goods and services. Rental and leasing generate income from the providing exclusive rights to use certain assets. Licensing generates money from giving customers permission to use protected intellectual property in exchange for licensing fees. Brokers earn from each deal. Advertising generates revenue from providing medial areas.

Key resources include tangible resources (production facilities, buildings, vehicles, and equipment) and intellectual resources (brand, knowledge, patents, copyrights, partnerships, customer databases and human resources - staff and managers). Key activities describe the most important activities involved in value creating. It can be production, delivery of product, designing, marketing, selling.

A component key partner describes the most important companies, authority or people cooperating with the company. Optimization and economies of scale lead to partnerships that serve for cost reducing. Sharing of know-how, finance or technology motivates companies to join the activities in a partnership. An example is the Blue-ray technology, which was developed by a group of the world's leading manufacturers of electronic, and after research and development they started to sell their Blue-ray products individually. Acquisition of resources and activities also encourages companies to search for partners, because companies do not own all the necessary resources or do not execute all the necessary activities for their business. For example, insurance companies have brokers who sale products and insurance company can deal with the core business. Costs represent a monetary award of production.

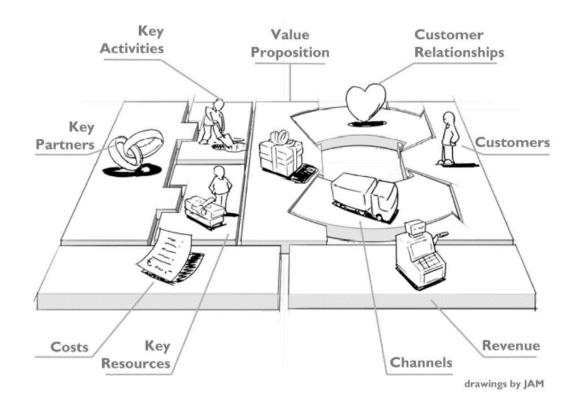


Figure 1. Business Model Canvas – The Basic Model

Source: http://www.zebramc.com/tag/business-model-canvas/

C. METHOD, DATA, AND ANALYSIS

This research using case study in various kind of food and snack home industries. This method provides an opportunity to see more sides of home industries as small and medium enterprises (SMEs), so there will be many strategies that can be used to improve performance so that business can grow. This data collection uses three methods, namely interview, observation and literature study.

The data used were collected through in-depth interviews on several types of home industries. Interviews were made to business owners, as they are aware of the business being run. In these home industries, business owners are also conducted as employees who held day-today operational activities. Table 3 describes the type of home industries interviewed.

Table 3. Respondents based on Type of Business Commodities

Organization	Type Business	
1	"pong" tofu	
2	white tofu	
3	traditional snacks	
4	various kind of "peyek"	
5	various kind of tempeh (soybean, "gembus", and "benguk")	

After completion of the data collection process, the results of the interview will be analyzed, if in this analysis additional clarification is required, additional interviews will be redone. The results of the analysis will then be adjusted to the review literature. The results of the overall analysis will be included in the business model canvas.

D. RESULT AND DISCUSSION

Business model canvas is an excellent way to review business management strategy and reveal the visual ideas describing a home industry's value proposition, customers, infrastructure and finances.

1. Customer Segment:

Customer segment is a dividing a company's customers into groups relevant to a particular business. Without client or customers, consulting companies could not survive any longer. Food and snacks home industries in Kulon Progo serve for wide customers.

Home Industry	Commodities	Customer Segment
1	"pong" tofu	 a. Restaurant b. Street vendor ("angkringan") c. Meat ball seller
2	white tofu	all segments
3	traditional snacks	a. Students b. Household members
4	various kind of "peyek"	a. Food stalls b. Factory and office labors c. Tourists
5	various kind of tempeh	 a. Mobile vegetable sellers b. Fried food sellers c. Housewives

2. Value Proposition:

Products offered by food and snacks home industries in Kulon Progo have not brought the value out yet. Only white tofu home industry owner has creating the value of their product as pure white tofu made by soybeans.

Home Industry	Commodities	Value Proposition
1	"pong" tofu	"pong" tofu
2	white tofu	pure white tofu from soybeans
3	traditional snacks	Various of traditional snacks: "molen", donuts, "dadar gulung", "arem- arem", "onde-onde"
4	various kind of "peyek"	Various kind of crunchy delicious tasteful "peyek"
5	various kind of tempeh	Various kind of tempeh: soybean, "gembus", and "benguk"

All of the home industries only have expertise on experience, not yet on knowledge and technology that will benefit their clients need.

3. Channels

Channels will describe on how company will communicate or reach client to deliver value proposition using the most effective channel. Food and snacks home industries in Kulon Progo only used offline, not yet online channels to marketing their products. Offline marketing through direct selling and key partnership cost lower and a lot easier for them.

Home Industry	Commodities	Channels
1	"pong" tofu	Direct sales
2	white tofu	Traditional market
3	traditional snacks	Direct sales
4	various kind of "peyek"	a. Direct salesb. Store at grocery store and food stalls
5	various kind of tempeh	a. Direct sales b. Product storage through siblings

4. Customer Relationship

A company should clarify type of customer relationships if they want to establish with each customer segment and it can be from personal to automated relationship. Food and snacks home industries in Kulon Progo provide personal relationship and services required by customers. For maintaining a long term relationship and trust, they usually giving free products and price for minimum order.

Home Industry	Commodities	Customer Relationship
1	"pong" tofu	Free tofu with minimum order
2	white tofu	 a. Hospitality b. Good quality c. Good packaging d. Bonus for minimum order
3	traditional snacks	a. Free 1 snacks for min. 10 ordersb. Special price for wholesale
4	various kind of "peyek"	 a. Delivered by owner b. On time delivery c. Discount for minimum order d. Free ¼ kgs crushed "peyek" per 5 kgs order
5	various kind of tempeh (soybean, "gembus", and "benguk")	Bonus for minimum order

5. Revenue Stream

Revenue stream can indicate cash a company can get from clients and can be either transaction revenue (one-time payments) or recurring revenue (ongoing payments). Food and snacks home industries in Kulon Progo revenue comes from selling main products, and some of waste for livestocks.

Home Industry	Commodities	Revenue Stream
1	"pong" tofu	"pong" tofu sales
2	white tofu	a. White tofu sales b. Solid waste sales
3	traditional snacks	a. Sales at food stalls b. Sales at home
4	various kind of "peyek"	 a. Sales at home b. Sales at traditional market c. Sales at stalls d. Sales at store
5	various kind of tempeh	 a. Sales of soybean tempeh b. Sales of "gembus" tempeh c. Sales of "benguk" tempeh

6. Key Resources:

Key Resources describes the most important assets needed to make a business model works to generate Value Propositions and Revenues. Food and snacks home industries in Kulon Progo usually using family member as workers, not yet hire professional labor. They feel, not having a strong financial structure yet to allow them to employ good workers who are able to serve under the company.

Home Industry	Commodities	Key Resources
1	"pong" tofu	Vehicles
2	white tofu	Owned vehicles
3	traditional snacks	a. Labors b. Processing equipment

various kind	
of "peyek"	 a. Labors b. Processing equipment c. Storage d. Strategic location (near traditional market)
various kind of tempeh	Siblings (careful and accurate)

7. Key Activities

Key activities are the key business activities that a company is going to provide value proposition to the client. Key activities of food and snacks home industries in Kulon Progo are focus on processing and selling.

Home Industry	Commodities	Key Activities
1	"pong" tofu	a. purchasing of raw materials
		b. producing "pong" tofu
		c. packaging d. selling
2	white tofu	a. preparing the raw materials
		 b. processing: 4 hours of submersion, cleaning, grinding, heiling, filtering
		boiling, filtering c. forming
3	traditional snacks	a. Made by whole family:
		b. Purchasing by Mother
		c. Processing by Mother and Father
		d. Delivery by Father

Home Industry	Commodities	Key Activities
4	various kind of "peyek"	 a. purchasing of raw materials (peanut, flour, oil, ingredients) and plastic bags b. Preparing processing equipment (stove, gas, frying pan) c. Packaging d. Selling
		e. Calculating sales report
5	various kind of tempeh	a. purchasing of raw materials (soybean, "benguk", tofu waste)
		b. processing: submersion, boiling, chilling, yeast pouring
		c. packaging

8. Key Partners

Key partnerships are usually formed to reduce costs as company unable to neither own all resources nor perform every activity by themselves. Food and snacks home industries in Kulon Progo partnership with raw material and packaging sellers, and the marketing channels. These key partners indicate that all of food and snack and home industries' strategy have no difference.

Home Industry	Commodities	Key Partners
1	"pong" tofu	a. soybean seller b. plastic bag seller
2	white tofu	a. soybean traderb. raw material sellerc. plastic bag sellerd. fuel seller
3	traditional snacks	a. food stall owner b. factory labors

Home Industry	Commodities	Key Partners
4	various kind of "peyek"	 a. raw materials seller b. family c. store owner d. food stall owner e. plastic bags seller f. factory labors
5	various kind of tempeh	a. soybean seller b. tofu waste seller c. "benguk" seller

9. Cost Structure:

Most companies, including home industry, expect lower cost structure. Therefore cost can be distinguished between cost-driven (focus on minimizing costs wherever possible) and value-driven (focus on value creation).

Food and snacks home industries in Kulon Progo applying low costing strategy in short term. They still focus on minimizing costs wherever possible than focus on value creation.

Home Industry	Commodities	Cost Strucure
1	"pong" tofu	a. raw materialsb. palm oilc. plastic bagsd. fuele. wages
2	white tofu	a. raw materials b. wages
3	traditional snacks	raw materials (butter, flour, oil, sugar, egg, plastics)
4	various kind of "peyek"	 a. raw materials (peanut, flour, coconut, oil, egg) b. delivery (fuel) c. packaging (plastic bags, baskets, jar)

Home Industry	Commodities	Cost Strucure
5	various kind of tempeh (soybean, "gembus", and "benguk")	d. raw materials e. yeast f. plastic bags

E. CONCLUSION

From the description and analysis, the food and snacks home industry in Kulon Progo cases in some ways can fit into the business model canvas. However, still not able to make as neat picture for the companies as recommended by Osterwalders. This may be due to a complex daily business and complex relation to partners and customers at the companies. A conclusion would somewhat say that the BMC, with food and snacks case-studies, is suitable for mapping purposes of current activities, but not suitable as a "paradigm" or framework to follow when outlining strategies for the future.

Each of the nine building blocks can be a starting point. Entrepreneurs should define the most important criteria to reduce the number of ideas that has been expanded earlier. The criteria should be prioritized according to the context of the business including revenue potential, possible customer resistance, and impact on competitive advantage. After the most important criteria are defined, the team should be able to "prototype" few potential business model innovations. This process can be done by using BMC to sketch out and discuss each business model. The Business Model Canvas (BMCs) has a lot of advantages compared to the classic thick business plan that takes a lot of time to be prepared. The BMC is like a tool to guide entrepreneurs thinking in a more systematic through each of the nine building blocks for devising a business strategy that matter most and have the greatest impact on driving business growth. The BMC created are depends on type of the enterprises' business models.

F. IMPLICATION/LIMITATION AND SUGGESTIONS

The SMEs, including home industries play a significant role in the social and economic development especially in developing countries. Realizing the urgency of business model innovation help SMEs sustain and be competitive. The key point of the business model innovation is to gain competitive advantage in industry. An innovative business model can either create a new market or allow a company to create and exploit new opportunities in existing markets. Business Model Canvas tool makes strategy more focused and measurable, because of its comprehensive yet simple map. Home industries need formulating a new value proposition to their customers i.e. brand and design to innovate the business model. Home industries should clarify their business model by understanding and implementing its strengths.

This study limited the scope of business only to food and snacks in Kulon Progo Regency. So that for future research study on SMEs in other home industries and SMEs is interesting to be conducted.

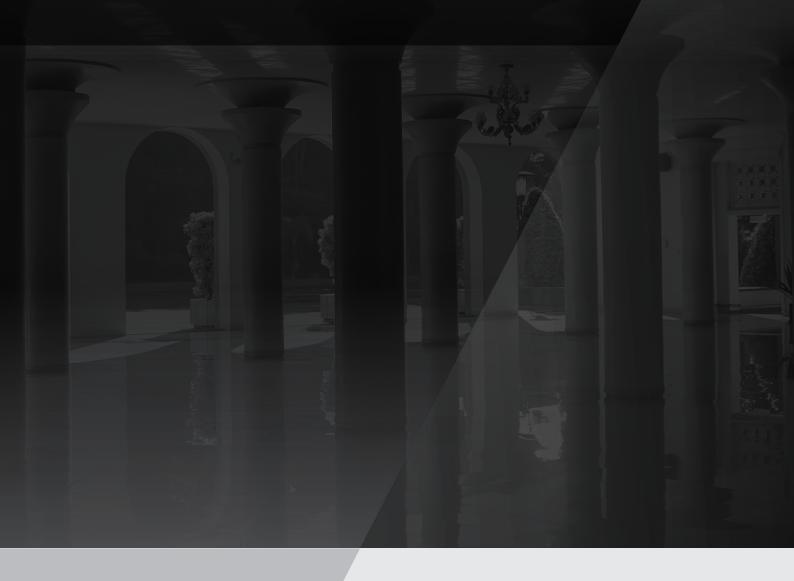
G. REFERENCE

- Afuah, A. (2003). Business Models: A Strategic Management Approach. New York: McGraw-Hill/ Irwin.
- Fuller, CH. & Morgan, M. S. (2010). Business Models as Models. *Long Range Planning*, 43(2), 156-171. http:// dx.doi.org/10.1016/j.lrp.2010.02.005
- Chesbrough, H. (2006). Open Business Models: How to Thrive in the New Innovation Landscape. Boston: Harvard Business School Press.
- Debelak, D. (2006). *Business model made easy*. Wisconsin: CWL Publishing Enterprises.
- Wheelen, T. L. & Hunger, D. L. (2008). *Concepts: Strategic Management and Business Policy*. NewJersey: Prentice Hall.
- Magretta, J. (2010). Why Business Models Matter. *Harward Business Review on Business Model Innovation*. USA: HBR Publishing Corporation.

- Osterwalder, A. & Pigneur, Y. (2009). *Business Model Generation*. Self Published.
- Slávik, Š. (2011). Komparatívna analýza podnikateľských modelov. *Ekonomika a manažment*,11(3), 23-43.
- Teece, J. D. (2010). Business Models, Business Strategy and Innovation. *Long Range Planning*, 43(2), 172-194. http:// dx.doi.org/10.1016/j.lrp.2009.07.003
- Watson, D. (2005). *Business Models*. Petersfield: Harriman House Ltd.
- King, R. (2010). Advanced Business Model Canvas: 3 Questions You Must Ask Before Mapping Your Business Model. Business model innovation hup. Retrieved September 10, 2013, from http:// businessmodelhub.com/profiles/blogs/ advanced-business-model- canvas
- Maurya, A. (2010). Why Lean Canvas vs Business Model Canvas? Practice Trumps Theory. Retrieved October 9, 2013, from http:// practicetrumpstheory.com/2012/02/ why-lean- canvas/

40 | Conference Proceeding of The 1st International Conference on Community Engagement and Education for Sustainable Development (ICCEESD) 2018

Theme for TRAINING, MARKETING, APPROPRIATE TECHNOLOGY, AND DESIGN



IMPROVING GOATS REPRODUCTION PERFORMANCE BY APPLIED OF A RECORDING SYSTEM IN SENTRA PETERNAKAN RAKYAT KEBON WULANGREH, JOGONALAN, KLATEN

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Goats were one type of livestock that had good development prospects in supplying **ABSTRACT** meat. Goat livestock development in rural areas is one of the alternatives in increasing production, but the productivity of goats at the farmer level is not optimal, it is necessary to increase the ability to raise livestock in the livestock farmers and productivity of goats to obtain optimal results. This service program aimed to determine the goats breeding system applied by farmers at Sentra Peternak Rakyat (SPR) Kebon Wulangreh, Karangdukuh, Jogonalan and improve the reproduction performance of goats. Interviews were conducted on 10 respondents of smallholders farmers and measured of 17 goats in Sentra Peternak Rakyat Kebon Wulangreh, Karangdukuh, Jogonalan, Klaten. Descriptive quantitative and independent sample t-test analysis was applied for the information and the data. The results showed that average of kidding interval, litter size, mortality, postpartum mating was 309.94±55.31 days, 2.00±0.70, 17,65%, 160.11±55.54 days. After the assistance and improvement of maintenance management were carried out, the reproduction performance of the goats has a significant increase compared to the previous one in the kidding interval and PPM (246.72 ± 35.12 days and 91.45 ± 35.31 days). Assistance and learning about the importance of reproduction recording of livestock were required to improve the performance of the goats that are kept by smallholder farmers.

Keywords Goats, Reproduction performance, Recording system, Sentra Peternakan Rakyat

A. INTRODUCTION

Goat has an important role in the agricultural business system in Indonesia. In socio-

economic terms, goats are livestock which is mostly maintained by small farmers as producers of meat, milk, fertilizer, leather, as savings and insurance as well as government facilities in alleviating poverty in several regions. Socially, goat plays a role in religious celebrations and cultural celebrations that have become a tradition of Indonesian people (Budisatria and Santoso, 2009; Budisatria et al., 2010). Thus the goat is one type of livestock that has a fairly good development prospect in the meat supply.

One type of goat that is suitable to be developed is Etawah Crossbred (PE) goats. The Etawah Crossbred Goat is one of the local goats in Indonesia with a fairly high population and widespread in the territory of Indonesia. The PE Goat Productivity is quite good with the level of kids production and milk production, often used as a producer of goat milk and meat or in other words, PE goats have a dual role (Budisatria et al., 2018a). Moran-Fehr et AI. (2004) state that in Indonesia and also in developing countries, small ruminants provide a variety of socioeconomic contributions and functions for their owners, but the development is quite slow because the majority of goat farms are at the level of small level farms with minimum inputs. Actually, if maintenance optimization is carried out, goats have great potential to be developed at the level of small farmers.

Goat farmers or breeders in Karangdukuh Village, Jogonalan District, Klaten Regency in Central Java raising goats only as side jobs, because most have main jobs as laborers in red bricks production. Goat maintenance is done traditionally in the yard or grazed on rice fields. In 2017, the Sentra Peternak Rakyat (SPR) or Community Livestock Center Kebon Wulangreh was formed in order to facilitate coordination in organizing the farmers with assistance from the Faculty of Animal Science, Universitas Gadjah Mada. The assistance activity of breeding goats aims to build the community breeding center based on mentoring and learning through the concept of good breeding farming. The concept of a breeding center is a system of providing superior males and mating pen in one location (integrated farm). So that it is expected that matting will occur naturally and will be able to increase conception and finally increase the kids' crop or production from the farm. So far, the results of assistance activities through the breeding center concept have shown that maintenance effectiveness and efficiency can be improved and able to change the preferences of previously limited goat farmers kept in the yard and grazed in rice fields, and the right now turning into integrated farm (Budisatria et al., 2017 and Budisatria et al., 2018b).

The process of developing livestock can be reflected in its productivity. One way to increase livestock productivity is by improving reproductive performance. The reproductive process that runs normally will be followed by good productivity (Hardjosubroto, 1994). The productivity of the female goat (does) in the SPR Kebon Wulangreh so far has not been optimal in accordance with what is expected, especially the kidding interval is long or more than 12 month. The main problem is that there is no recording system that is periodic and continuous towards the goat and the does in the breeding center. According to the Technical Guidelines for Livestock Breeding System (Ministry of Agriculture of Indonesia, 2008) recording is an activity that includes identification, productivity records, pedigree records, reproduction records, health records, and management records.

The absence of reproductive records from the does in the breeding center will complicate

and close the information for farmers regarding the condition. This certainly will affect the farmers' decision to matting, if the matting is not accurate it will prolong the gestation and consequently the kids interval be long. Once the kids if not recorded, the farmer will not know the correct weaning time. The impact of the quality of the kids becomes declining and the equivalent is the delay in the postpartum estrous (PPE) so that the kids interval is getting longer. The condition is disadvantaged for the farmers, both in terms of cost efficiency and maintenance time. This paper presents basic information on farmers profiles, goat breeding management, and the quality of goat based on the reproductive performance in the beginning period and after the assistance and introduction of recording systems at Community Livestock Center.

B. METHODOLOGY

The target group of community service activities is the Sentra Peternak Rakyat (SPR) Kebon Wulangreh located in Karangdukuh Village, Jogonalan District, Klaten Regency. Assistance activities begin in September 2017 until September 2018. The recording system was applied through socialization, counseling, demonstration, and continuous assistance by students until farmers can do it independently, recording is done on all goats by using recording card for the individual level, recording boards and books for the group level. Each goat is given an identity in the form of a necklace with a code of goat, gender, physiological status and the name of the owner/breeder. Recording on the does is focused on the time of estrous, mating, and birth, the weaning time and the postpartum matting (PPM).

The data of the reproductive performance of goat were obtained based on interviews at the beginning of the activity or before assistance, while for does performance after the activity is calculated based on records during the introduction and application of the recording system in the SPR. The data are the calving interval, litter size, mortality and postpartum mating (PPM). The data of differences in goat reproduction performance were analyzed by t-test (SPSS).

C. RESULT AND DISCUSSION

Reproduction performance observed in the service activities included the Kidding interval, litter size, Mortality, postpartum mating (PPM). The Reproduction performance of goats at the SPR Kebon Wulangreh is presented in Table 1.

Parameter	before (n=17)	after (n=11)
Kidding interval (day) ^s	309.94±55.31	246.72±35.12
<i>Littersize</i> (head)	2.00±0.70	1.64±0.84
Mortality (%)	17.65	17.39
Post Partum Matting (day) ^s	160.11±55.54	91.45±35.31

Table 1. Goat reproduction performance before and after introducting the recording system at Sentra Peternak Rakyat Kebon Wulangreh

^ssignificant

1. Kidding interval.

The kidding interval of the goat at the SPR Kebon Wulangreh, before the service activities, amounted to 309.94 ± 55.31 days. The kidding interval of the goat after the service activities 246.72 ± 35.12 days. These results have a significant difference based on statistical analysis. Devendra and Burns (1994) state that kidding interval is the period between two consecutive kidding time/birth consisting of the mating period (the period from kids birth to conception of does) and the gestation period is called the kidding interval. The kidding interval is generally influenced by service per conception (S/C), gestation period, weaning age and first matting after giving birth or postpartum matting (PPM). The results of the study by Budisatria et al. (2018) shows that the kidding interval range of PE goat is around 274 days at the level of small farmers and around 225 days at the intensive maintenance level. The average kidding interval of PE goats has been very good compared to the average results of this study.

Improvement of the kidding interval cannot be separated from the recording system of the does in the breeding center. Before the introduction of technology, farmers were only limited in their knowledge in terms of the time of weaning and postpartum matting (PPM). The weaning time is very long because the farmer feels and thinks that the kids growth will be very maximal if it is always maintained with a does, some even up to the age of 6 months are weaned. Farmers worry that if we are weaned earlier, the quality of the kids will be poor, due to lack of milk consumption from the does. When weaning time too long, will make the postpartum estrous of the does a very long time. This is what then makes the kidding interval very long.

After assistance is related to the maintenance of the kids-does by the team from Faculty of Animal Science UGM and supported by the recording card and the recording board, the farmer can immediately make a decision to matting the does who has given birth without weaning first and then the weaning time or separating the kids from their does within 5 months. The ideal time for weaning was 4 to 5 months if the quality of the does was good based on body conditioning score (BCS), but to PPM the ideal time was 3 months, so before weaning time, the does must be pregnant. Finally, the farmers understand and immediately marry the does who are still milking their kids. To make it easier for farmers, estrous synchronization was done with the pgf2@ hormone protocol, to increase the estrous quality and for optimizing the matting time simultaneously.

2. Litter size.

Litter size is the number of kids born and is influenced by the environment and microclimates where the animals are located (Hardjosubroto, 1994). The number of birth kids plays a very important role in determining livestock productivity. Based on some research results, it is seen that there is considerable variation in the number of birth kids in the goat. The average of litter size of kids at the SPR Kebon Wulangreh, Karangdukuh, Jogonalan before the service activities are 2.00 ± 0.70 heads. The average of litter size after the service activities had a significant increase to 2.50 ± 0.84 heads. The results showed that the average of litter size of PE goats raised by small farmers receiving livelihood rehabilitation programs in Bantul Regency, Yogyakarta Special Region and Klaten Regency, Central Java was 1.7 (Budisatria and Udo, 2013).

The average of litter size is quite high at the goat at the breeding center because there is one does kidding 5 heads, one does kidding 4 heads and one does kidding 3 heads and the rest of does was kidding twin. It is very rare for a single kid. The nutritional adequacy factor for the goats fed with high quality legumes and the availability of superiors males capable of producing optimal spermatozoa in each natural matting in the breeding center is a factor that can increase the average of litter size, because according to Budisatria et al. (2018), that the factors that affect the height of the litter size, mainly the feed factor. The level of feed consumption has an effect on the litter size, feeding with a higher level of nutrition at the time of ovulation will increase the amount of ovulated ovum.

3. Mortality.

Mortality is the percentage of kids who die from the total kids born. Factors that influence mortality are feed, difficulty in birth, climate, age, and maternal temperament, the number of kids born (litter size) and birth weight, and maintenance system. Mortality rates are a major factor in determining goat productivity (Devendra and Burns, 1994). Goat mortality at the SPR Kebon Wulangreh, Karangdukuh, Jogonalan before the service activities and after service activities are 17.65% and 17.39% respectively. Assistance related to the maintenance of post-birth kids is expected to reduce mortality in the breeding center. Some of the efforts that have been made are by giving mineral blocks to the does to avoid mineral deficiencies while lactation and giving colostrum immediately at the time of birth until the age of 3 days. Goats are ensured to immediately get colostrum both naturally and on a given basis through pacifiers. The old pregnant mothers are moved to the lower pen so that the kids birth process runs smoothly, not kids are trapped in the pen floor or fall from the stage pen that can cause mortality.

4. Post Partum Mating (PPM).

Post Partum Mating (PPM) or mating after giving birth is the day of matting after the goats give birth. In general, PPM is strongly influenced by the quality of feed given during lactation period and the time of weaning kids. The goat after giving birth takes time to restore the status and process of reproduction before the reproduction function can be normal, this process is often referred to as uterine involution. This process usually lasts about one to two months. At the first appearance of estrous after giving birth or postpartum estrous (PPE), the goats should not be mated directly, but wait for the coming of estrous in the next period. Mating after giving birth to a goat raised at a small farmers level is generally done after the kids are weaned, although it does not rule out the possibility that mating after kids birth can also be done even though the weaning period of the kids has not been done. In addition, the farmers usually do not directly matting the goats at the time of estrous emergence after giving birth, on the grounds that they feel sorry if the goats are directly mated because the child is not yet weaned, so the mating occurs after the kids are weaned (Budisatria et al. 2010). This is the same as the farmers' problem in the SPR Kebon Wulangreh.

The PPM of goats at SPR Kebon Wulangreh Karangdukuh, Jogonalan before the service

activities are 160.11 ± 55.54 days. After the activities of introducing and applying the recording system, the PPM of goats significantly increased to 91.45 ± 35.31 days. Assistance related to kids-does maintenance management and utilization of records on the recording card and recording board can reduce the PPM of the goats owned by the farmers in SPR Kebon Wulangreh.

D. CONCLUSION

The farmers in the Sentra Peternak Rakyat Kebon Wulangreh have a background that makes it possible to develop livestock, especially goats. Goat raising activities have been carried out in groups farm and integrated farm. Assistance and learning about the importance of reproduction recording were required to improve the performance of the goats. The recording system of livestock has a positive effect on reproductive performance. There needs to be assistance and further learning to improve the performance of farmers and their livestock.

E. ACKNOWLEDGMENT

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F. REFERENCES

- Budisatria, I. G. S, Widayati, D. T,, Suhartanto, B., Kustantinah., Mulyadi, H., dan Santosa, K. A. 2009. Germ Plasma of Goats in Indonesia. CV- Bawah Sadar, Yogyakarta.
- Budisatria, I. G. S., Udo, H. M. J., Eilers, C. H. A. M., Baliarti, E., and Zijpp, A. J. Van Der. 2010. Preferences for Sheep or Goats in Indonesia. Small Ruminant Research, 88: 16–22.
- Budisatria, I. G. S., and Udo, H. M. J. (2012). Goat-Based Aid Programme in Central Java : An Effective Intervention for the Poor and Vulnerable?. Small Ruminant Research, 109: 76–83
- Budisatria, I. G. S., Atmoko, B. A., Ngadiyono, N., and Ariyanti, F. 2017. Breeding Center: Appropriate Technology to Increase the Kids Crop in Smallholder Farmer. Proceeding in Seminar Nasional Peternakan 3. Fakultas *Peternakan Universitas Hasanuddin* yang akan dilaksanakan di Makassar, 328-338.
- Budisatria, I. G. S., Panjono., Maharani, D and Ibrahim, A. 2018a. Kambing Peranakan Etawah, Hitam atau Coklat?. UGM Press. Yogyakarta.
- Budisatria, I. G. S., Ngadiyono, N., Atmoko,
 B. A., Ariyanti, F., Panjono., Baliarti, E.,
 Widi, T. S. M and Yulianto, D. 2018b.
 Teknologi Tepat Guna pada Induk
 Kambing melalui Penerapan Breeding
 Center dan Flushing di Sentra
 Peternakan Rakyat Kebon Wulangreh,
 Desa Karangdukuh, Klaten. Indonesia
 Journal of Community Engagement, 4:
 87-108.

- Devendra C and M. Burns. 1994. Produksi Kambing di Daerah Tropis. Institut Teknologi Bandung. Bandung.
- Hardjosoebroto, W. 1994. Aplikasi Pemuliabiakan Ternak di Lapangan. Penerbit Gramedia Indonesia, Jakarta.
- Minister of Agriculture of Indonesia. 2008. Petunjuk Teknis Pembibitan Ternak Rakyat. Jakarta.
- Morand-Fehr, P., J.P. Boutonnet, C. Devendra, J.P. Dubeuf, G.F.W. Haenlein, P. Holst, L. Mowlem, and J. Capote. 2004. "Strategy for Goat Farn1ing in the 21st Century". Small Ruminant Research, 51:175-183.

GCONNECT2: DISASTER-RESILENCE AREA DEVELOPMENT THROUGH CONVERGENCES IOT-CLOUD AND COMMUNITY RESILENCE

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ABSTRACT Indonesia has a geographic and geological landscape that has natural resource potential and an equally large risk. One of them is a landslide that occurred in rocky mountainous areas in Wonogiri Regency, precisely in the Village of Selopukang, about 3 hours drive from Yogyakarta. This region has since become a fostered area to build a disaster response village and be economically independent. In 2018, this area was again developed into a disaster-resilient area through the Appropriate Technology Community Service Grant funded by the Directorate of Community Service of UGM in 2018, titled G-connect2: Provision of Disaster Detection Devices in Prone Areas. The installation of 3 location points has been completed as the placement of the G-connect2 tool on the landslide-prone red lane in collaboration with Wonogiri Regency BPBD and UGM KKN team 2018. 3 The location includes a significant pathway for significant soil cracks moving every time so that it requires monitoring reliable environmental data. The combination with the previous equipment, in G-connect2 is equipped with temperature sensors, ground movement, slope, humidity sensors and others that can be situational clues to the occurrence of significant soil movement symptoms which then become a sign of landslides. The attached device is given a temperature sensor, ground movement including a motion sensor which then data is recorded at any time and sent to the cloud server periodically. Then the collected data is presented in the form of time series information and analysis of symptoms of symptomatic land movement landslide information will be accessed by BPBD and related agencies and provide early warning to local residents. During the installation, the G-Connect team received support from the community who became the operator of tools in their daily lives and independently operated, Babinsa, and BPBD wonogiri district. Although the crack lines are still very long, this installation effort is a mainstay for mitigating people-oriented safety.

Keywords GConnect2; disaster, appropriate technology

A. INTRODUCTION

In the Sustainable Development Goals, one of the values of justice is access to information. Access to information is an important component of the formation of knowledgeable communities or groups of people. This causes the community to develop independently and create things that help their lives (Riasetiawan, M., 2017).

Access to information is a basic right to obtain information in the form of knowledge, understanding of information, content of information, and communication with parties outside the community (Riasetiawan, M., 2017). These basic rights are currently easily obtained by community groups in urban areas or close to cities. A means of connecting good transportation, communication, and human interaction causes information easily obtained, used and disseminated by all parties.

In contrast to conditions in urban or surrounding areas, 3T areas (outermost, outermost, and disadvantaged) do not get the same support. Geographical factors are the main cause, accompanied by other difficulties as a consequence of this. Although there have been many efforts from the government, district / city or non-governmental organizations and community groups, we still find from various sources that access to information is still a significant obstacle.

One area that feels this is Sendang is a village in the Purwantoro District, Wonogiri Regency, Central Java Province, Indonesia. Geographically, Wonogiri is located in the southeastern part of Central Java Province. The northern part is bordered by Karanganyar Regency and Sukoharjo Regency, the southern part is directly on the lip of the South Coast, the western part is bordered by Gunung Kidul in Yogyakarta Province, the eastern part is directly bordered by East Java Province, namely Ponorogo Regency, Magetan Regency and Pacitan Regency. The capital is located in Wonogiri District. The area of this regency is 1,822.37 km² with a population of 928,904 inhabitants.

With the geographical conditions of mountain contours, the risk of disasters is quite high in landslides. The social system which is inhabited by parents and youth groups that are limited in number, it requires attention in order to become independent and oriented to develop their own territory as a promising livelihood. After observing we found the main problem was the lack of equitable communication and information access for the periphery of the Gadjah Mungkur reservoir. To overcome the problem of limited access to information is to provide independent access to open information community pilot groups through the provision of access infrastructure for the Sendang Village area.



Figure 1. Landslide event in 16 February 2018



Figure 2. Landslide event in January 2019

B. METHODS

The G-Connect2 Project is carried out with careful consideration of the results of initial observations and information gathering (Cloud & Grid Technology Research Group, 2017) which gives the initial conditions points as follows:

- 1. Disaster Prone is an area with very few facilities and supporting communication infrastructure, and even more information. This is due to geographical and natural factors that are often affected by disasters.
- Communication infrastructure is very limited and very dependent on power supplies.
- 3. Disaster-Prone Areas become areas with low levels of access to information and result in low community-based knowledge about improving local welfare and awareness of disaster response.

The activities proposed in this activity focus on carrying out the following plans:

1. Location Setup

This activity will take the form of a Focus Group Discussion activity, which involves the target group to become a facilitator of activities in the field. Observation, to ensure the implementation of the G-Connect Project.

2. Packaging Technology

This activity aims to provide 1 G-Connect project module which contains:

- a. Ready Connectivity Devices
- b. Learning module
- c. Supporting Devices
- d. Demonstration

The activity will be realized in the development process in the Computer and Network System Laboratory, DIKE FMIPA UGM.

3. Implementation

Conduct a comprehensive implementation process at the target location in the form of:

- a. Physical installation of the device and operational trials
- b. Technical Support Standards to ensure operational technology
- c. Joint Learning with Target Groups for technology transfer
- d. Operational, observing the operational use of technology and the resulting impact.
- e. The security aspect is taken into account in the completeness of the appropriate devices used and implemented, as well as involving the involvement of local partners.

4. Quality assurance

The process of quality assurance activities is carried out on the basis of:

- a. Involving good advisors from senior researchers.
- b. Assistance in the implementation process
- c. Strict documentation on every realization of activities, especially those directly related to appropriate technology.
- d. Making a Full Forum, regular discussions to monitor all developments that occur during the implementation process involving the target group and researchers.

Reporting aimed at target groups and universities as a form of monitoring and implementation reports

C. RESULT & DISCUSSION

1. Map / zoning of potential disaster areas (digitization of land / disaster location)

Maps / zoning of potential disaster areas are carried out as a result of field observations with BPBD. The map / zoning is based on physical evidence of the location obtained at observation



Figure 3. Disaster Zone Map

2. Technology Design & Prototype

The EWS module is made using electronic components which are divided into 3 subsystem parts (Arduino.cc., 2015). The sections include information systems for the condition of the surrounding environment, power source systems for information provider systems and systems sending information to a data pool. The first system is an environmental condition information provider system built from the SHT 11 sensor input, anemometer sensor and MPU6050 sensor.

The SHT 11 sensor is a sensor that detects changes in temperature and humidity of the surrounding environment, the anemometer sensor is an air velocity sensor and the MPU6050 sensor is an acceleration and angular velocity sensor that will be converted into angular form. Of course, the data from the sensor cannot be directly used as the information needed, so the raw data from the sensor needs to be processed through certain calculations. Data processing is carried out by Arduino Nano microcontroller to be ready to use information.

Then, the data provider system might not operate without electricity (Perreira, J., Soares, J.N., Jardim-Goncalves, R. and Agostinho, C., 2017). In addition, the EWS module power source system is designed to have high portability without a 220V AC power source. Therefore, the power source used is a 12 V DC battery by recharging electricity through solar panels (Douzis, K., Sotiriadis, S., Petrakis, E.G.M. and Amza, C., 2016). The battery recharging process utilizes a controller where there is an output path that will be connected to the data processing system with a voltage drop through ubec 5V. When the main information provider system is operational, the next step is to store all the data that has been recorded in a container that can accommodate researchers to access it and process it further. To monitor environmental conditions prone to landslides, the development team also built a monitoring dashboard (Raspberry Pi Foundation, 2015).

This dashboard displays the latest data for the last 20 data. In addition, the data displayed is recorded data every 3 minutes. The dashboard can be accessed by the general public, so it is expected that especially agencies related to handling natural disasters such as the local government BPPD can use these facilities and be able to rush in appealing or making decisions to residents about landslides. Some dashboard displays are shown with the URL www.gamabox. id/g_connect.

3. Implementation

On September 24, 2018 the installation of 3 location points was completed as the placement of the G-connect2 tool in the landslide-prone red lane that had been mapped in collaboration with the BPBD of Wonogiri Regency and the 2018 UGM KKN team. so it requires a reliable detection and monitoring tool for environmental data. The combination with the previous equipment, the G-connect2 is equipped with temperature sensors, soil movement, slope, humidity and other indicators that can be a situational indication of the occurrence of significant soil movement symptoms which then become a sign of a landslide.

The installed device is given a temperature sensor, ground motion including a motion sensor which is then recorded data at any time and sent to the cloud server periodically. Then the data collected is presented in the form of time series information and an analysis of the symptoms of landslides with symptomatic landslides. will be accessed by BPBD and related agencies and provide early warning to local residents

In the installation, the G-Connect team received support from the community who were the operators of the tools in daily life and could independently operate the Wonogiri district, Babinsa, and BPBD. Although the crack path is still very long, this installation effort is a mainstay for mitigation oriented to human safety.



Figure 4. The GConnect Deployment

D. CONCLUSION

The installed device is given a temperature sensor, ground motion including a motion sensor which is then recorded data at any time and sent to the cloud server periodically. Then the data collected will be presented in the form of time series information and analysis of the symptoms of landslide symptoms which will be accessed by the BPBD and related agencies and provide early warning to local residents.

In the installation, the G-Connect team received support from the community who were the operators of the tools in daily life and could independently operate the Wonogiri district, Babinsa, and BPBD. Although the crack path is still very long, this installation effort is a mainstay for mitigation oriented to human safety.

E. DAFTAR PUSTAKA

- Cloud & Grid Technology Research Group, 2017, G-Connect Project, https:// cloud.wg.ugm.ac.id/new gamabox, diakses 2 September 2017.
- Riasetiawan, M., 2017, Self-Assignment Data Management pada Alokasi Sumber Daya untuk Pusat Data, *Disertasi*, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Gadjah Mada Yogyakarta.
- Raspberry Pi Foundation, 2015, *GPIO: MODELS A+, B+ AND* RASPBERRY PI *2,* https://www.Raspberry Pipi.org/ documentation/usage/gpio-lus-andraspi2/, diakses 20 September 2017.
- Arduino.cc., 2015, What is Arduino, https:// www.Arduino.cc/en/Guide/Introduction, diakses 20 September 2017.
- Douzis, K., Sotiriadis, S., Petrakis, E.G.M. dan Amza, C., 2016, Modular and generic IoT management on the cloud. *Future Generation Computer Systems*, 78, 369–378. https://doi.org/10.1016/j. future.2016.05.041.
- Ferreira, J., Soares, J.N., Jardim-Goncalves, R. dan Agostinho, C., 2017, Management of IoT Devices in a Physical Network. *Proceedings-2017 21st International Conference on Control Systems and Computer, CSCS 2017*, 485–492.https:// doi.org/10.1109/CSCS.2017.75.

IMPLEMENTATION OF BATIK MACHINE TO IMPROVE HAND-DRAWN BATIK PRODUCTION TIME

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- **ABSTRACT** Batik is Indonesian artwork that has become hereditary culture from generation to generation. By UNESCO, batik has been designated as a Masterpiece of the Oral and Intangible Heritage of Humanity on October 2nd, 2009. One of the problems faced by batik industry recently is increasing demand of batik products. Nowadays, overall processing time of batik from sketches to batik products may take around 2 to 3 days, where the batik process itself may take one full day to complete. On the other hand, the number of batik craftsmen is increasingly limited, many young people are less interested in becoming batik craftsmen.

This paper describes how to increase batik production using Computer Numerical Control (CNC)-based batik machine. Manual hand-drawn batik is copied and then applied to the batik machine to generate optimal routing path, and hence to minimize production time. Focus of this paper is on the primary batik process (known as klowong) using batik machine. This process may take around 75% of overall processing time, so this technology hopefully reduces production time to increase productivity. The experiment results are then compared between machine and manual batik processes.

The experiment results prove that the drawings design must be taken into account and then adjusted by the feedrate, because the higher feedrate tends to reduce processing time. However, feedrate also has affects on product quality. The experiments results of klowong processing time for manual batik is around 170 minutes and processing time using batik machine is only around 72 minutes with the same motif. The results show klowong processing time has been reduced by 57.65% using batik machine.

Keywords hand-drawn batik, batik machine, klowong, production time, CNC.

JEL Classification: 03, 04, L6

A. INTRODUCTION

Manufacturing process can be defined as the application of physical and chemical processes to transform the geometry, properties and appearance of a raw material in making components or products; the manufacturing process also includes merging some components to make the product assembled (Groover, 2001). In the last decade, batik became a growing industry and one of the icons in Indonesia. By UNESCO, batik has been designated as a Masterpiece of the Oral and Intangible Heritage of Humanity on October 2th, 2009. One of batik industry problems is increasing demand of batik products. On the other side, overall batik processing time from sketches into finished products may take approximately 2-3 days, where the batik process itseft may take one full day.

The use of technology in industry is inevitably condition. Computer Numerical Control (CNC) machine has started being used in batik industry because of the need to improve batik production time to cope with the increasing demand and the lack of batik craftsmen as many young people are less interested in becoming batik craftsmen.

Design batik pattern was developed by Nurhaida et al (2015) to create automatic Indonesian's batik pattern recognition using the Scale Invariant Feature Transform (SIFT) approach as a feature extraction method. The main reason is difficulty of weaving detailed and irregular ornamental compositions into the cloth. Despite many batik pattern has the same motif, they may be different in terms of position, size, and direction. This research has main objective to evaluate SIFT features based on Hough transform for object recognition in batik pattern. The main idea is to find extreme points in image and then to construct regional point descriptors. The proposed method gains better performance over the original SIFT matching method with 8,47% equal error rate.

Related to design processes and production of batik, a model of batik design was developed by Arsiwi (2016) to design batik motifs based on Bezier curves. Batik motifs have been created using vector-based programming (HTML, JavaScript, and php) with the output of Scalable Vector Graphics (SVG). This research used Bezier curves approach for generating motifs to made them not identical between one another to keep the character from hand-drawn batik, with the level of deviation is around 10%. Adiguna (2013) developed the design of canting mechanism on CNC machines. The method that used for optimization is Design of Experiment (DoE) Taguchi method. Canting prototype that produced in the research is used valve and spring mechanism. On the experiment, using wax temperatures above 100°C, nozzle cannot hold the heat load, so the design has changed become a straight pipe with nozzle diameter is 0.8 mm.

Hanif (2017) conducted research by developing automated stamp batik machines that moves stamp module where the movement of CNC machines automatically set by G-codes and inputted via ArtSoft Mach3 software. The method is done by observing batik stamp processes manually in a batik industry. The results of the research stated that the batik quality using CNC machines is almost the same as the quality of manual batik processes, with the wax temperature is around 138°C with 0.2 s for delay. The production time of 10 meters of fabric on the CNC machine is 66 minutes, whereas the manual batik process is 70 minutes. The research only optimized the setup of wax temperature, so the production time between CNC machines and the manual batik processes are not much different.

B. RESEARCH METHOD

1. Batik Motif

Batik motif is chosen based on interview with batik craftsmen who have had experience more than 10 years. Batik motif used in this research is Kalimantan motif. Batik has been created with manual batik process and documented using a camera which then redrawn using CorelDraw X8 software. Redrawing process of batik motif is carried out to improve the quality of the line on the motif so that the process of creating G-Code is easier to do. Figure 1 shows the redrawing process of batik motif using CorelDraw with a vector format for the *klowong* process. The process began with importing photo jpg into media images of CorelDraw. The image was created using Bezier tool that is used to manually follow each curved line on the batik motif.

2. G-Code Generator

G-Code is made as input parameters of the movement of Mach3 CNC software. The G-Code on this research was created using Inkscape software that had ability to translate vector images into G-Code. The generating of G-Code on Inkscape is done using Gcodetools in Extensions menu. The function of the Path to Gcode to form the G-Code appropriate path or line that has formed batik motif is shown in Figure 2.

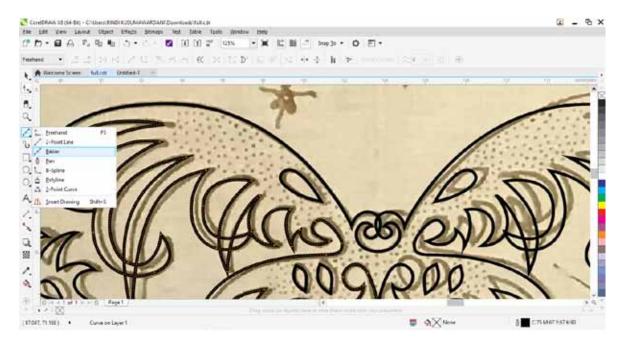


Fig 1. Redrawing process with Bezier tools

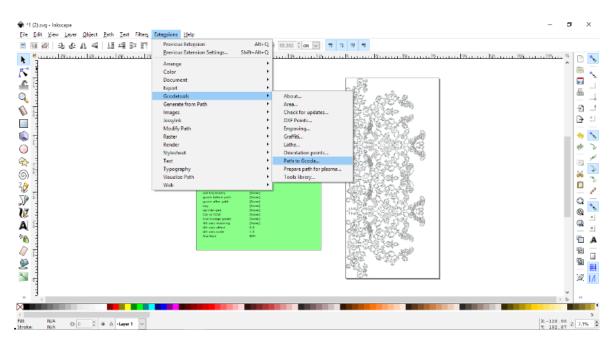


Fig. 2. Inkscape parameter setting

3. Batik Production

The production processes of handdrawn batik on CNC machine was done at the Production Processes and Systems Laboratory, Department of Mechanical and Industrial Engineering, University Gadjah Mada. The machine is controlled by a computer using Artsoft Mach3 software. Each servo motor of X, Y, and Z-axis are connected by a driver to convert each command from the computer to respective motor movement. On Mach3 interface, there are more panels that can be used for controlling of motor. Figure 3 shows the interface of Mach3 software, with canting position demonstrated by the panel that shows the 3-dimensional coordinates of X, Y, and Z. CNC machine then runs the G-Code program that follows manual batik process of *klowong*. The batik machine used in the experiment is shown in Figure 4.

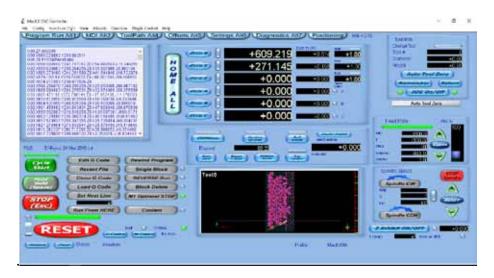


Fig. 3. Mach3 interface

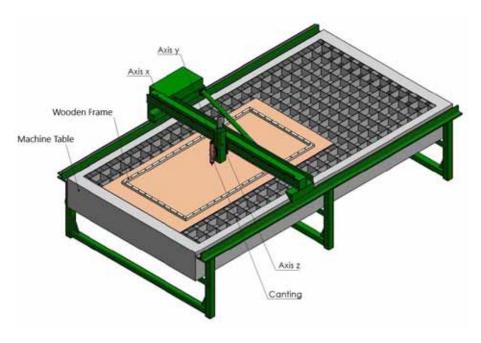


Fig. 4. Batik machine

C. RESULTS AND DISCUSSION

1. Results of Batik Machine

The batik production using CNC machines is done with 3 times experiment, using different feedrate to get the best feedrate on *klowong* process; because in this research only uses canting with single nozzle size, while in manual batik process may use different canting size. The feedrate is selected based on preliminary study by varying the feedrate on a small part of motif to get the similar line size with manual product. The processing time results from Experiment 1 is 97 minutes, Experiment 2 is 89 minutes, and Experiment 3 is 72 minutes. The result is compared with manual batik process. For klowong, the line size that is similar to those manual batik is on the Experiment 3 with feedrate 1500 mm/min, processing time 72 minutes, and line width 2.5 mm. Table 1 shows the results of *klowong* process in different feedrates.

Expe- riment	Feedrate (mm/min)	Processing Time (minute)	Line Width (mm)
1	1000	97	3
2	1200	89	2.5
3	1500	72	2.5

Table 1. *Klowong* process in different feedrates (Kusumawardani, 2018)

Table 1 shows that using higher feedrate, the time required to complete *klowong* process is shorter. The resulting line width on feedrate 1000 mm/min is a 3 mm, while a smaller line width i.e. 2.5 mm is obtained at higher feedrate. The comparison of *klowong* between manual batik process and CNC machines from each experiment is shown in Figure 5. Figure 5(a) shows result of *klowong* in manual batik process with 2.5 mm line size. Figure 5(b) shows result of batik machine with feedrate 1000 mm/min that produces line width 3 mm, whereas in Figure 5(c) with feedrate 1200 mm/min that produces a line width 2.5 mm, and in Figure 5(d) with feedrate 1500 mm/min that produces line width 2.5 mm. More results in fabric size of 200 x 115 cm² are available in Appendix; include *nglowongi, nemboki, nyeceki,* and *nglatari* processes.









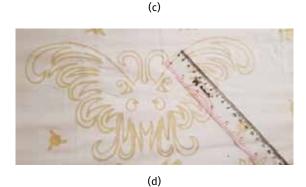


Fig. 5. *Klowong* result (a) manual, (b) *feedrate* 1000 mm/ min, (c) *feedrate* 1200 mm/min, (d) *feedrate* 1500 mm/ min

2. Comparison Between Manual and CNC Machine

Batik processing time is calculated from the initial process using canting with fabric size 200×115 cm² and using the same motif. Table 2 shows the overall processing time comparison table between the manual and CNC machine. Processing time by expert craftsmen to work on klowong is 170 minutes, at the best among 3 craftsmen. While using CNC machine, the processing time to made klowong motif is 72 minutes, at the best from the experiment. So, in one day at working hour of 8 hours, the batik machine could produce approximately 6-7 pieces for klowong for a motif used in this study, and with a process that runs automatically, i.e. the operator only works for the setting and loading at the beginning and unloading at the end of process, so that the operator could work on other processes. Figure 6 shows a graph from Table 2.

Table 2. Comparison of klowong processing
time (Kusumawardani, 2018)

Evenoviment	Time (minute)			
Experiment —	Manual	Batik Machine		
1	181	97		
2	173	89		
3	170	72		
Minimum	170	72		
Average	174.66	86		

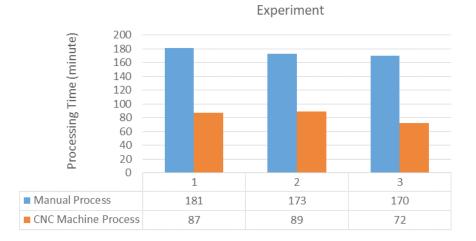


Fig. 6. Comparison of klowong processing time

Figure 5 shows comparison of production time of *klowong* between manual batik process and batik machine. Because of the percentage of *klowong* processing time that may account up to 75% of the total batik production time, so the difference of *klowong* production time is very significant. Craftsmen hand movement, tiredness, idle time, etc. may affect the production time of manual batik process.

D. CONCLUSION

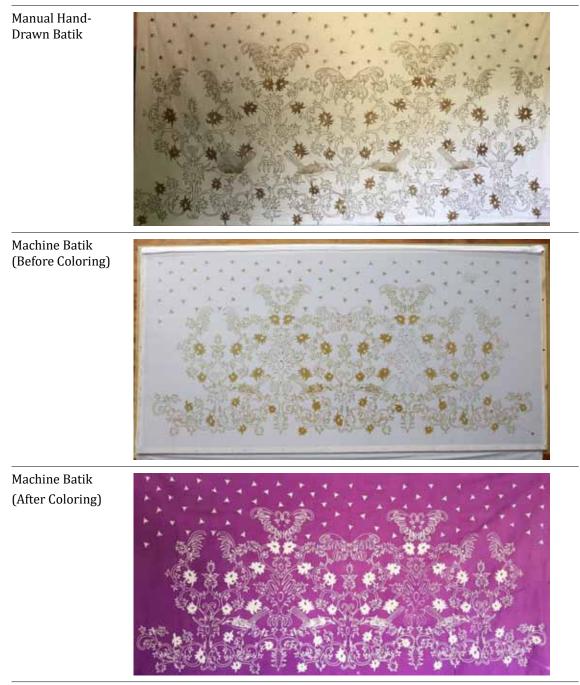
The experiment results prove that the batik drawing design must be taken into account and then adjusted by the feedrate. Higher feedrate tends to reduce processing time, however feedrate also has affects on product quality. The experiment results of klowong processing time for manual batik is 170 minutes and processing time using batik machine is 72 minutes for a chosen motif. The results show proccesing time has been reduced by 57.65% using batik machine.

E. REFERENCES

- Adiguna, R.P., 2013, Pengembangan Desain dan Perancangan Mekanisme Canting pada Mesin CNC Batik, Undergraduate Thesis, Industrial Engineering, UGM, Yogyakarta
- Arsiwi, P., 2016, Pengembangan Model Desain Motif Batik Tulis Berbasis Bezier Curve, Graduate Thesis, Industrial Engineering, UGM, Yogyakarta
- Groover, M. P., 2001, Otomation, Production System, and Computer-Integrated Manufacturing, 2nd Edition, Prentice Hall International, London
- Hanif, M., 2017, Pengembangan Mesin Batik Cap Otomatis Tipe Modul Cap Bergerak, Undergraduate Thesis, Industrial Engineering, UGM, Yogyakarta
- Kusumawardani, R., 2018, Perancangan Motif dan Produksi Batik Tulis pada Mesin CNC Batik Tulis untuk Meminimalkan Waktu Pembatikan, Graduate Thesis, Industrial Engineering, UGM, Yogyakarta

Nurhaida, I, Noviyanto, A., Manurung, R., Arymurthy, A.M., 2015, Automatic Indonesian's Batik Pattern Recognition Using SIFT Approach, International Conference on Computer Science and Computational Intelligence (ICCSI), Procedia Computer Science, 59, pp. 567-576

F. APPENDIX



REDUCING STRESS AND INCREASING THE CONFIDENCE OF THE BLIND THROUGH GO-BLIND (GAMELAN FOR BLIND) AS AN INCLUSIVE EDUCATION

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ABSTRACT Gamelan is one of the Indonesian musical instrument which has been recognized by UNESCO since 2014. Primary research in Yaketunis (Yayasan Kesejahteraaan Tunanetra Islam) that blind people also want to play gamelan as love and cultural preservation, but they have difficulty when playing it. From this problem required gamelan that is easy to use by the blind. Go-Blind is an inovative electronic gamelan for blind people. Go-Blind works when the "finger touch" touches the brass board that serves as grounding then the microcontroller will process inputs then data is sent wirelessly to PC, and the software will manage the data to produce the sound of gamelan instruments. The Grounding of Go-Blind consists of two versions, the first version is made from acrylic and is meant for practice, while the second version is made of wood and is intended for staging. The E- Gamatuna test was conducted at Yaketunis with 6 participants in each test. Testing is done by judgment assessment and focus group discussion. From the test results show (1) appraisal comfort of finger touch; 50% stated comfortable and 50% expressed doubt; (2) 100% of participants stated understand how Go-Blind works; (3) all participants can ring the tone of ji, ro, lu, pat, mo, nem, and tu. The conclusion that Go-Blind is an electronic gamelan that can already be played by the blind people.

Keywords *Electronic gamelan, blind people, inovation.*

A. INTRODUCTION

Firstly the blind was seen as a useless and often troublesome individual. However, this perspective has gradually changed since the mid-18th century (Pradopo, 1977). On the other hand, according to the humanistic view, all individuals including the blind are the same (Smaligo, 1999). Every individual has the same ability and right to develop his potential. This assumption continues to grow in order to shape the welfare of each individual, although with different limitations.

The Go-Blind team conducted primary research at the Islamic Blind Welfare Foundation. This primary research aims to find out the opinions of blind friends towards *gamelan*. The results show that blind friends have an interest and want to play gamelan. The purpose they want to play *gamelan* is, to preserve culture.

Gamelan is an original Indonesian musical instrument that developed since the 8th century (Sasaki, 2007). In fact, currently in several countries such as America, Europe, Japan, Australia, New Zealand, Canada, Germany, France, Belgium to Israel have offered the *gamelan* education (Warto, 2012). In addition, *gamelan* has been patented as a cultural heritage of Indonesia by UNESCO since 2014. However, the existence of *gamelan* in foreign countries is not accompanied by its existence in its own country, Indonesia.

According to Supanggah (2007), *gamelan* artists from the lineage (lineage) are getting fewer. Therefore, with the right tools / technology, it does not rule out the possibility that more *gamelan* artists will come from education, such as in schools, campuses,

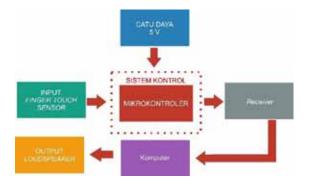
and so on (Supanggah, 2007). Technological developments in terms of digitalization have provided many conveniences in all aspects (Warto, 2012). The *gamelan* digitalization process has also been carried out by the LPPM team of Dian Nuswantoro University who is chaired by Mr. Y.Tyas Catur Pramudi, S.Sc., M. Komom and has been able to encourage the existence of the *gamelan*.

The results of primary research conducted by the Go-Blind team showed that out of ten participants, only three participants were able to play musical instruments. Those three participants included in low vision. Meanwhile, other participants included in the total blind. this is because individuals with low vision are still able to see even with aids, whereas individuals with total blindness are only able to feel light and dark (Pradopo & Tobing, 1977).

Learning gamelan begins with ear to eye technique (Supanggah, 2007). This technique is useful for introducing *kepatihan* notations. As a result, the blind have difficulty learning notation, because it is hampered by visual stimuli. Thus, even the blind find it difficult to play gamelan because it is difficult to determine the exact precision between the paddle and the gamelan blades. On the other hand, the blind want to participate in preserving gamelan. Therefore, we need a solutive innovation to answer these challenges. The problem formulation of this activity is how to make *gamelan* specifically designed for the blind ?. The solution offered and the purpose of this activity is to make gamelan digitization for the blind in the early stages of learning and by still maintaining the original and noble values of the gamelan.

B. METHODE

1. The Design of Hardware



Go-Blind hardware design includes electronic circuit design, namely PCB (Printed Circuit Board) design for minimum system circuits and power supply circuits and receiver circuits.

Figure 1. The flowchart of The Go-Blind hardware.



(a) Copper removal

(b) Cutting

(c) Ready to use

Figure 2. The process of making electronic circuits

2. The Design of Software

Go-Blind has seven inputs in the form of a switch / button, these buttons are placed on each rings made of cloth whose outer layer is coated with aluminum foil, these rings are called a finger touch. Finger touch is a sensor that will be active when touching the brass board (conductor material). whereas, software design is based on desktop applications.

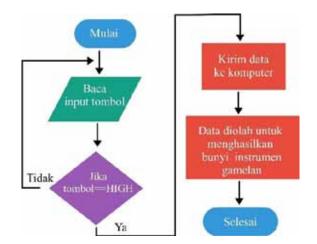


Figure 3. The flowchart of The Goblind software

3. Trial and Evaluation

The trial was conducted at the Foundation for Islamic Blindness Welfare (YAKETUNIS) on August 10, 2017 at 16.00-18.15 WIB. Participants consisted of six participants in the focus group discussion and five participants in the judgment assessment. The classification of participants is randomly selected. The participants obtained from volunteering to take part in trials and on the recommendation of the foundation. The following is the identities of the Go-Blind participants in the table 1.

Name (old)	Education level	BT / LV *)	judgement	focus group discussion
Wildan (13)	SMP	ВТ	\checkmark	-
Akbar (14)	SMP	ВТ	\checkmark	\checkmark
EvitaSari (16)	SMP	ВТ	-	\checkmark
Sela (15)	SMP	ВТ	-	\checkmark
Syifa (17)	SMA	ВТ	-	\checkmark
Ovi (18)	SMA	ВТ	-	\checkmark
Radit (19)	SMA	LV	\checkmark	-
Dani (>22)	College student	ВТ	\checkmark	\checkmark
Hari (>22)	College student	LV	\checkmark	-
Hari (>22)	College student	LV	\checkmark	-

Table 1. The identities of the Go-Blind participants

*) SMP: Junior High School; SMA: Senior High School; BT: blind total; LV: low vision

Trial and evaluation based on four assessment processes. The four processes are identifying what will be assessed, gathering information, analyzing information, and making decisions (Schudt, 2008). Focus group discussion aims to find out more about the attitudes and perceptions of the blind towards Go-Blind. The trial with judgment assessment consists of several stages with each stage having different objectives, as follows:

a. **Objective**: Measuring the comfort level of Go-Blind finger touch.

Tester instructions: We will play electronic *gamelan* (while installing finger touch on the blind / participants)

Tester questions to participants: "Do you feel comfortable, uncomfortable, or hesitant when using finger touch?"

b. **Objective**: To measure participants' level of understanding of the finger sensor on the finger touch of Go-Blind.

Tester instructions: There is a sensor at your fingertips (while holding participants' fingertips in turn). Now, each sensor will represent a tone. Here there are seven sensors that represent each note, such as *ji*, *ro*, *lu*, *pat*, *mo*, *nem*, and *tu* (the tester holds the participant's fingertips at each mention of the note, alternately). Question to participant tester: "Up to here, do you understand, don't understand, or doubt?"

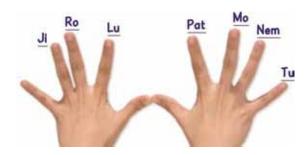


Figure 4. Fingers represent notations

c. **Objective**: find out if participants can play Go-Blind.

Tester instructions: *Gamelan* sounds can be heard, if the input touches this board (participants feel the area of the Go-Blind grounding board). participants can touch the fingertips of all areas on this board.

Observation: "Now let's play. Ring the tone of *ji, ro, lu, pat, mo, nem,* and *tu*."



1. Hardware Design

Go-Blind consists of three main hardware namely finger touch, microcontroller circuit, and receiver. The finger touch on Go-Blind is useful as sensor input which is only attached to each finger and wrist. This part is made of cloth and at the end of it is adhesive, so it can be measured according to the participant's hand. In addition, the participant's palm was not given a cloth to be free to move and not hot.



Figure 6. Finger touch position



Figure 5. Papan grounding Go-Blind

Second, the main hardware of Go-Blind is the circuits of microcontrollers which are useful for processing input data from finger touch and sending it to the receiver which is useful for receiving data from a microcontroller and sending data to a computer, inside the computer the data will be reprocessed if the software has been made.

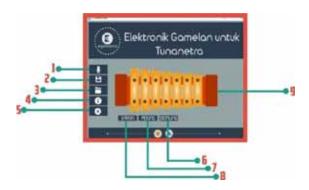
The results of this trial will be evaluated until Go-Blind is comfortable for the blind.



Figure 7. Receiver

2. Hasil Perancangan Software

Go-Blind's design software is desktop based. The following interfaces and features contained in the Go-Blind software.





(a) Portable version



(b) Show Version

Figure 8. Go-Blind hardware versions are based on grounding; (a) it was designed to be aesy to carry (portable version) and was intended for practice; (b) it was designed to introduce the original *gamelan* to the audience when performing arts by the blind (show version).

Figure 9. The Interface of Go-Blind

Software feature details:

- 1) **Recording**, to record a gamelan instrument when played, the result of the format recording. * Mp3
- 2) **Save**, used to save the recording, when the save button is not pressed then the recording will not be saved
- 3) **Opening Files**, used to open recorded files, so users can listen to the recordings that have been previously recorded.
- 4) **Information**, information about the application
- 5) **Exit button**, to exit the application
- 6) *Saron* **button**, for selecting saron instruments
- 7) *Peking* **button**, to select the Peking instrument
- 8) Instrument display

3. The result of trial

The trial was carried out at the Islamic Blind Welfare Foundation. From the judgment assessment process, the results are as follows:



Figure 10. Proses judgement assessment



Figure 11. Proses Focus Group Discussion

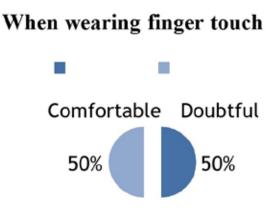
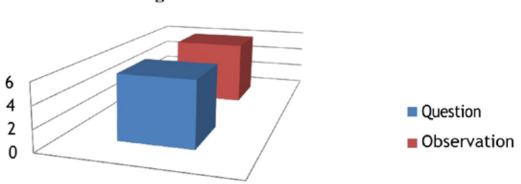


Figure 12. Measuring comfort level of finger touch



Understanding How Go-Blind Works

When playing Go-Blind

Figure 13. Understanding how Go-Blind works

The trial results showed half of the judgment assessment participants were doubtful if the finger touch was comfortable or not when worn. After conducting a focus group discussion, participants were hesitant because it was difficult to feel. According to Pradopo and Tobing (1977) the sense of hearing in the blind does not necessarily become sharper. However, individuals who often use a sense organ in their daily lives will bring up habits. The same is true when the blind person touches the surroundings with his hands. The process is an activity carried out to see the surroundings from the sight of the blind. Meanwhile, when installing finger touch it will directly inhibit the blind in feeling the surroundings. Therefore, it takes a process of habituation and learning in stages.

The test is carried out with the same steps and instructions by the testers for all participants. This will help to synchronize instructions when explaining how Go-Blind works. From the results of trials have shown when participants were asked about their understanding, 100% of participants answered "Understanding". Meanwhile, from the observation results all participants were able to produce tones (ji, ro, lu, pat, mo, nem, and tu) in sequence. In addition, it is able to use the finger touch and recognize the area of the brass board (grounding) as a conductor (switching). The results of focus group discussions have shown that the blind don't mind playing through touch. Even according to their point of view, this method will make it easier to produce a tone when they are playing Go-Blind. This easy process is expected to be a platform for the participation of the blind in interacting with other alert children.

Gamelan has a soul (Supanggah, 2007). A participant revealed that he had been able to play gamelan since he was eight years old. The participant is included in low vision and has a family background that is capable of musical performance. It is possible for participants who are the blind to be able to play gamelan because the beating process is an irreplaceable process. Therefore, Go-Blind as an initial stage of learning to introduce gamelan and as a means of preserving gamelan culture by the blind.

D. CONCLUSION

Go-Blind is an electronic gamelan that has been designed by the Go-Blind team and can be played by the blind as a means of self-development based on the introduction of gamelan culture in the early stages of learning.

E. REFERENCES

- Pradopo, S. 1977. Pendidikan Anak-anak Tunanetra. Bandung: Departemen Pendidikan dan Kebudayaan.
- Pradopo, S. S., & Tobing, L. 1977. Pendidikan Anak-anak Tunanetra. Jakarta: Departemen Pendidikan dan Kebudayaan.
- Sasaki, M. 2007. Laras pada Karawitan Sunda. Bandung: Pusat Penelitian dan Pengembangan Pendidikan Seni Tradisional.
- Schudt, J. 2008. Comprehension Assessment. New York: The Guilford Press.
- Smaligo, M. A. 1999. Resources for Helping Blind Music Students. Future Reflections Spring . Supanggah, R. 2007. Bothekan Karawitan II: Garap. Surakarta: ISI Press Surakarta.
- Warto. 2012. Digitalisasi Gamelan dan Penyebaran Nilai Adiluhung Budaya Islam. ISSUU , 242-254.

Theme for COMMUNITY EMPOWERMENT AND SOCIAL ACCESS



AN OVERVIEW OF INITIAL ESTABLISHMENT OF KARANG TENGAH TOURISM VILLAGE, IMOGIRI, BANTUL THROUGH ROLE OF INDEPENDENT AND SUSTAINABLE TECHNOPRENEURSHIP AND DYNAMIC SUSTAINABLE ENTERPRISE BASED ON SMALL AND MEDIUM ENTERPRISES (SMEs)

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ABSTRACT Karang Tengah Village, Imogiri District, Bantul Regency, Special Region of Yogyakarta is a kind of village with a lot of potency in human and natural resources, as well as Small and Medium Enterprises (SMEs) which extremely important to support the establishment of tourism village. However, they have few problems to objectify that purpose, such as (1) the large of the place, intended to be main tourism and supporting zones have not been determined, (2)variety and potency of SMEs were not supported by an adequate product quality, and (3) the producting and marketing process of SMEs were still managed in household scale. In order to acomplish them, innovation aspect has the important role. Several innovations might be conducted through several aspects, like (1) technology of production process, (2) marketing and network, and (3) product design.

> The principle of technopreneurship through degree of dynamic sustainable enterprise constitutes an used approach to initiate the formation of tourism village Karang Tengah. It refers to such enterprise's principle, positionizing technology as its driving force. In this case, technology plays on encouraging efficiency and innovation of the product. The achieved indicators upon its degree as they can comply several conditions, such as the dynamic sustainability of (1) product, (2) production process, (3) resources, and (4) strategic role.

> The result of its iniatives are,(1) it has been determined of Watu Wedok as main tourist's destination, of which would be developed as tourism park completed with supporting buildings; (2) it has been arranged of ecotourism map of SMEs based- desa Karang Tengah; as well as (3) it has been conducted the training and supervision of adaptive technology' utilization and marketing.

Keywords Karang Tengah Village, SMEs, tourism village, technopreneurship, dynamic sustainable enterprise

A. INTRODUCTION

Community Empowerment is an effort to develop community independence and prosperity by enhancing knowledge, attitudes, skills, behaviors, abilities. awareness, and utilizing resources through policy, program, activity, and mentoring in accordance with the essence of the problem and priority of village community needs (UU Village, Chapter I, Article 1: 12). The mandate of the Village Laws clearly assert that village is very closely related to the implementation of village community empowerment. Optimizing the potential of villages and their communities, especially SMEs, will be able to support national economic stability.

The existence and development of Small Medium Enterprises (SMEs) and in Indonesia is very important in the national economy. Moreover, SMEs have played a role in the absorption of labor, processing local resources, providing broad economic services to the community, the distribution process and increasing community income. In addition, SMEs potentially form more productive and competitive businesses. SMEs in Indonesia have a significant role in contributing to the economic development through providing employment, increasing GDP, and exports (Mead and Liedholm, 1998; Tambunan, 2008).

The economic crisis occurred in the past provided wisdom, namely the emergence of awareness and recognition to the importance of the role of SMEs in national development in Indonesia (Sulistyastuti, 2004). Because it plays a major role in job creation, the SMEs sector has a large contribution in sustaining household income, and at the same time reducing poverty (Mourougane 2010). In addition, SMEs also develop local economies and communities, create markets and innovations through their flexibility and sensitivity as well as the dynamic interrelationships between business activities, and contribute to increasing non-oil and gas exports (Urata, 2000).

In Indonesia, SMEs are the most dominant business entity, representing 99% of businesses in Indonesia and 97% of employment, but only 57% have more value (Berry et al., 2001; Mourougane, 2012). There are three main sectors of SMEs in Indonesia including agriculture; trade, hotel, restaurant; and manufacturing industry. In the manufacturing industry the activities comprise simple traditional manufacturing such as wood products, furniture, textiles, garments, footwear, food and beverages. Only a small number are involved in the production of machinery, production equipment and automotive components (Tambunan, 2010).

According to Sulistyastuti (2004), in the context of regional development, SMEs have proven to contribute a lot. A new paradigm in regional economic development known as the Modern Regional Policy is believed to provide greater and more sustainable benefits. The main argument in this perspective is that ideal development capital should originate or be encouraged from within the region concerned. There are two main things that act as the original development capital, namely Small and Medium Enterprises (SMEs) and technological developments (technological progress). SMEs play a role in regional development by reducing inequality because it has strong roots and links with the structure of the local economy (Giaoutzi et al., 1988).

To empower SMEs in encountering the era of the ASEAN Economic Community (MEA) and free markets, efforts need to be made to improve product quality, market access, and the use of appropriate technology in order to provide greater benefits and be felt by the surrounding community. Some aspects of innovation needed for SMEs in developing their innovations are (1) innovations in technology of production process, (2) innovations in marketing and networking, and (3) innovation in product design. By adoption of these technological innovations, it is expected that SMEs can compete at both the local and global markets. It requires the support of various aspects to implement these innovations and technology, including aspects of regulation, policy, finance, human resource capacity and technology.

Towards the Asean Economic Community (MEA), it is expected that products and services from both domestic and overseas can easily compete on the free market. To maintain the existence of SME products and make the MEA era an opportunity as well as a threat, strengthening the capacity of SMEs is one of the strategies to strengthen SMEs to be able to penetrate and compete with products from abroad.

Based on the description above, Karang Tengah Village, Imogiri District, Bantul Regency as one of the villages in the Special Region of Yogyakarta has the potential of natural resources, especially green hills which have not been optimally managed by the village community. Another potential that is owned by the village is SMEs which are scattered in the area of the Karang Tengah Village village with various types of businesses. The potential that has not been managed has become a problem for the village how to make this village an independent village with the theme 'Tourism Village'.

The purpose of this initiation activity based on the above problems is to (1) determine an area that will be the main zone for tourist visits and at the same time supporting zone so that a tourist area will be created (2) map ecotourism based on SME potential in Karang Tengah Village, and (3) building awareness among citizens, especially SMEs, to be able to make a breakthrough to increase business productivity through adaptive technology and broader marketing.

B. METHODS

The initiation of the establishment of Karang Tengah Tourism Village, Imogiri District, Bantul Regency was in accordance with the objectives (1) and (2) above, carried out by survey methods, implementation of Focus Group Discussion (FGD), mentoring and training. The rise problems are carried out identification and processing by the analytical descriptive method, namely making a problem solving by considering the arguments of Karang Tengah Village stakeholders and formulated together.

Meanwhile, to acomplish the goal (3) is carried out with the principle approach of technopreneurship to achieve a dynamic and sustainable business degree. The degree, according to Budiarto, et al. (2015), was stated to have been achieved if SMEs were able to fulfill various conditions as follows:

1. Dynamic Product Sustainability

SMEs are able to sustainably supply products to meet market needs that are very dynamic. Market dynamics are not only in terms of product quantity, but also in terms of variety, quality and service.

2. Dynamic Preservation of the Production Process

Product sustainability demands also mean a demand for SMEs to be able to carry out sustainable production processes. The production chain is guaranteed to be sustainable from the involvement of raw materials to final products. Quality assurance is applied so that there is a continuous improvement in quality (sustainable quality improvement).

3. Dynamic Preservation of Resources

The production process that refers to business targets is carried out without sacrificing the sustainable carrying capacity that should be provided by the environment. Here, the aspect of handling waste, for example, is a key word. The zero waste orientation becomes the corridor of control. The purpose of handling waste to be a byproduct that has high added value is one of the goals. In addition, exploitation of natural resources is carried out without exaggeration and is always within the limits of sustainable carrying capacity. Furthermore, human resources which play a role as a whole movement of SME activities are developed optimally.

4. Dynamic Preservation of Strategic Roles

Within the typical boundaries of the micro, small and medium dimensions, SMEs are able to sustainably play a dynamic role in strengthening the environmental, social and economic aspects of society and the village. Thus, SMEs are able to become one of the vital keys to the resilience and sovereignty of society, villages, nations and countries.

C. RESULT AND DISCUSSION

Morphologically, the area in Karang Teengah Village is in the form of hills or better known as Boekit Hijau with its use in the form of guava metedan cultivation with wild silk cultivation located on the hill. The hilly region which was developed as an Agro Tourism area. Agro tourism area or often called wild agro silk is located on the Karan Ttengah hill with an area of 55 hectares.

The search results carried out by the Survey Team from the Directorate of Community Service (UGM) with the Central Karang Village Head and staff and community leaders in Karang Tengah Village showed the potential of nature with a beautiful panorama on Bukit Hijau. On the hill, tourists can see the Oyo river on the south side, the beach on the southwest side, and the view of the city of Yogyakarta to the northwest. There was pelitasan Ki Ambarsari Sekarsari, Pelitasan Watu Wedok, Watu Gedek, WAtu Ambn and built gazebos-gazebos silk houses, cattle pens, parking lots, laboratories. The series of surveys and formulation of results are shown in Figure 1.



Figure 1. The Survey Team is conducting a survey in Bukit Hijau and coordinating the formulation survey results to make Watu Wedok Tourism Park Middle coral village.

Based on the results of the joint formulation, Karang Tengah Village confirmed the Bukit Hijau area to be the main tourist destination zone and was given the name 'Taman Watu Wedok'. The area as shown in Figure 2 is planned to include: (1) Bukit hijau BNI is one of the destinations where tourists can feel in the peak area of Bogor, (2) Watu Wedok Viewpoint will be able to spoil tourists with green views from rice fields , forests, rivers, and rural atmosphere. The utilization of this viewing station will be maximized by the construction of a café that has cultural nuances, (3) Watu Wedok is a large stone that has a hemisphere in the middle and there is water whose water will never run out even in the long dry season. The legend of Sultan Agung when he was going to build the Makan Raja-Raja area in Imogiri was very attached to the minds of indigenous peoples in Tengah Karang

Village, and would make Watu Wedok the main tourist destination zone, (4) Tomb of Nyai Ambarsari, would become a spiritual pilgrimage followers of Sultan Agung, (4) Watu Amben, Amben in Javanese is a place to sleep. It is said that here is the resting place of Sultan Agung while looking for land shipments from the King of Saudi Arabia, (5) Brenggo Gumuk is a place of prayer used by Sultan Agung and his followers while resting in the area. Until now, when prayer times are often heard the call to prayer comes from this stone, (6) Garuda Hill is a hill in the highlands so that if you are in this place it will fly like a Garuda bird, (7) Cultural Hall will be a place for displaying various artistic potentials in Karangtengah Village. The pavilion is already there but it can be considered less feasible to use so it must be repaired again and made so that it can be used as a suitable attraction for tourism. The pavilion already has toilet facilities and a prayer room but it is no longer functioning, (8) Herbal garden, currently the land still has cashew trees but in the future it will be replaced with herbs on the right side and send because the middle area of the park will be used to be a spectator stand from an event held at the Culture Hall. In addition. from this location, sunrise and sunset can be witnessed. (9) Parking Parks, the location of which is located opposite the outbound area, the main rest area will be built, equipped with workshops and center for SME-based souvenirs, (10) Outbound area, on site besides being able to be used as a place for outbound, it can also be used as a campground for both school children and the public.



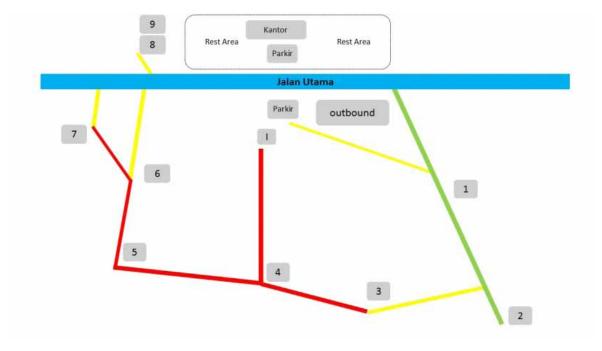


Figure 2. Local Map of Taman Watu Wedok Karang Tengah Village, and Map of Cycling Track 1 and 2.
Legend : 1. Bukit Hijau BNI, 2. Gardu Pandang, 3. Watu Wedok, 4. Makam Nyai Ambarsari, 5. Watu Amben, 6. Gumuk Brenggo, 7. Bukit Garuda, 8. Pendopo Budaya, 9. Taman Herbal, 10. Gardu Istirahat

While the results of the SME potential mapping show the distribution as shown in Figure 4. The types of SMEs in Tengah Karang Village include batik, food, drinks, handicrafts, and plantations. One example of SMEs in Karang Tengah Village is Peyek and Kripik Lekhan. Lekhan is a SME that produces tempe and peyet chips. The production process and showroom are on one roof in Numpukan Hamlet RT 02/12 Karang Tengah Village. The marketing process of Lekhan, according to him, did not experience many obstacles because there were already subscriptions, some even took directly to their production houses.

Acording to the discoveries at the field, financial calculations are performed in very simple technique, such as determining prices not adjusted for production costs. In fact, it can be said that the price since 2013 is still relatively the same because anxiety of the owners from losing their market due to price alteration.



Figure 3. The Economic Map of Karang Tengah based on Dsitribution of SMEs.

Based on survey, it is also found several problems that must be developed, including: work layouts that are still very prone to accidents in the work, risk management on fluctuations in raw material prices, healthier use of cooking oil, the use of very simple tools that are less hygienic and prone to occupational accidents, packaging that does not meet the minimum requirements to be able to enter the supermarket, less attractive labeling design, insufficient number of workers for greater production, and pricing and packaging that should be adjusted to market segments not at 'regular prices' or raw material prices.



Figure 4. Training in Adaptive Technology Capability, Online Marketing, and branding SMEs' product in Universitas Gadjah Mada.



Figure 5. Online Marketing of SMEs' Product through UGM Mall and Promoting Product through Village Working Program and SME's product Exhibitionn at Universitas Gadjah Mada

The problems coped by these SMEs are carried out with a technopreneurship approach. According to Dendi (2009), technopreneur is an entrepreneur who develops himself based on technology, science or art or in other words, technopreneurship is a technology and science-based entrepreneur. Form of technopreneurship, including the use of technology and science in the production, marketing and process product design. Related to this, through the Directorate of Community Service UGM held several training and mentoring activities for mastering adaptive technology and marketing development for SME players in Karang Tengah Village during the period of 2016 to 2017, which included (1) Product marketing training SMEs through Marketplace, (2) Training in uploading SMEs products on online media, (3) Adaptive technology assistance for cutting tempeh, bakpia packing presses, seasoning dough mixers, frying remover, long banana cutters, and oil extractor, (4) SMEs Digital Training and online payment (payPal), (5) Training on making branding of SMEs products. The implementation of training activities and training products in the form of examples of Lekhan product branding can be seen in Figure 4 and marketing of SMEs products through online media at UGM mall and through exhibition activities can be seen in Figure 5.

D. CONCLUSION

- The conclusion in the initiation of the formation and strengthening of Karang Tengah Village, Imogiri District, Bantul Regency as Karang Tengah Tourism Village is as follows:
- 2. It has been determined that the main purpose of tourist visits to Karang Tengah Village is the Watu Wedok tourist attraction, which will be developed into a tourist park with various supporting buildings.
- 3. A map of UMKM-based Karang Tengah Village ecotourism has been compiled.
- 4. Training and assistance have been carried out using adaptive technology and marketing.

Given that this activity is still an initial initiation, it is necessary to continue with activities that are more technical in nature and are suggested as follows:

- It is required to make a detailed map of the Watu Wedok Tourism Park area which is equipped with a grand design of tourist areas and integrated with the potential of SMEs.
- It is required to carry out more intensive assistance with the transformation of mastery and use adaptive technology to support the productivity of SMEs in Karang Tengah Village.
- 3. It is required to provide awareness for all elements of society about excellent service for tourists visiting the Karang Tengah Village area.

E. REFFERENCE

- Berry, E. Rodriguez and H. Sandee, 2001. Small and Medium Enterprise Dynamics in Indonesia, Bulletin of Indonesian Economic Studies, Vol. 37, No. 3, pg. 363-384.
- Budiarto, R., Saptoadi, H., Ridwan, M., Susilo, D.B., 2015. Pengembangan UMKM antara Konseptual dan Pengalaman Praktis. Gadjah Mada University Press. Hal. 97 – 99.
- Dendi, H., 2009, Pembentukan & Pembinaan TECHNOPRENEURdiSekolahMenengah Kejuruan, Makalah disampaikan dalam Seminar: "Membangun Entrepreneurship Sukses", Kelompok Kerja Sekolah Kejuruan (K3SK-SMK) dan Musyawarah Kerja Kepala Sekolah (MKKS-SMA), Yogyakarta.
- Giaoutzi, Maria, Peter Nijkamp and David J. Storey, 1988. *Small and Medium Size Enterprises and Regional Development*, Routledge, London.
- Maskun, S, 1994. Pembangunan Masyarakat Desa. Asas, Kebijaksanaan dan Manajemen, Media Widya Mandala, Yogyakarta.
- Mead and Liedholm, 1998. The Dynamics of Micro and Small Enterprises in Developing Countries. World Development, Vol. 26, No. 1, pp. 61-74

- Mourougane, A., 2012. Promoting SMEs Development in Indonesia, OECD Economics
- Department Working Papers, No. 995, OECD Publishing, available at http://dx.doi. org/10.1787/5k918xk464f7-en.
- Sulistyastuti, D.R., 2004. Dinamika Usaha Kecil dan Menengah (UKM), Analisis Konsentrasi Regional UKM di Indonesia 1999-2001. Jurnal Ekonomi Pembangunan Vol. 9 No. 2, Desember 2004 Hal: 143 – 164
- Tambunan, T., 2008. SME Development in Indonesia with Reference to Networking, Innovativeness, Market Expansion and Government Policy, in Lim, H. (ed.), SME in Asia and Globalization, ERIA Research Project Report 2007-5, pp.99-131
- Tambunan, T., 2010. Development and Some Constraints of SME in Indonesia, Research Institute of Economy, Trade and Industry, http://www.rieti. go.jp/jp/events/10100101/pdf/5-5_tambunan_ paper_en.pdf (accessed October 2, 2017).

DISASTER RESPONSE RECONSTRUCTION PROGRAMS IN TINATAR, PUNUNG, PACITAN

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ABSTRACT Tinatar Village, Pacitan Regency, East Java Province became one of the villages affected by landslides in 2017. This landslides were caused by the presence of Cempaka cyclone that hit Indonesia. It causes material and non-material losses. Community capacity in dealing with this disaster is very minimal and it makes poor condition. Tinatar has a lack of disaster alert infrastructure, community understanding of disaster education, and community empowerment. This conditions require the handling of post-disaster programs in Tinatar Village. This activities start from observation, field surveys, and community empowerment. Empowerment activities including: socialization of disaster preparedness and emergency, mapping and making disaster signs, security based on community, and development of tourism potential.

Keywords landslide, community empowerment, disaster preparedness

A. Introduction

Indonesia is a country with the label "super market of natural disasters", both disaster caused by Earth's activities, such as moving tectonic plates, volcanoes, as well as the disaster caused by the factor of hydrometeorology, such as floods, landslides, droughts, tropical cyclones and wildfires. Some of the potentially hydrometeorology disaster struck Indonesia nearly every year (Syaifullah, 2015). Landslide disaster becomes the most cause fatalities (BNPB, 2017). In the end of 2017, Indonesia affected by tropical cyclone formation Cempaka in waters south of the island of Java that caused the disaster in 28 counties and cities in Java (BNPB, 2017), flood, landslides, and whirlwind. Tropical cyclone is a rare hydrometeorology disaster in Indonesia because of its geographic position is located around the equator. Actually Indonesia is not the region that traversed by the path of tropical cyclone, but there is also a cyclone that formed around the waters of Indonesia and give impact on weather conditions in Indonesia (Syaifullah, 2015). Tinatar village located in Pacitan Regency, East Java province was one of many areas which severely affected by this Cempaka cyclone.

Tinatar village divided into seven areas and seven of them directly affected by landslide. There were no death victims in the incident, but landslide damage farmland and houses of citizens, but Krajan, one of the area is badly affected, thus must be relocated (Sujarismanto, 2017). In addition, that also ruined an alternative access road connecting the district Arjosari and Punung. Based on the results of the interview with the head of the village of Tinatar, 7 areas are directly exposed to the impact of the landslide. Among these, houses were badly damaged and closed access road in the area of Krajan, damages bridges and houses in the area of Buyutan. Landslide effects also still can be observed clearly to the present (see Figure 1.)

The village of Tinatar has a hilly morphology to mountainous with slopes slope, i.e. more than 30° and weathering processes and have a fairly intensive erosion on soil that is thin and less than two meter (Samodra, 2018). This condition causes the onset of movement-prone Tinatar Village land, especially in the rainy season. In addition, the position of the village of Tinatar which is located in the Valley of the river Tinatar is not stable. This is because the side slopes of the experienced erosion at the foot of the slope due to the flow of the river so that the slope of the slopes become larger, high-slope be incremented resulting instability of the slopes (Hardiyatmo, 2012).



Figure 1. Landslides in Buyutan and Ngemplak Areas

The physical condition given to the Tinatar village requires the citizens to understand start practicing disaster relief activities, one of it is to build community preparedness in the village of Tinatar. According to Law Number 24 year 2007 about Disaster preparedness is a series of activities conducted in anticipation of disasters through organizing and through appropriate measures. Based on that situation, KKN-PPM UGM Tinatar (student community service) has planned and conduced some projects to enhance people awareness towards disaster preparedness. We hope those activities can establish preparedness and increase public awareness of the disaster, particularly a disaster of landslide.

The activities of the community in here has a goal to steer Tinatar village as a "Desa Tangguh Bencana". Rules on Disaster Resilient villages have been regulated in the Indonesian Law of the national disaster mitigation Agency Head No. 1 Year 2012. In general, there are 16 principles relating to the development of the villages of disaster Resilient, i.e.; (a) the disaster was joint affair, (b)-based disaster risk reduction, (c) the fulfilment of the rights of communities, (d) the community becomes the main perpetrator, (e) done in a participatory, (f) mobilization of local resources, inclusive (g), (h) based on the humanity, (i) fairness and gender equality, (j) alignments on vulnerable groups, (k) transparency and accountability, partnership (l), (m) multi-level threat, (n) autonomy and decentralization of Government, (o) design perspective into sustainable development, (p) held in cross-sector (chapter III, regulation of the head of the national disaster management Agency number 1 Year 2012).

Observations in the field indicates the readiness of the village of Tinatar in the face of the disaster is still lacking. This condition is identified from the absence of an organized group or specifically to cope with the disaster. The community still feel comfortable and feeling safe because it has not happened since 1983 (halopacitan.com, 2018) and suddenly it happened before their eyes. In 2017, students community service form UGM based in Tinatar had installed Early Warning System (EWS) to reduce the risk of landslide risks, however, EWS cannot be used anymore because there was no person in charge. Few EWS spread around the village also become additional factors in EWS failure. Because of that, the activities of psycho-education has also been carried out by a team of KKN UGM

Tinatar last year even though the team has not seen any direct impact from those programs. Thus, there is need for a new effort can be realized directly in the community after the landslide, including disaster preparedness and socialization for emergency warning, mapping landslide and manufacture signs disaster also community based early warning. This empowerment program is hoped to enlighten people's awareness towards disaster and developing the tourism in Tinatar thus resulting in economy enhance.

B. Problems

In the end of 2017, community service performed by students of the Universitas Gadjah Mada in the landslide. Tinatar village has a hilly area in the form of morphology to mountainous slope by degrees $> 30^\circ$. The thin soil conditions (< 2 meters) are experiencing further weathering so many found the rock which causes the firmness of the soil to be weak, especially when exposed to rain, then the land would be easier to move (Samodra, 2018). The Tinatar village has several sources of water. It could be one of the triggers landslide due to the presence of springs on the neck of a slope that add the pressure to the land. According to Survolelono (2003) the emergence of a water source at the foot of the slopes could cause erosion of the reeds (piping). Piping caused the landslide-prone area become slopes.

Based on information submitted by the community, the landslide occurred because of rain for several days. Suryolelono (2003) delivered a landslide factors is the increase of the weight of the load on the slope. The increase of the load can be derived from nature, among other infiltration rain water into the ground at the open slope, and causing the moisture content of the soil increases. The soil became saturated. The weight of the soil increased volume and load the slope's weight.

Furthermore, related to the readiness of the society face disaster, community capacity is less. It is driven by the fact that the landslide in 2017, is the first major landslide in three decades. In addition, data obtained through interviews of researchers showed that society anxiety is only a landslide happened in rainy season. When summer comes, people will feel safe.

The village disaster preparedness is still lacking. This condition can occur because of a number of tools that are a still less, maintenance, and development of community-based also lacking. Disaster resilient village infrastructure is also not yet fully exist (BNPB, 2012). As a result, residents have not had the full awareness and preparation towards disaster.

The economic conditions of the community after the disaster, the public Tinatar have hung their economies on agricultural land in the hills and slopes. The main products of the land in the form of rice and inventiveness (turmeric, temulawak, and more). It was feared when the land could not be prossesed (because of the avalanche), the public cannot boost their economy.

C. Method

1. Setting

This disaster response reconstruction program performed in Tinatar, Punung, Pacitan, East Java. The programs performed include the seven areas, namely Petung, Pakis, Ngemplak, Buyutan, Krajan, Ngasem and Pagutan. Community service performed on the Kuliah Kerja Nyata (KKN) during 60 days, from June, 24 to August, 10 2018.

2. Steps description and method

This programs are conducted with three comprehensive stages. First, data collection through the activities i.e., field survey, key informant interviews - the village head and selected people randomly selected in every neighborhood or neighborhood of Tinatar. Field survey activities carried out to find out the distribution and the characteristics of a landslide. Then, we run the plotting by using Global Position System (GPS). Interviews were also conducted to know the incidence and extent of understanding of the people against the landslide disaster preparedness. We used a detailed questionnaire. The second step, i.e. data processing results of field activities and interviews with the use of ArcGIS mapping application. This step intend to map the distribution point as well as a basic determinant of a landslide to set up the signs of disaster. In addition, the second phase also includes logging and settlement in the village of Tinatar to know the number of people's vulnerable to disasters. The result of this second step is a basis of the third stage of the service. The third step i.e. socializing landslide disaster preparedness by using two instruments activity. The first activity is socializing with exposing data the results of the activities of the field and processing data about the spread of point landslide, placement of signs, and disaster preparedness training. The second activity was a disaster psychoeducation to elementary school children through an informative and educational activities to enhance understanding of the disaster. In addition, the final stage of the activities undertaken include an empower on economic recovery by the tourism attractions. The goal is to make a tourism activities as an alternative way to rebuild the economic of people community in Tinatar village sustainably, typically after the disaster.

D. Discussion

The community services program in Tinatar Village was held on 24 June 2018-10 August 2018. The following programs carried out:

1. Socialization of disaster preparedness and emergency

Kamil (2014) said that, one of the activities in the pre-disaster is a socialization about the disaster. The other activities are the installation of Early Warning System (EWS) and others support equipment (Kamil, 2004). So, we do the socialization of disaster preparedness and emergency in collaboration with the Government of Tinatar Village and Tinatar Village health centers (Puskesmas Pembantu Desa Tinatar) (see Figure 2 and 3). The socialization of disaster preparedness presented by the National Agency of Disaster (BNPB) of Pacitan Regency. The implementation of these activities are based on lack of knowledge of the people about the disaster. They did not aware about the disasters because this large landslide has just occurred after 34 years ago (halopacitan.com, 2018). According to Rachmalina, Friskarini, & Manalu (2010), the formation of the village the most basic, idle that is the presence of medical personnel and the cadres of health cadres. Therefore, we try to do empowerment for cadres ready through emergency and first aid practice at accidents submitted by Clinic Assistants of Village. The expectation, cadres

ready can understand the basic techniques in the rescue of victims in case of a disaster.

Socialization of disaster preparedness presented by BNPB is aimed to build Disaster Resilient Village (Desa Tangguh Bencana). BNPB expects Tinatar village can be a pioneer of resilient village to face the disaster. Some preparation such as disaster preparedness, evacuation lines map, signs of the disaster, socialization of emergency, disasters simulation, and so on must be done to support this goodwill.



Figure 2. Disaster Preparedness Socialization



Figure 3. Emergency Practice

2. Mapping and making disaster signs

Landslide mapping and set up the signs of disaster based on the results of observation and interviews to the entire village of Tinatar. This observation and interviews run in a month and we get the information from head village and also the people from random houses (informant key). The informant key is estimated to be able to provide data or information about landslide and demography. Landslide plotting also carried out to know the spatial spread and intensity of the disaster opportunity. Landslides can be identified through some traits, the appearance of cracks and wrinkles on the surface of the slope (Hardiyatmo, 2012), and can also be viewed directly from the landslide, such as the crown, the avalanche, scarp, and etc. Identification of landslide intensity from small to large is a qualitative and subjective votes because of the absence of direct measurement in this activity. The result of the activities of the field observations showed that there are more than 35 point landslide with mild to severe intensity. The point most avalanche found about cliff road axis, where the occurrence under cutting erosion there is slope (Kartasapoetra, 2005, Disaster Geography, 2017). Point landslide on cliff road cutting results are classified as areas that have a medium degree of vulnerability (Nugroho, et al., 2012). Meanwhile, the point of great intensity with a landslide can be found in the cliffs around the river as a result of erosion at the foot of the slope due to the flow of the river (Hardiyatmo, 2012) in the area of Buyutan, and on the streets of the Krajan area (see Figure 1 and Figure 4).



Figure 4. A Large Landslide in Krajan which Photographed from Watu Gede, Ngemplak

The results of the mapping of landslide distribution point (see Figure 6) as the basis in determining the amount of signs of the disaster that will be installed as one of the formidable village development infrastructure in the disaster. Signs of the disaster include, landslide warning, evacuation spot, and assembly point sign. Installation of several catastrophic signs (see Figure 5) is determined based on the results of discussions with key informants and the assessment of the facilities owned by the village. A wider places such as a mosque, a meeting hall, security post (Poskamling), and schools used to be an assembly point.



Figure 5. Installation of Landslide Signs

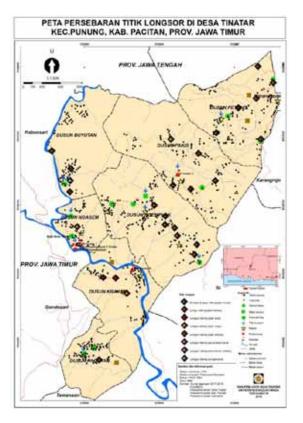


Figure 6. Landslide Distribution Map of Tinatar Village

3. Security based on community

Increasing public awareness related to landslide realized by optimization of *Poskamling* (see Figure 7). According to Fredryansyah (2018), the local values can be entered in the handling of pre-disaster, namely *Poskamling* which features a slit drum. There are 14 points we did the addition of the poster attribute in *Poskamling,* information boards, and posters about the landslide. Fourteen point *Poskamling* has had a slit drum as a sign of danger as a warning system. If there is a landslide, the public can use it in emergency situations and disaster information can spread widely.



Figure 7. Security Based on Community in Pagutan

4. Development of tourism potential

Warm springs in the Tinatar village is in the area of Krajan. In this village there are four points of discharge of warm springs. Of the four that point there is a spring that has been used by residents with a way to make the shelter form the pool. According to the information that is written on the edge of the pond, making shelter or warm water have been made since the year 1970 and named Tirto Wiyono. Spring Tirto Wiyono teetering on the edge of a river that has an interesting view. Thus, the village has expectations to make this warm springs as a tourist attraction. Through discussions between the team and the villager, eventually it was decided to start pioneering tourism potential by making the board description. We also fix the access road to go down into the warm spring water source (see Figure 8 and Figure 9). The activities of the employment service is done together with local people to clear road access. Then, we do the installation of a fence around the site for security reasons and also the art in this tourism object. The development of tourism has close links with the economic development of the region. The advantages and the benefits for community are a lot of concern (Yoeti, 1997, in Haryanto,

2014). As well as on the source of the springs Tirto Wiyono. Later, the management will be handed over to the local people in order to manifest a more self-contained village community in particular economically. After the installation was completed, the villagers have had to use these objects to test the activity of flying fox across the river and as the location of transit road. Hope in the future local people can benefit from the tourism potential of this stub and support sustainability.

E. Conclusion

Disaster response reconstruction programs in Tinatar have been implemented. Among the programs that have been carried out are the Socialization of disaster preparedness and emergency, Mapping and making disaster signs, Security based on community, and Tourism-Based Economic Improvement: Development of Potential Warm Water *Tourism.* These programs are carried out in the context of community service and for directing Tinatar village to villages that are resilient to disasters. We hope that various programs can be more optimal and useful. They needed guidance and supervision from various parties.

F. REFERENCES

Badan Nasional Penanggulangan Bencana. (2012). Buku Saku Tanggap Tangkas Tangguh Menghadapi Bencana. Jakarta.

> . 2017. 2.341 Kejadian Bencana, 377 Tewas dan 3,5 Juta Jiwa Mengungsi dan Menderita Akibat Bencana Tahun 2017. *Berita*. Diakses melalui: bnpb.go.id/2.341

kejadian-bencana-377-tewas-dan 3,5-juta-jiwa-mengungsi-danmenderita-akibat-bencana tahun 2017 pada tanggal 21 Oktober 2018.

- Disaster Geografi UGM. 2017. Bahaya Longsor. *Berita*. Diakses melalui: disaster.geo.ugm.ac.id/index.php/ berita/bahaya-longsor pada tanggal 31 Oktober 2018.
- Fedryansyah, M., Pancasilawan, R., Ishartono. (2018). Penanggulangan Bencana di Masyarakat Desa Studi di Desa Cipaning, Desa Cileles, dan Desa Cikeruh Kecamatan Jatinagor Kabupaten Sumedang. Social Work Jurnal Vol 8 hal 11-16.
- Halopacitan.com. 2018. Laporan Gerakan Tanah Pacitan: Tiga Dusun di Desa Tinatar Tetap Harus Waspada. Diakses melalui: halopacitan.com/read/ laporan-gerakan-tanah-pacitan-tigadusun-di-desa-tinatar-tetap-haruswaspada pada tanggal 21 Oktober 2018.
- Hardiyatmo, C.N. 2012. *Tanah Longsor dan Erosi Kejadian dan Penanganannya*. Yogyakarta: Gadjah Mada University Press.
- Haryanto, JT. (2014). Model Pengembangan Ekowisata dalam Mendukung Kemandirian Ekonomi Daerah Studi Kasus Provinsi DIY. *Kawistara* Vol. 4, No. 3, Hal 271-286.
- Kamil, G.R.N.I. (2014). Manajemen Bencana pada Kegiatan Pra Bencana. *Skripsi*. UNEJ.
- Nugroho, U., Cahyo A. H. T., dan Purnomo, M. 2012. Mekanisme Longsoran Lereng pada Ruas Jalan Raya Sekaran Gunungpati Semarang. *Jurnal Teknik Sipil dan Perencanaan*, vol. 14, No. 1, Hal 71-80.

- Peraturan Kepala Badan Nasional Penanggulangan Bencana Nomor 1 Tahun 2012 tentang Pedoman Umum Desa/Kelurahan Tangguh Bencana.
- Rachmalia, S.P., Friskarini K., Manalu, H.S. (2010). Pemetaan Kesiapan Desa Menuju Desa Siaga di Lima Propinsi. Jurnal Ekologi Kesehatan Vol 9. Hal 1248-1253.
- Samodra, G. 2018. Longsor Desa Tinatar Pacitan Tahun 2017. Artikel. Diakses melalui: longsor.psba.ugm. ac.id/2018/08/20/longsor-desatinatar-pacitan-tahun-2017/ pada tanggal 21 Oktober 2018.
- Sujarismanto. 2017. Longsor Parah, Ratusan Warga Tinatar Mengungsi. Diakses melalui: m.pojokpintu.com/baca. php?idurut=57144 pada tanggal 21 Oktober 2018.

- Suryolelono, K. B. (2003). Bencana Alam Tanah Longsor Perpektif Ilmu Geoteknik. *Pidato Pengukuhan Jabatan Guru Besar*. Yogyakarta: UGM.
- Syaifullah, M. D. 2015. Siklon Tropis, Karakteristik dan Pengaruhnya di Wilayah Indonesia Pada Tahun 2012. Jurnal Sains dan Teknologi Modifikasi Cuaca, vol. 16, hal: 61-71.
- Undang-undang Republik Indonesia Nomor 24 Tahun 2007 tentang Penanggulangan Bencana

YOUTH AND HEALTH CARES EMPOWERMENT TO INCREASE THE NUMBER OF YOUTH VISITS TO POSBINDU

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- Posbindu is an integrated health post for people aged 15-50 year-old held by **ABSTRACT** community. Government urge Posbindu to be carried out routinely at the hamlet level. Unfortunately, after two years running, the number of Posbindu visits especially teenagers in Cabeyan Hamlet was very low. The aim of this Community Partnership Program (CPP) is to increase the number of visits of youth to Posbindu in Cabeyan Hamlet, Panggungharjo Village, Sewon Sub-district, Bantul Distric so that youth are monitored regularly for their health. The partners involved were health cadres and youth in Cabeyan Hamlet, all of whom numbered 50 people. The activities were carried out during September 2018, namely the socialization of Posbindu, team-building training between health cadres and youth, counseling on non-communicable diseases, health examination training, organizational strengthening and brain-storming of income opportunities for self-financing so that the sustainability of this program will be maintained. To increase the visits to Posbindu, it was agreed that the implementation of Posbindu would be accompanied by community gatherings, such as youth meetings, gathering of mothers, etc. Teenagers are trained to conduct health checks on their own friends. Health cadres and youth are scheduled to become health workers at each community meeting. The community agreed that Posbindu's cash will be taken from the community's cash. In addition, community agreed to utilizing vacant land by growing vegetables and fruit, later crops can be sold to increase Posbindu cash. This CPP provides grants in the form of two packages of medical devices, also fruit and vegetable seeds for planting in community gardens. In addition, the Panggungharjo Village Government supported this program by providing assistance in the form of medical devices and funds for Posbindu coordination meetings.
- **Keywords** empowerment, youth, teenagers, health cadres, non-communicable disease, Posbindu

A. INTRODUCTION

Non-communicable diseases (NCD) are the biggest killers in the world with 35 million deaths each year from around 60% of all deaths, especially heart attacks, strokes, diabetes mellitus, cancer, chronic lung disease and traffic accidents (Kiting, Ilmi, & Arifin, 2017). In developing countries such as Indonesia, the majority of the disease has been shifted from infectious disease to noncommucnicable disease (NCD). NCD control in Indonesia is implied in UU RI No.36 tahun 2009 concerning about non-communicable disease, the efforts to control it: preventive, controlling, treatment; and the effects made by the disease (Umayana & Cahyati, 2015). An example of NCD control made by the government through the Ministry of Health (MOH) in 2014 was developing a program named Pos Pembinaan Terpadu (Posbindu).

Posbindu NCD is a community participation in early detection and risk factors monitoring of the main NCD. This is an integrated, routine, and periodic activity. NCD risk factors are smoking, alcohol consumption, unhealthy eating habbits, minimum physical activity, obesity, stress, hypertension, hyperglycemia, and hypercholesterolemia. Early detection and management of these risk factors can be achieved by *Posbindu* through medical counseling and referring to primary health care (Depkes, 2012).

Posbindu targets healthy population, the population with risk factors, and population with non-communicable disease, aged 15-50 year old. *Posbindu* has been adapted in some districts in Indonesia, for example in Panggungharjo Village, Sewon District, Bantul Regency. Panggungharjo village consists of 14 hamlets and divided into 118

RT which inhabit 560,966.5 hectares area. Panggungharjo village is near Yogyakarta city, the capital of D.I.Yogyakarta province.

Panggungharjo village was the first winner in Lomba Desa dan Kelurahan Tingkat Nasional held by the Ministry of Home Affairs (MOHA) in 2014. Improvement is continuously developed, one of them is in the health sector. Posbindu in Panggungharjo village has been run in Sorowajan hamlet, Dongkelan hamlet, and Cabeyan hamlet. The launching of Posbindu in Cabeyan hamlet was held in April 2017 by the Chairperson of the Construction Family Welfare (Pembinaan Kesejahteraan Keluarga/PKK) in Bantul Regency. Cabeyan's population consist of 1,540 people, divided into 7 sub-hamlet (Rukun Tetangga). This hamlet is located in the south-east part of the village, along with Parangtritis street km 7.

Posbindu "Ducasera" (Dusun Cabeyan Sehat Sejahtera), as Group 1, is categorized as "pratama" because they are newly formed. This Posbindu was launched on April 23, 2017. Posbindu "Ducasera" has 12 health cadres. Among the cadres, only one cadre who had been practically trained in the level of Bantul Regency for a week and the rest have attended one day NCD training by Primary Health Care. However, the Health Office has criteria for cadres who are allowed to take part in the training, which is at least high school level education. Cadres are voluntarily recruited from the Cabeyan community and they are mostly housewives. Actually, there are many young mothers who are potential to become cadres in Cabeyan. But, because their education background is junior high school and haven't been trained, they don't have enough knowledge to become Posbindu cadre.

Until July 2017, "*Posbindu* Ducasera" (*Dusun Cabeyan Sehat Sejahtera*) has carried out 4 activities. They already have a weight scale for medical examination. But, according to Ministry of Health, a *Posbindu* Pratama must have a tool to measure abdominal circumference, a sphygmomanometer/ tensimeter, and a fat analysis. The Health Office will provide the tools if the program has been routinely running and the community is actively involved.

Posbindu Ducasera is currently carrying out its activities at the hamlet chief's house, together with *Posyandu Balita* and *Posyandu Lansia*. And until now the *Posbindu* board has not yet been formed. This house is used alternatively for other activities so the equipment and administrative books related to *Posbindu* are stored in the warehouse. To date, people who attend the *Posbindu* are housewives. The youth have never attended *Posbindu* to check their health status.

Group 2 is youth (*pemuda Karang Taruna*) Cabeyan hamlet. Youth rarely visit health care provider because they are in a productive age with a good physical condition without any health complain. Furthermore, there isn't any health care provider that can be easily accessed by youth in their school age.

There are around 100 youth in Cabeyan hamlet who join some youth associations. There are 4 youth associations in Cabeyan hamlet. They are *Ikatan Remaja Cabeyan (IRCA), Warga Muda Cabeyan (WMC), Galang, and* Mosque youth. There are many youth associations because the Cabeyan hamlet which is consist of 7 sub-hamlet is separated by the rice field. They are actively doing many positive activities, independently or collaborate with the government, Primary Health Care, etc. For examples are Ramadhan activities, social activity with students community service program *(Kuliah Kerja Nyata /KKN)*, Independent Day celebration, etc. This is a potential to optimizing *Posbindu* programme for youth.

After conducting a situation analysis, there are some issues related to the implementation of *Posbindu* for youth. First, youth have never attended *Posbindu* after two years running. Second, youth don't have medical examination skills so the examination must be done by the cadres. This can inhibit *Posbindu* activity because of limited cadres. Third, *Posbindu* doesn't have their own medical examination equipment.

To overcome these problems, a service team from Department of Biostatistics, Epidemiology, and Population Health, Faculty of Medicine, Public Health, and Nursing develops a programme named "Community Partnership Program (CPP) *Posbindu* Cabeyan hamlet". The general objective of this programme is to increase the number of youth visit in *Posbindu* Cabeyan Hamlet. Youth, as a nation's successors, need to have their health routinely monitored so any disease can be early detected.

B. METHODS

In order to ensure this programme is carried out properly, we started the programme with the socialization. The socialization was carried out to the relevant parties including the local government, youth, and the residents of Cabeyan hamlet where the programme is implemented. With this activity, we expected a support from them both institutionally, morally, and materially.

This program involves two community groups as partners. Group 1 (Posbindu cadre) and Group 2 (youth/Pemuda Karang Taruna) have provider and customer relationship so the approach for them is not entirely separated for each other. The approach is carried out to build a synergy, familiarity and a common perception between them. This activity was held on September 2018, including an introduction to Posbindu, team-building for cadre and youth, counseling about non-communicable disease especially about nutrition, adolescent reproductive health, basic medical examination training, institutional strengthening and discussion about business opportunities. The last activity was held to make sure Posbindu can continue their activities independently after this programme.

The number of youth visit to *Posbindu* after PKM is assessed to decide whether this programme is success or not. Furthermore, we also assess cadre and youth's knowledge and skills related to *Posbindu*. Their knowledge was measured by pre- and posttest. Pre-test was held before starting the programme and post-test was held after the cadre and youth already finished all PKM activities. Their skill was measured by observing their performance when conducting medical examination. The results of the measurement conclude as correct or incorrect.

A qualitative and quantitative analysis is conducted to assess the result. Quantitative analysis is used to calculate the increase from pre-test to post-test. Qualitative analysis is used to assess the skill improvement through observation, focused discussion and Group's agreement.

C. RESULTS AND DISCUSSIONS

The first activities are pre-test and introduction about *Posbindu* and NCD. Table 1 shows pre-test and post-test result in both Group. The highest score is 15 (all answer are correct). The pre-test score mean from 50 people is 8.6 and the post-test score mean is 12.16. The mean difference shows that there is an increasing score from pre-test and post-test after finishing CPP activities.

Vari	iable	n	Mean	Confidence	Interval 95%
Knowledge	Before	50	8,6	7,851	9,349
	After	50	12,16	11,331	12,989

Table 1. Pre-test and post-test mean about *Posbindu* and NCD

Figure 1 shows the comparison of pre-test and post-test score between Group 1 and Group 2. Pre-test score for both Groups are almost the same. The difference score between pre- test and post-test is higher in youth group, but it is not statistically significant.

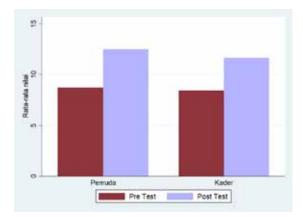


Fig. 1. Pre-test and post-test score in youth and cadre group

The team-building training was held in Goa Cemara beach. Both Group were put together and divided into 4 groups. The training consists of some games to build a synergy and teamwork. Figure 2 shows one of the activities during the team-building training.



Figure 2. Team-building training activity

Problem identification found that *Posbindu* timing, which is 9.00 a.m., is not possible for youth to come. This is the reason why youth never come to *Posbindu*. At 9.00 a.m., most of them are in school, university, or working. After they discussed this problem, there is an agreement that *Posbindu* will be held together with the other community

activities such as youth association meeting, sub-hamlet meeting, mosque youth meeting, etc, that usually held monthly at night. Youth were trained to conduct medical examination so they can do it independently and help the cadres. This also makes *Posbindu* finish faster. Cadre and youth are rotated to do medical examination according to the schedule of the association meeting. Figure 3 shows the medical examination training for youth.



Figure 3. Abdominal circumference measurement training

Residents of Cabeyan agreed that the maintanance of medical equipment will be taken from each association cash. So there is no more dues for *Posbindu*. This are the best solution that will not be a burden to the community. In addition, youth and cadres agreed to raise funds by utilizing their own yards to plant vegetables and fruit. The vegetables and fruit can be self- consumed for nutrition improvement and can also be sold at the nearest vegetable or fruit market to increase *Posbindu* income.

Through CPP, *Posbindu* Cabeyan hamlet received a grant consists of two packages of medical examination tools, also papaya seeds to be distributed to the community to be planted in their own garden. The medical examination tool packages are stored in the hamlet chief's house and will be taken if there is an association meeting schedule. This programme also launched youth health card to record their health status including body weight, body height, abdominal circumference, thickness of fat, blood pressure, blood hemoglobin level, blood sugar levels, and blood cholesterol levels. If there is an examination that is not within the normal range, they will be referred to the nearest Primary Health Care.

In October 2018, *Posbindu* for youth began to take place in the youth association meeting. The first medical examination was accompanied and monitored by the UGM team. From the observation, we concluded that youth, with or without cadre's supervision, had been able to carry out basic medical examinations among themselves. There are two youth who are studying health major, midwife and nursing academy. They can become a role model for their peers. All examination results are recorded properly in the *Posbindu* book.

This activity was welcomed by youth, cadres, and local government. *Posbindu* Cabeyan hamlet organization was formed with cadres and youth as administrators and hamlet chief as an advisor. Figure 4 is a photo of the hamlet's chief, the UGM team and all participants of the Community Partnership Program *Posbindu* Cabeyan hamlet. The Panggungharjo Village Government will provide a package of medical examination equipment for *Posbindu* and funds assistance for the *Posbindu* coordination meeting. The Primary Health Care as the institution in charge of the implementation of *Posbindu* can routinely monitor and managing medical examination results in *Posbindu* (Pranandari, Arso, & Fatmasari, 2017).



Figure 4. UGM team and CPP Partner *Posbindu* Cabeyan Hamlet

Youth *Posbindu* have not been widely promoted in the other regions. The author has not found any article reporting *Posbindu* for youth. So far, *Posbindu* that has been well developed is *Posbindu* for the elderly (Putri & Andriyani, 2018). This program is expected to motivate the emergence of *Posbindu* for youth in other regions.

D. CONCLUSION AND RECOMMENDATIONS

Community Partnership Program (CPP) activities in Cabeyan hamlet managed to increase the number of youth visits to *Posbindu*. Furthermore, CPP activities have also increased the knowledge of Non-Communicable Diseases (NCD) and increased skills of cadres and youth regarding basic medical examination. The local government welcomed the implementation of this activity. Sustainability of *Posbindu* is supported by community association funding and the communitys agreed to use vacant land in their yard to plant fruit and vegetables to support *Posbindu* income.

Author and UGM team hopes that *Posbindu* for youth will be held continuously and youth will actively visit *Posbindu* to routinely monitor their health status. The emergence of diseases can be detected early to get better treatment through *Posbindu* activity. The local government and the Primary Health Care should support the sustainability of these activities with their respective capacities. Sustainability of this CPP can be a pilot project and an example for the other *Posbindu* in different age groups and in the other regions.

E. REFERENCES

- Anonym, "Profil Desa Panggungharjo" http://www.panggungharjo.desa.id/ wilayah/, tanggal akses: 12 Juni 2017
- Anonym, "Pencanangan Posbindu di Dusun Cabeyan"
- https://puskesmas.bantulkab.go.id/ sewon2/, tanggal akses:12 Juni 2017
- Anonym, "Peta Desa Panggungharjo", http:// bkm.panggungharjo.net/profil-desa/ data- umum/ , tanggal akses: 13 Juni 2017
- Anonym, "Profil LPPM UGM", http://lppm. ugm.ac.id/ , tanggal akses: 15 Juni 2017
- Anonym, "POSBINDU PTM", http://www. indonesian-publichealth.com , tanggal akses: 15 Juni 2017

- Anonym, "Renstra Pengabdian UGM", http://lppm.ugm.ac.id/wpcontent/ uploads/2017/06/Renstra-UGM-2012-2017.pdf, tanggal akses: 21 Juni 2017
- Depkes, R. (2012). Laporan Pendahuluan: Survey Demografi dan Kesehatan Indonesia Tahun 2012: Jakarta: Pusat Penelitian dan Pengembangan Kependudukan.
- Kiting, R. P., Ilmi, B., & Arifin, S. (2017). FAKTOR YANG BERHUBUNGAN DENGAN KINERJA KADER POSBINDU PENYAKIT TIDAK MENULAR. Jurnal Berkala Kesehatan, 1(2), 106-114.
- Pranandari, L. L., Arso, S. P., & Fatmasari,
 E. Y. (2017). Analisis Implementasi
 Program Pos Pembinaan Terpadu
 Penyakit Tidak Menular (Posbindu
 PTM) di Kecamatan Banguntapan
 Kabupaten Bantul. Jurnal Kesehatan
 Masyarakat (e-Journal), 5(4), 76-84.
- Putri, S., & Andriyani, S. (2018). Needs and Problems of Posbindu Program: Community Health Volunteers Perspective. Paper presented at the IOP Conference Series: Materials Science and Engineering.
- Umayana, H. T., & Cahyati, W. H. (2015). Dukungan Keluarga Dan Tokoh Masyarakat Terhadap Keaktifan Penduduk ke Posbindu Penyakit Tidak Menular. Jurnal Kesehatan Masyarakat, 11(1), 96-101.

A NEW APPROACH OF COMMUNITY ENGAGEMENT FOR HARLEY DAVIDSON CLUB INDONESIA (HDCI) DIY: BUILDING A NON- COMPETITION BASED MARKET FOR VILLAGE BY USING GLOBAL GOTONG ROYONG (G2R) TETRAPRENEUR MODEL

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Poverty alleviation program that mostly implemented until in 2000's is tend in ABSTRACT a form of monumental or physical development with mechanism of handling yet the surface only or as called 'Cinderella Program'. A new approach of program Global Gotong Royong (G2R) Tetrapreneur is one of the innovation efforts in order to alleviate poverty and reduce the level of economic inequality that is still quite high in DIY. In 2018, the G2R Tetrapreneur model is first performed in Girirejo and Wukirsari Villages, Imogiri District, Bantul District and still has been going on until 2023 ideally. Girirejo was chosen because the poverty rate was quite high, while Wukirsari with a high level of economic inequallity. Both villages were trained and assisted to invent superior village products. Stages in G2R Tetrapreneur consist of Chainpreneur (Tetra 1), Marketpreneur (Tetra 2), (Tetra 3) Qualitypreneur, (Tetra 4) Brandpreneur. This article shall discuss in a best practice approach for the implementation case for Tetra 2, Marketpreneur, namely building the non-competition based market by the Harley Davidson Club Indonesia at Yogyakarta Special Region (HDCI DIY). It is in line with the vision and mission of HDCI DIY in the social and tourism field. The non-competition based market that create by HDCI DIY is manifested at event of HarleyDABantul is a touring event which is part of the yearly program. The event is followed not only by the Harley Davidson, but also by many various motorcycle clubs in DIY and others districts. The end point of the touring is at G2R Tetrapreneur's villages are Wukirsari and Giriejo, Imogiri, Bantul.

Keywords HDCI DIY; G2R Tetrapreneur; Marketpreneur; Community Engagement.

A. INTRODUCTION

Harley Davidson Club Indonesia (HDCI) was established since 1990. Many people are not aware that HDCI is not only an "just" a motor club, but HDCI is a legitimate organization which is registered in Ministry of Law and Human Rights and Ministry of Internal Affairs of Republic Indonesia (Kemenhum RI). Therefore, HDCI is liable by law and all of their activities are accountable accordingly.

According to HDCI's Pocket Book (HDCI, 2012), HDCI's vision is to makes a hobbybased organization that drives with the most respected Harley Davidson motorcycles and has a good reputation not only domestically also internationally. The vision is in line to one of the HDCI's mission with regards to the community engagement, which is, acting in social activities, especially caring for the poor and victims of natural disasters. One of the execution for the community engagement mission is by performing as partner of Global Gotong Royong (G2R) Tetrapreneur per August 2018. One of the real action as the partner of G2R Tetrapreneur is done by HDCI at Special Region of Yogyakarta (HDCI DIY) by organizing event of HarleyDABantul in October 2018.

In addition, HarleyDABantul is also an implementation of HDCI DIY's mission as a DIY tourism ambassador and is expected to be a barometer of automotive activities that can promote togetherness and brotherhood between motorcycle communities. There are around 200 motorbike riders from across motorbike clubs in DIY, Central Java, Bali, Cilacap and Kustomfest visitors who come from domestically and internationally that join together in HarleyDABantul. Furthermore, HarleyDABantul is also attended by motor clubs with disabilities.

This paper consists of Introduction, Literature Review which consist of (a) Values of HDCI DIY; (b) Tetrapreneur Model: The 4 Pillars for Entrepreneur Movement; and (c) G2R Tetrapreneurs, Research Method & Analysis, Result & Discussion, Conclusion, and References.

B. LITERATURE REVIEW

Literature review consist of (a) Values of Harley Davidson Club Indonesia (HDCI) D.I.Yogyakarta; (b) Tetrapreneur Model: The 4 Pillars for Entrepreneur Movement; and (c) G2R Tetrapreneur;

1. Values of Harley Davidson Club Indonesia at Special Region of Yogyakarta (HDCI DIY)

HDCI branch Yogyakarta as an organization upholds a number of values to be applied both among fellow HDCI members and to parties outside the organization. Values among the fellow members are togetherness, brotherhood and family. Meanwhile, values into the environment are inclusive, horizontal, and social.

Togetherness, brotherhood and kinship are interrelated values. Through many activities including touring, a sense of togetherness will arise along with the interactions that occur in it. The members increasingly get to know each other then the intimacy will arise and also the value of brotherhood will be stronger. Solidarity of brotherhood brings a spirit of kinship which is at the same time a value to be achieved (HDCI, 2012).

The HDCI branch Yogyakarta in its activities and interactions with parties from outside of the organization adheres to three values, namely inclusive, horizontal and social. HDCI does not consider itself exclusively. HDCI members are expected to be able to see from another perspective when responding to something so that family values are not misinterpreted to be blind fanaticism. HDCI places itself as a member of society in general in the same position (horizontal). In addition, in every behavior and creativity that is related to the HDCI community as well as possible social value to them.

2. Tetrapreneur Model: The 4 Pillars for Entrepreneur Movement

Tetrapreneur consists of four holistic approaches (Rika Fatimah, 2016); namely Chainpreneur, Marketpreneur, Qualitypreneur, and Brandpreneur (see Figure 1). Chainpreneur is a new approach to describing entrepreneurial conditions using the supply chain philosophy. The supply chain consists of all parties involved, directly or indirectly, in meeting customer demand. The goal of each supply chain must be to maximize the overall value produced. This value is known as the supply chain surplus (Cavinato, 2002).

Marketpreneur is an innovative perspective to identify the needs of entrepreneurs in each stage by projecting market activities that meet consumer needs, desires and expectations. These groups have a stake in the success and business results, which are called key people. Qualitypreneur is a quality approach (Sower, 2011) in providing practical recommendations in characteristics to satisfy explicit or implied needs of the needs, desires, and expectations of entrepreneurs. Next is Brandpreneur; association strategy to encourage entrepreneur growth by using the Brand Value Approach, then assigning stakeholders who are specifically responsible.

The aim is to strengthen strategic positions in the market, maintain life cycles and compatible capabilities to compete and collaborate through global best practices. Having best practices, benchmarking is one of the well-known techniques for identifying best practices in a successful global entrepreneurship model.



Figure 1. Tetrapreneur Model: The 4 Pillars for Entrepreneur Movement namely Chainpreneur, Marketpreneur, Qualitypreneur, and Brandpreneur (Rika Fatimah, 2016)

3. Global Gotong Royong (G2R) Tetrapreneur

Each village is unique and has a wealth of resources, competencies to different customs, so that giving rise to the potential for competitive advantage that distinguishes it from other villages. Empowerment of village potential can be a solution to the creation of competitive advantage and the sustainability of village welfare in the future. One form of empowerment from the government in the form of Autonomy, namely villages can manage resources independently.

The integration and comprehensive richness of the noble values of the ancestors of the Indonesian nation is reflected in mutual cooperation such as trust in God Almighty, attitudes of help, selfless mentality, prioritizing the interests of the people, courageous because they are true, united in differences, togetherness in decision making, caring and loving each other, and etc. The need to make existing mutual-cooperation sustainable, becomes independent, promising selling value, and the village has an integrated competitive advantage through government, academia, village government and institutions within the village to the wider community (Rika Fatimah, 2018).

Management that involves the community directly is expected to be able to encourage the economy by empowering all elements of society to fulfill. G2R Tetrapreneur by implementing the Tetrapreneur Model, especially Chainpreneur that emphasizes the production process of products starting from upstream to downstream is carried out in the village (see Figure 2). This activity will cause the circulation of money to be closed only in the village namely 'closed loop for village chain benefit'.

Furthermore, the availability and readiness in responding to non-competition based markets to competition based (Tetra 2) as a means of exchanging the value of noncompetitive market-based product creation. So, if the industry or stakeholders become G2R Tetrapreneur partners, it is hoped that there will be a CSR scheme or if there is an event, please choose G2R products. So, with a non-competition based market there is indeed a CSR scheme that is obliged to be issued with a cooperation scheme for certainty of buyers.

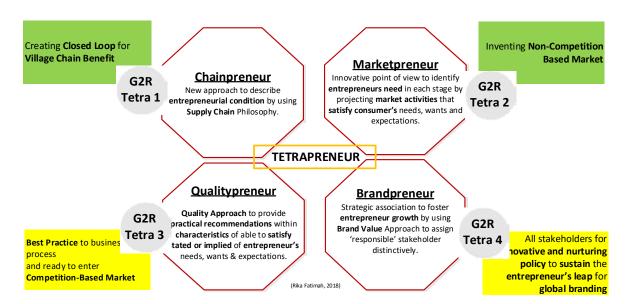


Figure 2. Global Gotong Royong (G2R) Tetrapreneur Model for Village Entrepreneur Movement (Rika Fatimah, 2018)

C. RESEARCH METHOD AND ANALYSIS

1. Research Method

This research will focus on Chainpreneur (Tetra 1) and Marketpreneur (Tetra 2) by using qualitative method. The basis of the Chainpreneur approach using the Supply Chain philosophy. The research strategy is to analyze the three perspectives of the entrepreneurial chain in general, dynamically, as well as the character of the three villages themselves. In particular, to analyze the summaries of general chains, this research will conduct descriptive analysis by using in depth interview and field observation to classify the best practice of the research object. The next steps is Marketpreneur. Marketpreneur will analyze the general, unique, and main needs of the company. To meet general needs, this study will conduct descriptive observation to the object then identify similar characteristic in detail activities.

The object of this research is the HarleyDABantul event that was held on October 7th, 2018. In this event, Harley Davidson Club Indonesia at Special Region of Yogyakarta (HDCI DIY) was involved as one of the G2R Tetrapreneur partners and the village of Wukirsari and Girirejo as the

G2R Tetrapreneur village. The Strategic Role of HDCI branch DIY in the G2R Tetrapreneur partnership is the creation of a non-competition market (Tetra 2) as a form of business model innovation that synergizes mutual cooperation and village entrepreneurship cultures to jointly bring Indonesian local wisdom to the world level.

2. Analysis

Measurement shall be done in various unit analysis and method of data collection (see Table 1). Both Chainpreneur (Tetra 1) and Marketpreneur (Tetra 2) will explore through primary data. Additional secondary data to Tetra 2 in order to support the primary data that have been collected. Chainpreneur will be measured by in-depth interview and field observation to both parties of HDCI DIY and Village Team of G2R Tetrapreneur's.

The measurement is aiming to identify the needs of entrepreneurs in carrying out and developing their business. Managerial competence is determined by the quality of the product or service and how the entrepreneur operates efficiently. Entrepreneurial competence is determined by job creation, innovation, creativity, and their ownership. Finally, network competence is determined by whether they are socially responsible and ethical in handling stakeholders.

Tetrapreneur	Data Collection & Method	Unit Analysis
Chainpreneur [Tetra 1]	Primary Data: In-Depth Interview & Field Observation	Overview of the collaboration: General chain Dynamic chain Chain characteristic
Marketpreneur [Tetra 2]	Primary Data: FGD & Field Observation	Overview of the event execution: Number of participants Performance of G2R Tetrapreneur Superior Product
	Secondary Data: Literature Review	 Performance of other village's product Number of village's people involve in joint committee Performance of communication or conflict Media release Stakeholder's attendee

Table 1. Research Measurement of HarleyDABantul by using Global Gotong Royong (G2R) Tetrapreneur: Data Collection, Method & Unit Analysis

D. RESULT AND DISCUSSION

This part will be discussing the result and discussion.

1. Result

As a Tourism Ambassador from Tourism Department of Bantul Regency, Harley Davidson Club Indonesia (HDCI) tried to promote and advance tourism in Indonesia, especially in Bantul Regency. HDCI held the 2018 HarleyDABantul Tourism Rally Event which was held on 7 October 2018. HarleyDABantul Tourism Rally is a regularly scheduled event by HDCI Bantul where this activity is a representation of the HDCI branch Bantul's work program in the field of social and tourism. The existence of this organization can contribute more continuously and significantly in the economic development of DIY tourism communities and Bantul in particular. This is in line with the vision and mission of HDCI DIY as a DIY Tourism Ambassador to help promote tourism through positive activities and provide tangible benefits to the world of tourism.

Some of the remarkable things from the HarleyDABantul Tourism Rally Event are participants who come from various motor clubs from inside and outside Yogyakarta such as from Bandung, Kebumen and other cities, besides that there is also a social mission appointed by HDCI DIY as one of DIY's tourism ambassadors and the G2R Tetrapreneur partner.

Present at the event were the HDCI board of directors namely the HDCI DIY Regional Administration Chairperson, HDCI Chairperson Bantul, Chair of the HDCI Sleman Office Ervin Arifianto, Head of the HDCI Yogyakarta City and several representatives from HDCI Denpasar, HDCI Bandung, HDCI Banyumas, and HDCI Kedu Residency. Also present were representatives of government elements including the Head of the Bantul Regency Tourism Office, Head of the capacity building and creative economy of the Bantul Regency Tourism Office, Head of PMD Division of PPKBPMD Office in Bantul Regency, Head of Development of Rural Economic Village Potential and TTG, and conceptor as also expert advisor on G2R Tetrapreneur.

2. Discussion

HarleyDABantul Tourism Rally Event carries the spirit of inclusion so that participants come from across the motor community as well as the disabled, to determine the end point locations, namely G2R villages Wukirsari and Girirejo. HDCI chose this location because these villages are untouched tourist place. It is still original and less well known by the community. The area has a lot of potential that is so interesting to explore, including natural, cultural, educational tours, centers of batik craft industry, puppets, as well as various traditional culinary. HDCI hope that by the event, G2R villages Wukirsari and Girirejo can defeated mall or any landmarks and become the new one stop entertain.

The HarleyDABantul Tourism Rally Event gave some impacts not only for the member of HDCI but also for the G2R Village Wukirsari. There are synergy and natural business activities during the preparation of the event. The indicators namely (1) knowledge collaboration and sharing knowledge and experience; (2) direct business negotiation simulation during the ordering of superior product, which in the process there were miscommunication between the member of HDCI but also for the G2R Village Wukirsari, but it become direct education for both parties; (3) the involvement of other member of society, Bantul regency government and Department of Tourism; (4) economic transaction not only G2R product, but also products for other member of society.

E. CONCLUSION

Harley Davidson Club Indonesia at Special region of Yogyakarta (HDCI DIY) was involved as one of the Global Gotong Royong (G2R) Tetrapreneur partners since August 2018 as one of the execution of HDCI DIY mission of community ngangement. The Strategic Role of HDCI DIY in the G2R Tetrapreneur partnership is the creation of a non-competition market (Tetra 2) as a form of business model innovation that synergizes mutual cooperation and village entrepreneurship cultures to jointly bring Indonesian local wisdom to the world level. as the G2R Tetrapreneur village. HarleyDABantul is a touring event followed by open accros any motobike's community in DIY and others districts. The end point of the touring is at G2R Tetrapreneur's villages are Wukirsari and Giriejo, Imogiri, Bantul.

There are synergy and natural business activities (Chainpreneur-Tetra 2) during the preparation of the event. The indicators for both Tetra 1 abd Tetra 2 namely (1) knowledge collaboration and sharing knowledge and experience; (2) direct business negotiation simulation; (3) the involvement of other member of society, Bantul regency government and Department of Tourism; (4) economic transaction.

F. REFERENCES

- Cavinato, J.L. (2002). What's your Supply Chain type? *Supply Chain Management Review,* May-June: 60-66.
- HDCI. (2012). *Buku Saku Anggota HDCI*. Harley Davidson Club Indonesia.
- Rika Fatimah, P.L. (2016). Supporting Needs at Different Stages of Entrepreneur. Mandiri Institute. Indonesia.
- Rika Fatimah, P.L. (2018). Buku Pedoman Global Gotong Royong (G2R): Inovasi Gerakan Desa dengan Menggunakan Model Tetrapreneur. Badan Pemberdayaan Perempuan dan Masyarakat (BPPM) DIY. Yogyakarta.
- Sower, Victor (2011). Essentials of Quality with Cases and Experiential Exercises. United States of America: John Wiley & Sons, Inc.

106 | Conference Proceeding of The 1st International Conference on Community Engagement and Education for Sustainable Development (ICCEESD) 2018

Theme for STUDENT COMMUNITY SERVICES



ESTABLISHING HOMESTAY IN GIRIKERTO VILLAGE TO CONSERVE MOUNTAIN FLORA OF MOUNT LAWU, NGAWI REGENCY, EAST JAVA

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ABSTRACT Girikerto Village is located on Sine District, Ngawi Regency, East Java. The village is on the northern slope of Mount Lawu at an altitude of 675-975 meters above sea level. In 2017, Girikerto Village is inaugurated as tourism village by the Regent of Ngawi. In order to promote tourism villages, the community service team of Universitas Gadjah Mada initiated the establishment of homestays. This study wants to know the minimum requirements and uniqueness of mountain homestay. The results prove that establishing a homestay began with a survey in every houses in Girikerto Village. Parts of the house were observed, particularly the bedroom, the bathroom, the living room and the yard. The team also discussed and unified their perceptions with the house owner regarding vision and mission of homestay. After the discussion, socialization and training were carried out. The team provided homestay assistance to finalize the program while improving the facilities of Girikerto Village. Four houses were successfully initiated. The houses had meet the criteria of homestays: 1) the host does not have a criminal recors, 2) adequate house facilities and 3) house offers uniqueness described in this paper. The team recommend the online marketing of the homestays, so that they will be known quickly by tourists from other region.

Keywords homestay, tourism village, community service, mountain flora, Mount Lawu, community empowerment

A. INTRODUCTION

Girikerto Village is located on Sine District, Ngawi Regency, East Java. The village is on the northern slope of Mount Lawu. Girikerto village is on 675-975 meters above sea level. The village has four dusuns¹: Dusun Banjaran, Dusun Girikerto, Dusun Nglegok and Dusun

¹ Dusun is lower than village in a nation's administrational hierarchy.

Jamus. Dusun Banjaran has two dukuhs²: Dukuh Banjaran and Dukuh Dodokan. Dusun Girikerto has three dukuhs: Dukuh Jengkoro, Dukuh Bugar and Dukuh Girikerto. Dusun Nglegok has two dukuhs: Dukuh Nglegok dan Dukuh Maron. Dusun Jamus is the only dusun that does not have dukuh. The total area of Girikerto Village is 1352.70 hectare, which consists of forest, plantation area, tea field, field (used for school/village activities), graveyard, habitation, grass or empty land, rice fields and shrubs. The forest contributes 722.56 ha (53.42%) of the total area, the plantation area is 29.59 ha (2.19%), the tea field is 254.59 ha (18.82%), the court is 1.48 ha (0.11%), the graveyard is 0.91 ha (0.07%), the habitation is 34.01 ha (2.51%), the grass or empty land is 60.95 ha (4.51%), the rice field is 60.62 ha (4.48%) and the shrubs is 187.99 hektar (13.90%)³. Although the forest contributes half of the total area, the common jobs in Girikerto village are farmer, cattleman, tea leaves picker, construction worker and goods/street food seller. Girikerto village has several tourism spots. They are Sumber Koso, Sumber Lanang, Jamus Camping Ground, Jamus Tea Field, Batu Jajar and Teletubbies Hills.

According to *ASEAN Homestay Standard*, homestay is an alternative tourism where tourists will stay with the host's family in the same house and will experience the everyday way of life of the family and the local community. There are criteria of homestay, as follow: (1) the homestay is located close to nature-based and cultural tourism attractions in the surrounding area, (2) the homestay provider shall be free of criminal record, (3) the homestay provider shall be in good general health and not inflicted with communicable diseases, (4) the homestay provider shall provide a guest bedroom(s) that is separated from the other bedrooms in the house, (5) provide basic amenities and furnishing in the guest bedroom(s) such as fan, desk, mini cupboard, mirror, electric socket, mosquito net or coil etc., (6) provide either sitting or squatting type of toilet inside or outside close to the house.

Aminudin (2015) states that tourism village is a village that has specific characteristics to be categorized as tourist destination. In this area, the villagers still hold their original tradition and culture. Besides, factors as food, farming system and social system enrich the village's environment. In addition, undamaged natural environment is another important factor of a tourism area⁴. In 2017, Girikerto Village is inaugurated as tourism village by Ngawi government. When this village is inaugurated, the existence of homestay is limited. The nearest homestay is located on Ngrendeng Village, while the existing homestays in Girikerto Village are only two. Both homestays are furnished houses, yet the owners live at other houses.

B. RESEARCH QUESTION

There are two questions in response to the introduction, as follow:

- 1. How are the homestays in Girikerto Village initiated?
- 2. How do the community service team empower the homestay providers to make their house as homestay?

² Dukuh is lower than dusun in a nation's administrational hierarchy.

³ Listyaningrum dkk. Peta Desa Girikerto.

⁴ Ali Ria Aminudin. Pelaksanaan Pengelolaan Homestay di Desa Lubuk Kembang Bunga Kawasan Eko Wisata Tesso Nilo Kabupaten Pelalawan Provinsi Riau. Jom FISIP vol. 2 no. 2. Oktober 2015.

C. DISCUSSION

In 2017, Girikerto Village is inaugurated as tourism village by the Regent of Ngawi. In the same year, the community service team of Universitas Gadjah Mada (code JTM-05) did their service with "Quality Improvement of Sapta Pesona Agro Wisata in Girikerto Village by Utilizing the Potential of Natural **Resources and Empowerment of Local Human** Resources in the Tourism Sector to Improve Community Welfare" as its theme. During the period of community service, there were thematic programs created by Team JTM-05. One of the programs is homestay initiation. The team did a survey to locate the homestay provider candidates. After the survey, the team did a discussion with the house owners to unite the perception of homestay and asked the owners' willingness to make their houses as homestay. The result was used as a material to held homestay socialization. The community service team invited a speaker from Jogja. From this process, there are four houses as homestay candidates. Two of the houses are located on Dusun Banjaran and two others are located on Dusun Girikerto. The owners of houses in Dusun Banjaran are Mr. Yatmin and Mrs. Saidi. The owners of houses in Dusun Girikerto are Mr. Rohadi and Mr. Seman.

In 2018, the next community service team of Universitas Gadjah Mada (code JI-002) continued the thematic program from the previous team. The homestay initiation is continued until the finalization step. Team JI-002 remade the wooden sign board and put it near the homestays. Besides, Team JI-002 reviewed the progress and the houses before they made an agreement of homestay rules. Here is the data of each houses:

1. MR. SEMAN'S HOMESTAY

Mr. Seman's family consists of five persons. They are Mr. Seman, his wife and his two sons and one daughter. They live in Dusun Girikerto. There are three bedrooms in Mr. Seman's house. All of the bedrooms are used by the family members when there is no guest. One of the bedrooms will be vacant if there is a guest. Overall, Mr. Seman does not have any specific motivation when he agreed to be a homestay provider.

Mr. Seman's homestay is located near Sumber Koso, one of two springs in Girikerto Village. Sumber Koso is relatively new as a tourism spot. It has camping ground, flying fox, spring with clean water and instagramable selfie spot. With its location, the guest who stays at Mr. Seman's homestay can visit Sumber Koso in a short time.

The dishes provided are simple vegetable dishes. The ingredients are taken from his own vegetable farm. For example, pecel lele is served to the guest(s) in breakfast time. The guest will get *sayur jipang* in lunch time. Dishes in dinner time will be the same with lunch or breakfast, with egg or *kerupuk* as the complement. All of the dishes served to the guest(s) have Girikerto Village's taste standard: spicy and sweet. If the homestay provider receives groceries from the guest(s), the homestay provider will use the received groceries as dish ingredients. If the homestay provider receives money from the guest, they will use the money to buy ingredients to cook more varied food. Mr. Seman and his family usually eats in the kitchen, while the guest is allowed to eat in the living room. When the guest is eating in the living room, the homestay provider will accompany them.

The toilet is located near the cowshed and in one room with the kitchen. The floor of the toilet in Mr. Seman's house is still made of cement. The size is relatively small. It could contain a cement-made squatting toilet, a bucket for bathing and a big bucket for washing clothes. Mr. Seman gets the water supply from Gunung Gandel spring. However, the water flow tends to be small as the water coming from Gunung Gandel is not flowing heavily.

When other homestays provide washing machine to ease the guest(s) washing their clothes, Mr. Seman's homestay offers manual washing. The washing activity is done in the toilet. As explained before, the big bucket in the toilet is used for manual washing. However, sometimes the bucket has filled with the homestay provider's dirty clothes, so the guest has to ask for permission if they want to use the bucket for washing clothes. The existence for the big bucket and manual washing system may not please guests, yet there is no nearest laundry at the moment.

2. MR. ROHADI'S HOMESTAY

Mr. Rohadi lives in Dukuh Jengkoro, Dusun Girikerto. His family consists of four persons. They are Mr. Rohadi, his wife and two children. Mr. Rohadi's house is not located near the street, so four-wheeled vehicles cannot park on the street. However, Mr. Rohadi's house has a spacious yard, so fourwheeled vehicles can park there. The house has a living room, four bedrooms, a TV room, a kitchen, a dining room, a toilet and a barn. The floor is ceramics, except the kitchen, dining room and barn. Overall, Mr. Rohadi's house is neat and comfortable.

Mr. Rohadi agreed to make his house as homestay. There are two bedrooms available

for guests. One of the bedrooms is located on the front of the house, in the TV room, the other bedroom is located on the back, near the kitchen and dining table. Compared to the latter, the first bedroom is smaller. There are a bed, a desk, a chair, a wardrobe, a mirror and a window in the front bedroom. There are minor improvement Mr. Rohadi had to do to improve the bedroom's comfort, such as fixing the window link, repainting the wall, fixing door hinges, replacing the wardrobe and replacing the bed.

The bedroom near the kitchen has relatively complete furniture. There are a desk, a chair, a bed and a wardrobe. However, there is no mirror in this bedroom. Besides, this bedroom also needs minor improvements, such as replacing the bed, adding a mirror, repainting the wall and changing the bulb.

The clove trees that grow on the yard is a natural attraction to the guests. The clove trees are commonly harvested once in one or two years. When the harvest season comes, the guests can try to pick the cloves. The cloves sold are the wet ones. Besides cloves, the leaves and the twigs are also sold. The twig and the leave can be processed as oil.

The homestay provider always provide breakfast, lunch and dinner. The dishes are commonly vegetables as the ingredients are taken from Mr. Rohadi's own vegetable farm. Mr. Rohadi offers tea or coffee to the guest(s) in the morning to warm their bodies.

There is a toilet in Mr. Rohadi's house. The toilet size is not big. It consists of a closet, a bath dipper and a water container. The toilet is clean, but there is a hole in ceiling, so the air from outside the house gets in. There is a washing machine in front of the toilet. The homestay provider lets the guest(s) use the washing machine if they want to wash their clothes. This helps guests who wants to stay longer.

Mr. Rohadi stocks snacks and fruits in the front guest bedroom. He also lets the guests to cook themselves if the host is not present at the house. Mr. Rohadi invites the guests to have a chit-chat and watch TV together in TV room at night.

3. MR. YATMIN'S HOMESTAY

Mr. Yatmin lives in Dusun Banjaran. The family consists of Mr. Yatmin, his wife and two children, yet Mr. Yatmin lives only with his wife. His first child has married and lives in other houses in Girikerto Village. His second child lives in Surabaya. Mr. Yatmin's house is located near the street, so it eases the mobility. Pak Yatmin agreed to make his house as homestay.

Mr. Yatmin's house is comfortable, clean and tidy. The wall is made of cement and the floor is ceramics. There are a living room, a kitchen, a small garden, a toilet and three bedrooms. One of the bedrooms is used by Mr. Yatmin and his wife. The two bedrooms are vacant if there is no guest. One of the rented bedroom is relatively small, so there is no wardrobe. However, Mr. Yatmin made a wall-desk to store the guest's belongings and clothes. Besides, the bedroom needs a mirror, a small trash bin and a mat. There is no livestock in Mr. Yatmin's house, so the guests will not be annoyed. Mr. Yatmin does not have washing machine, so washing activity is done manually. There is no nearest laundry, so it will be a minor problem.

Mr. Yatmin has a clove tree. When the harvest time comes, the guest(s) can try picking the cloves. Mr. Yatmin also raise birds. The

common species of the birds is lovebird. Some of birds are inside the house, while three to four birds are outside the house during the day. In addition, Mr. Yatmin grow vegetables and strawberries. The strawberries is allowed to be picked if there is any. The vegetables grew are tomato, chili, paprika and mustard greens. The guest(s) can try to plant the vegetables. The ripe vegetables will be either sold or used as dish ingredients.

The house owner sometimes offer fried rice as breakfast and healthy menu in lunch and dinner time as the ingredients are homegrown. The tea is served in the morning, either during the breakfast time or at 10 a.m. There is a *warung* (traditional restaurant), so if the house owner is not at home or if the guest(s) want(s) to try different menu, they can go to the *warung*.

4. MRS. SAIDI'S HOMESTAY

Mrs. Saidi lives in Dusun Banjaran with her daughter and granddaughter. Mrs. Saidi lives by herself in her house, while her daughter and granddaughter lives in a house besides her. Unlike Mr. Yatmin's house, Mrs. Saidi's house is not located near the main street, so the guest(s) has to walk down the road beside a green mosque around 50 meters to the west. The road can be passed by a car or two motorcycle. Mrs. Saidi is one of crisps suppliers. The variant of the crisps are banana crisps, tempe crisps, cassava crisps, taro crisps and blue cassava. She supplies snack order for special occasions. She agreed to make her house has homestay.

Mrs. Saidi's house has a small yard, a living room, TV room, a kitchen, a toilet and four bedrooms. One bedroom is used by Mrs. Saidi and three other bedrooms are vacant if there is no guest. The floor is ceramics, except the kitchen. The first bedroom is located in the living room. The bedroom is small, so it can only be filled by a bed and a small table. The bedroom does not have a wardrobe, so guests who stays in a longer time cannot store their clothes. The bedroom also does not have hanger, window and mirror, so the guest cannot hang their clothes and the room lacks sunlight. The second bedroom is located behind the living room. The bedroom has a bed, a table, a wardrobe, a mirror, a hanger and a television. The facilities eases the guest, particularly if the guest stays for a longer time. When the house owner watches television in TV room but the guest wants to watch different channel, the guest can watch from the television in the bedroom. The third bedroom has a bed, a table, a wardrobe, a mirror and a hanger.

Mrs. Saidi serves food at breakfast, lunch and dinner. There are various menu, such as tempe and tofu, *pecel, sambal tumpang* and *ayam bacem.* The ingredients of *pecel* are from homegrown mustard greens and other homegrown vegetables. The mustard greens are planted using polybag. Besides, the house owner serves tea or coffee in the morning. The guest can join the house owner in crisps producing, from peeling, cutting and frying the ingredients to packing the products.

There are two toilets in Mrs. Saidi's house. The first one is located inside the house, the second toilet is outside the house. The first toilet is clean, the floor is ceramics, yet the water tub is made of cement. The water tub is big and the water flows swiftly. There is a washing machine inside the first toilet. The washing machine helps the house owner and the guests in washing clothes. However, if the house owner uses the washing machine, the guest have to wait if they want to use the toilet. Team JI-002 suggests Mrs. Saidi to move the washing machine outside, so the washing activity will not bother or will not be bothered by people using the toilet. The arrangement of toiletries in the toilet inside the house is not in order and there are some unused toiletries, resulting to an impression of an untidy toilet. Team JI-002 suggests Mrs. Saidi to reorder the toiletries. The toilet has a ventilation, making the toilet is bright during the day.

D. CONCLUSION

Girikerto Village is located on Sine District, Ngawi Regency, East Java. The village is on the northern slope of Mount Lawu at an altitude of 675-975 meters above sea level, so the village has cool temperature. The village has four dusuns: Dusun Banjaran, Dusun Girikerto, Dusun Nglegok and Dusun Jamus. Three of the dusuns has dukuhs. Dukuh Banjaran has two dukuhs: Dukuh Banjaran and Dukuh Dodokan. Dusun Girikerto has three dukuhs: Dusun Jengkoro, Dukuh Bugar and Dukuh Girikerto. Dusun Nglegok has two dukuhs: Dukuh Maron and Dukuh Nglegok. Dusun Jamus is the only dusun that does not have dukuh.

In 2017, Girikerto Village is inaugurated as tourism village by the Regent of Ngawi. Community service team of Universitas Gadjah Mada (code JTM-05) collaborated with the local people of Girikerto Village to improve the facilities for tourism village, such as homestay. In initiating homestay, the team did a survey to locate suitable houses and had a discussion with the house owners to unify the perception and asked their willingness. After the discussion is done and the house owner agreed, the team held a socialization. The aim of initiating homestay is to improve the village's facilities. This is also a mission to make the local people not taking illegal woods from the forest.

In 2018, another community service team from Universitas Gadjah Mada (code JI-002) continues some of the programs, including the initiation of homestay. The initiated houses are Mr. Seman's house, Mr. Rohadi's house, Mr. Yatmin's house and Mrs. Saidi's house. Mr. Seman and Mr. Rohadi lives in Dusun Girikerto, while Mr. Yatmin and Mrs. Saidi lives in Dusun Banjaran. The house owners do not have criminal record and are healthy. Their houses are located near Sumber Koso, the nearest natural-based tourism attraction. They provide guest bedroom with basic amenities and furnishing, although there are some minor improvements suggested. Their houses provide squatting toilet. Overall, they fulfill the criteria to be the homestay provider.

E. BIBLIOGRAPHY

- Aminudin, Ali Ria. 2015. Pelaksanaan Pengelolaan Homestay di Desa Lubuk Kembang Bunga Kawasan Eko Wisata Tesso Nilo Kabupaten Pelalawan Provinsi Riau. Jom FISIP vol. 2 no. 2. Oktober 2015. Diambil dari https://media.neliti.com/media/ publications/32483-ID-pelaksanaanpengelolaan-homestay-di-desa-lubukkembang-bunga-kawasan-eko-wisata. pdf
- ASEAN. ASEAN Homestay Standard. Jakarta: ASEAN. http://www.asean.org/ storage/2012/05/ASEAN-Homestay-Standard.pdf

COLLABORATIVE ALUMNI – STUDENT COMMUNITY SERVICES IN LOMBOK EARTHQUAKE AFTERMATH: A NEW DISASTER RESPONSE AND RECONSTRUCTION PERSPECTIVE

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ABSTRACT In 2018, Lombok has been hit by three big earthquakes on July 29th, August 5th, and August 19th. A 7 SR earthquake on August 5th caused major damage for Lombok Island including Gumantar Village in North Lombok. All permanent and important buildings collapsed such as houses, schools, and Mosques that caused people lost their home and paused all their activities. Beside physical damages, electricity and waterways also collapsed, in addition there were trauma among the people because of the earthquake. This kind of situation triggered response from many people including student and Alumni of UGM or KAGAMA who came right away after the earthquake to Gumantar as volunteer then known as Kagama Care. After that, UGM also send the students from various disciplines as Student Community Services Disaster Response *UGM* to involve and help in the reconstruction and recovery after the earthquake. Recovery process is performed through program in four sectors: social, infrastructure, health, and logistic. The recovery process itself is a collaboration between Kagama Care, Student Community Services UGM, DERU UGM, volunteers and also Gumantar people. The aim of this program is not only about helping the victims but also preparing them to continue their daily activities like before the disaster occured. *There are some results that successfully accomplished, such as initiate temporary* school, rebuild Mosque, repair waterways system, build sanitary facilities (MCK -Mandi Cuci Kakus) and provide health service and health facilities for the people.

Keywords service community, collaboration, sanitary, education, health

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A. INTRODUCTION

KKN Peduli Bencana-Universitas Gadjah Mada (KKN PB-UGM) or Universitas Gadjah Mada-Student Community Service (SCS) *Disaster Response* is a quick response to the disaster, for this case was the earthquake in Lombok which caused great damage. Student Community Service is a form of direct contribution in the community in the midst of emergency response situations, where in this case there were 30 students departed to Lombok for one month period of contribution in the community. Not only contributing in disaster response, but PB KKN is also a form of community service as one of the Tri Dharma tertiary institutions (Direktorat Pengabdian Kepada Masyarakat, UGM).

Students who went to Lombok and did disaster relief and volunteer activities were not working alone. There were various social elements and parties that together with students helped post-disaster recovery in Lombok, precisely in Gumantar Village. Volunteers were chosen from fellow students and the public, UGM alumni who are members of KAGAMA Care, DERU UGM, and of course the participation of the surrounding community itself. Students went into the field to find out clearly what the problem was and how to resolve it.

North Lombok as an area affected by the earthquake was severe enough to get the attention of various parties to get assistance, but unfortunately, it was not quite evenly distributed and reached all villages. One village that is quite far away is Gumantar Village, which is an option so that assistance will be more useful and on target. Some of the problems that arise after an earthquake such as infrastructure are damage to people's homes, public facilities such as mosques and schools, and damage to water pipes which hamper the distribution of water and sanitation. In addition, health problems also arose because of poor sanitation and inadequate conditions of temporary shelter (tents). Infrastructure damage also has an impact on social life such as the cessation of economic activities, school activities, and the inhibition of spiritual activities in the mosque.

From these problems, students and other volunteers try to help by not only providing assistance themselves but inviting citizens to participate in the post-disaster recovery. Reviving various activities in Gumantar Village is one of the most effective ways in post-disaster recovery and reconstruction because the community is also involved in it. Students act as initiators and facilitators in various activities to revive Gumantar Village

B. METHOD

Student Community Services as one of the forms of community service precisely aims to increase students' awareness of the surrounding community, especially in areas affected by disasters so that they can develop student empathy. Empowerment also remains an important part of community service with the aim of postdisaster rehabilitation and reconstruction. Community empowerment is intended to strengthen the community itself by placing them as important actors. Engaging the community in rebuilding and post-disaster improvement activities is the method that the Student Community Services team is doing so that it is also a form of community

empowerment. In addition, the Student Community Services program also applies Education for Sustainable Development because as students and are involved in educators, the Student Community Services team also has an obligation to provide awareness in the community, especially in disaster areas that all elements can contribute to sustainable development itself including the economy, environment, and social culture (Gadjah Mada University).

In this community service activity, multidisciplinary and teamwork are the key to running programs. Multidisciplinary here not only means that students from various clusters work together, but students must be ready to work not according to their clusters or fields because of the conditions that require it or can be said to be a form of problem-solving because of limited human resources compared to their needs. Students become more flexible and also adapt quickly to new conditions but remain effective at work.

Theoretically, when doing Student Community Services should be divided into clusters according to the study fields studied, namely Social-Humanities (Soshum), Science-Technology (Saintek), Medical (Medika), and Agro.In particular practice Student Community Services for disaster response, this can not be applied simply because of the limited number of students involved, for the case of Lombok there was no student from Science-Technology cluster. However, the problems that need to be resolved require the expertise of this cluster, besides that there are also problems that must be managed but difficult to categorize into which clusters. So that the division of work in Student Community Services divides into four different teams that are filled by students from various clusters and not always in accordance with their fields. while the four teams are social, infrastructure, health, and logistics teams. Each team has its own programs in accordance with the problems at the field, but members of each team still help each other and work together in the implementation of the program.

Team	Program	Description	
Social	Emergency School	Reviving school activity that was stalled after the earthquake	
	Processing of Agricultural Products	Igniting the enthusiasm people to work aftermath of the earthquake while utilizing agricultural potential and increasing the selling value of products.	
Infrastructure	Construction of Mosque	Rebuilding Mosque that damaged by the earthquake, started with an emergency mosque then continued to the construction of the Bamboo Mosque	
	Improvement of Waterways and Sanitation Systems	Improving the irrigation system damaged by the earthquake and increasing it, as well as providing adequate MCK or sanitary facility for the people in Gumantar.	
Health	24 hours Clinic and Home Visit	Providing free, close and easily accessible health services for residents.	
Logistic	Distribution of aid and management of post	Providing assistance for residents with the right target .	

C. CONTENT

1. Emergency School

The earthquake caused total damage to the education facilities and infrastructure of SDN 04 Gumantarl, causing a vacuum of learning activities for approximately 4 weeks. Students lost their playground, gather with friends and study. In addition, this situation also causes children to roam without any supervision and useful activities in the areas of Tenggorong Hamlet (Dusun Tenggorong) and Beleq Hamlet (Dusun Beleq).



Emergency School at UGM Post

The construction of emergency schools aims to provide play and learning space for students as a solution to prevent the vacuum of learning activities too long after a disaster, reconnecting children's social relations with their closest friends and teaching staff, as well as indirectly a trauma effort healing for both children and teaching staff and parents of students. Through the collection of financial assistance and education logistics from various parties, two temporary (semi-permanent) school buildings built of bamboo, wood and palm fiber roofs were constructed with each building measuring 12m x 6m x 5m. The construction site is in the former SDN 04 Gumantar building while waiting for the school building to be rebuilt permanently. This development was carried out by considering the convenience of access to education for 167 students and 11 teaching staff including the principal. The duration of school construction takes 6 days starting from 12 September 2018 until it is completed on 16 September 2018.

On September 18, the inauguration and handover activities were carried out to the school from representatives of donors and students. In addition to the construction of physical school buildings, the provision of educational logistics in the form of stationery, such as: notebooks, picture books, pens, pencils, paper erasers, tapering, and rulers (167 units each), whiteboards and erasers (as many as 7 units), as well as a study table measuring 80 x 40 x 30 cm (88 units). In the process of building schools, local communities work together with students and donors. While in terms of funding, several parties were involved as donors, including Canyoning Lombok; Edelweiss Out Bond; Surabaya Cares; and CMO - PT. PP (Persero) Tbk.



Semi-permanent school building for SDN 04 Gumantar

The construction of these temporary schools has actually been started since August 28, 2018. However, due to limited funds and support from donors to establish more conducive and more representative school buildings, teaching and learning activities are temporarily carried out at the UGM Post. The temporary school which was previously established consisted of a set of tents and 1 set of tarpaulin which was formed as a tent roof using bamboo poles. Emergency schools are conducted every Monday-Saturday wearing free uniforms. On Monday-Friday learning and teaching activities are carried out normally, but especially on Saturday there are no teaching and learning activities but they are filled with morning exercises together.

The trauma healing activity was also carried out as an effort to alleviate trauma for the community after the earthquake disaster in West Nusa Tenggara. In the program, this time Student Community Services team collaborated with a team of 10 volunteers from DERU UGM from the discipline of Psychology and Midwifery. This trauma healing activity was carried out with learning and playing methods that do not impose children's thoughts and do not require them to think critically but become activities that are primarily aimed at eliminating the traumatic experiences experienced by each child. In particular, this activity was specifically aimed at students and children from 7 hamlets out of a total of 16 hamlets in Gumantar Village (Beleq Hamlet, Tenggorong Hamlet, Gumantar Hamlet, Paok Gading Hamlet, Nangka Lombok Hamlet, Amor-amor Hamlet and Dusun Dasantreng) or incorporated into the education coverage area of 4 elementary schools, namely SDN 02, 03, 04 and 05

Gumantar. Due to the limited time and staff, unfortunately, educational assistance and logistical distribution activities cannot be carried out and sent to SDN 01 Gumantar by Students in the 1st batch of Student Community Services. However, in the hope that these activities can be carried out by the second batch team.



Trauma healing activity at SDN 05 Gumantar

The first trauma healing activity was held at the UGM Center Post along with the DERU volunteer team every day at 7.30-9.00 WITA for 8 consecutive days before the teaching and learning activities carried out by the teachers commencing on 29 August 2018 with the main target students of SD 04 Gumantar totaling 110 out of a total of 167 children. The second trauma healing activity was held at the SDN 2 Gumantar (Emergency School) as well as the DERU volunteer team every day at 7.30-9.00 WITA for 4 consecutive days before the teaching and learning activities were held by the teachers aimed at 199 children. This trauma healing activity was also carried out by collaborating with a team of UNS volunteers from March 30, 2018. The third trauma healing activity was held at SDN0 3 Gumantar School every day at 7.30-9.00 WITA for 3 consecutive days before the implementation of teaching and learning activities by teachers as of September 12, 2018, with a target of 183 children. The fourth trauma healing activity was held at the SDN 05 Gumantar (Emergency School) at 7.30-9.00 WITA for 1 day due to limited time and staff. This activity was also carried out before the commencement of teaching and learning activities by teachers on September 17, 2018, with a target of 91 children.

2. Processing of Agricultural Products

The natural potential that exists in Gumantar Village, especially Beleq Hamlet can be considered quite abundant, this can be proven by the amount of land planted with the dominant types of coffee plants, bananas, and cashew. The determination of the Student Community Services program regarding the processing of agricultural products was initiated because of the less empowerment and the implementation of the processing and marketing of products. Several types of plants used to process products of economic value include bananas, coffee, and cashew nuts.

Post-disaster was one of the obstacles for the surrounding community in processing products. However, if the cessation of this production activity can actually be considered to be able to provide loss and decrease in the income of the surrounding community to meet their needs. Processing of agricultural products is currently led by KWT (Kelompok Tani Women) Molah Mudi Dusun Beleq which was founded in 2017. Commodities of coffee and banana plants in Beleq Hamlet have been processed into typical local products namely packaged coffee and banana chips. However, cashew type plants in Gumantar Village have not been processed into a product that has a high value. Cashew nuts are only sold in the form of unprocessed raw cashew at very cheap prices of Rp. 19,000.00 / kg, so this is the basis of team initiation. Student Community Services in planning new products in the production of agricultural products so that the KWT is increasingly developing and producing. One name of processing this agricultural product is "One Brand One Village".



The product of Cashew Chips



The processing of Cashew Chips

The discovery of new product innovations in the form of cashew fruit chips can be considered to have a higher selling value compared to the yield of the cashew nuts. The basic ingredients in the form of cashew fruit are very effective to be processed into food products because in addition to having a substance in pseudo-fruit, cashew nuts that are good for health, cashew fruit is also more useful and optimized, because in general, cashew nuts only become waste and as animal feed only without the use of healthy local food products. The agricultural production processing program produced a new type of cashew chips and introduced a new brand in the theme "One Brand One Village" namely "Gumtar food" for 3 types of products in Beleq, Gumantar Village including banana chips, guava chips, and Gumantar coffee.

The price range for the processing capital of agricultural products is a total of Rp. 90,000.00 for food ingredients, frying ingredients, and packaging while raw materials are free from nature. Then the selling value offered on banana chips and cashew chips is Rp 10,000.00 / pack with each package is 100 grams. While coffee products are offered at a price of Rp. 20,000 / pack in units of 150 grams. Planning certainly needs to be taken into account carefully about the beginning of capital, implementation, to marketing so that production can continue to run and get a big advantage for the sustainability of the "Gumtar Food" business. This agricultural production processing program can provide opportunities for residents, especially the KWT to be creative and active in conducting independent business and can provide the added value of their own income on the

other side of their livelihoods as farmers. The realization of an agricultural production processing program with a new brand in the theme "One Brand One Village", namely "Gumtar food", is expected to continue and can bring innovation to the latest and innovative special foods to be developed, produced and marketed to outside the island of Lombok , so that a high economy can be realized for a prosperous society and life.

3. Improvement of Waterways and Sanitation Systems

Although in the Health Profile 2017 (Kementerian Kesehatan Republik Indonesia, 2018), West Nusa Tenggara Province (NTB) ranks second in the implementation of community-based sanitation, public hygiene issues are one of the problems that still need attention, especially in Tenggorong and Beleq Hamlet. The level of sufferers of skin diseases and other diseases that are quite high comes from the behavior of bathing, washing, and irregularities due to the lack of optimal sanitary facilities (MCK - Mandi Cuci Kakus) and the availability of clean water. Coupled with natural disasters bring the community to the conditions of all limitations. As a result of the earthquake that occurred on the island of Lombok, sanitation facilities in the form of public bathrooms were totally damaged so that the activities related to sanitary were further hampered. Communities have to travel long distances to get to water sources or alternatively make public bathrooms along the pipeline. This also affects the smooth distribution of clean water in the hamlets. There, needed a concrete action to achieve stabilization of post-disaster conditions in Tenggorong and Beleq Hamlets. With the aim of facilitating the improvement of the community's clean lifestyle, especially those living in the hamlets of Tenggorong and Dusun Beleq, it is necessary to build sanitary facility.

There are two sanitary facilities sites, namely at the location of the land belonging to the Head of Beleq Hamlet, which is located in Tenggorong Hamlet (Location of UGM Post) and Tenggorong Bamboo Mosque. The sanitary facility established at the UGM Post was an emergency sanitary facilities that was obtained through assistance from the UGM Faculty of Engineering and the Ministry of Public Works and Public Housing (PUPR). Aside from being a public facility for the local community, Emergency sanitary facility is also used to support post's activities. The construction was carried out for two days with the help of the local community, and collaborated with Kagama Care Volunteers, Student Community Services Pemenang Unit (Engineering Students), and Lecturers from the Faculty of Engineering UGM.



Sanitary facility from Ministry of Public Works and Public Housing

The process of building was carried out on 24-26 August 2018. Three emergency sanitary facilities are preferred to cover sanitary needs in the two hamlets. One toilet measuring 1x1 meter with facilities in the form of a bowel movement and tap water. Then for one of the 3 x 1.5-meter toilets which are divided into two bathrooms with a toilet and a tub of water in it. These three emergency sanitary facilities get water supply from the water source network used by the residents, accommodated in a public hydrant tank. Disposal of liquid waste through a septic tank measuring 2.5 x 2 meters with a depth of 3 meters connected to PVC pipes in each toilet.



Sanitary facility from Faculty of Engineering UGM



Permanent sanitary facility

Not just stop at the emergency sanitary facilities, as a form of sustainability of facilities to support the behavior of clean and healthy living in the surrounding community, permanent sanitary facilities is directly initiated by students with the local community as the spearhead of the implementers. The sanitary facilities is placed in the prospective Tenggorong Bamboo Mosque with the reason of being the center of community activity in the hamlets of the region. Permanent sanitary facilities which was established at the location of the Tenggorong Hamlet bamboo mosque was carried out in conjunction with the construction of a temporary and permanent mosque on September 7 - 30 2018. The required material procurement was supported by various groups including the Saudi Kagama, IATMI (Indonesian Petroleum Engineering Association), and Kagama Care.

4. Construction of Mosque

One of infrastructures that was destroyed because of the earthquake was the Al Falah mosque in Tenggorong Hamlet. This mosque is used as a community worship center in the Tenggorong Hamlet and Beleq Hamlet, with a population of nearly 1,000 people and the majority adhering to Islam. The mosque is also used as a center of friendship, and information for the surrounding community. Damage to the mosque due to the postearthquake caused a decline in worship activities and other community activities.

The impact of the cessation of activities in the mosque that was most noticeable was the absence of a call to prayer (Adzan). This was felt by the residents at Kagama Care post, they felt the time was running very fast because there was no time change marker. Only the rising and setting of the sun becomes a marker of time so that time seems to run fast, unlike when there is a call to prayer that reverberates five times a day.



Collapsed Mosque at Tenggorong Hamlet

The Tenggorong Mosque is also used as a place to teach the Koran for children and adolescents in Tenggorong and Beleq. The number of students studying in this mosque before the earthquake occurred was 60 students. And when after the quake the reciting activities stopped completely, the children were still traumatized by the earthquake and they were still afraid to move outside the home environment.

The villages environment was quiet and there was no traffic to the mosque. Within this conditions of disaster that caused property damage and deaths, people need to pray and surrender to the Creator. Because by praying and surrendering, earthquake victims will be mentally stronger in the face of trials. So it is expected that the community's spirit arises from the impact of the earthquake experienced. Based on the results of the assessment outlined above, Students Community Service and Kagama Care initiated the improvement of Worship Places and revived activities in Mosque through several programs, including: the construction of Emergency Mosques and the improvement of the completeness of Worship, Construction of Temporary Mosque, construction of permanent mosque / Bamboo Mosque and reactivate landfill activities.



Temporary Mosque using tent

The construction of the Emergency Mosque was held on August 19,2108,3 days before the Eid al-Adha holiday. The Emergency Mosque was built next to the ruins of the mosque and involved the people of Tenggorong and Beleq in its construction. The emergency mosque building is in the form of a tent that has a tarpaulin supported by poles from bamboo and tarpaulin floors. For worship activities, the Emergency Mosque is equipped with a sound system to proclaim the call to prayer and sermons, as well as a wooden pulpit taken from the old mosque. Congregational prayers and recitation activities begin after the construction of this emergency mosque. Eid al-Adha prayer services are also held at the emergency mosque. The Emergency Mosque lasted for one month and was replaced by a Temporary Mosque because the collapsed mosque area would be used for cleaning activities of the mosque ruins and the construction of permanent mosques.



The temporary Mosque moved to semi-permanent building

Temporary mosque was built outside the waqf mosque area so that worship activities would not be interrupted by the construction of the permanent mosque. Mosques While a semi-permanent building measuring 7 x 11 meters with brick foundations and wooden frame buildings from the ruins of a mosque, the walls of the mosque use plywood and the roof uses tarpaulins from the emergency mosque.



Building the Bamboo Mosque

Permanent mosques will be built on the foundation of the old mosque. The size of the old mosque's foundation is 12 x 12 meters, while the permanent mosque will be built 9 x 9 meters. The mosque to be built as a form of building that adopts the traditional form of Lombok's traditional mosque. The main material of this mosque is bamboo. Bamboo is chosen as the main material because bamboo is more earthquake-friendly than concrete material. This has been proven by the collapse of traditional houses in Tenggorong and Beleq whose material is made of bamboo and wood.

The choice of bamboo as the main material for the permanent mosque was Kagama Care's attempt to provide a model for the community in choosing building materials other than concrete because currently, people whose homes were destroyed in the earthquake were still afraid to rebuild their homes using concrete or brick materials. Bamboo is not the only choice as the main building material, there is a choice of wood, mild steel, plywood, kalsiboard, and others that can be used. However, the potential for bamboo to rehabilitate buildings in the Lombok area can be said to be adequate.

Based on the survey results of the "Bambu Bos" team, the bamboo stocks found in Central Lombok and East Lombok were 10,083,536 clumps. From the sample in Pringga Jurang Utara Village, Montong Gading Subdistrict, East Lombok showed in 1 clump consisting of 25 stems. So that the total bamboo culm is 252,088,400 stems. If the maximum amount of bamboo harvesting is 25% of the existing stock, then the amount of bamboo that is harvestable annually is 63,022,100 stems. At the planning stage, the 9 x 9 meter Bamboo Mosque uses 100% bamboo as the main material for frames, roofs, and walls. The frame of the mosque uses apus bamboo, and the wall uses double lids, while the roof uses a sirap pelupuh. The connection between bamboo uses a bolt, making it stronger and more flexible to resist earthquake. To further strengthen the Bamboo Mosque construction, the base of the bamboo pole is 16 concrete casts planted. Bamboo Mosque is built with a higher size than the traditional Lombok mosque, the aim is to provide opportunities for widening the mosque building if later the mosque will be widened to the east, north, and south. The estimated cost of building this mosque per meter is Rp. 1,200,000, it is estimated that the construction cost is 100 million rupiah. The construction of the Bamboo Mosque building will be carried out by Kagama Care, UGM Community Service Program, Community and in collaboration with the Bambu Bos Team as experts and supervisors.

The fundraising of the Bamboo Mosque was carried out by Kagama Care. Through the Kagama Care network, Rp. 150,000,000 from IATMI donors, Saudi Arabia Kagama and also group and individual donors. After the fundraising was closed, then the order of the Bambu Mosque building was imported from Jogja.

Bamboo materials are ready to use imported from Yogyakarta, although there are many bamboos around the construction site. This is done with the aim of shortening the processing time because there needs to be a bamboo preservation process that takes quite a long time, besides that in Lombok there is no bamboo preservative installation. The bamboo preservation process for the mosque is carried out from 27 August 2018 to 10 September 2018. Preservation of bamboo uses borate solution and takes 2 to 3 days for draining. Scheduled

bamboo materials sent from Yogyakarta on September 14, 2018, along with 1 expert and 3 repairmen. Materials sent from Yogyakarta are as follows:

No	Goods	Specifications			
No.		Length (m)	Diameter (cm)	Total	
1	Apus Bamboo	6		369	
2	Reng Bamboo	2		1020	
3	Bamboo Lids (pelupuh)	2		895	
4	Bamboo Lids	2,4		5	
5	woven	3 x 2		159	
6	Sponati	1,35 x 2,25		110	
7	Long Drat	1	0,06	932	
8	Long Drat	1	0,1	84	
9	Nut (mur)		0,06	5592	
10	WP		0,06	5592	
11	WP		0,1	504	
12	Nut (mur)		0,1	504	
13	Bamboo stairs	6		2	

The construction phase of the mosque began with the cleaning of the ruins of the old mosque. Residents worked together to move materials that cover the foundation of the old mosque. In addition to clean up the debris, residents also prepared locations for bamboo materials. The bamboo material will be placed in the former emergency mosque which is next to the foundation of the old mosque.

After cleaning the mosque debris, the next step is the construction of the mosque as the foundation to support the bamboo mosque frame post. *Umpak* is the foundation used as the base or base of a simple building that uses a wooden or bamboo frame system. The Bamboo Mosque will be built requires 16 pieces of the pedestal, with a diameter of 40 cm and tall from the floor 30 cm. The Bamboo Mosque's umpak is made of concrete buis which is based on 50 cm thick cast concrete, and between cast and pedestal is reinforced with a series of 10 mm cast iron. So the pedestal structure embedded under the floor is 60 cm and that is above the floor surface as high as 30 cm. The work of the peddling is carried out by residents in mutual cooperation. The bamboo that will be assembled should be cleaned first. Bamboo cleansing aims to remove herbs and dirt that sticks to the outer surface of bamboo. This bamboo cleaning takes 3 days and is carried out by the community supervised by Bambu Bos.



Process of building the Bamboo Mosque



Design of the Bamboo Mosque

The assembly phase of the Bamboo Mosque begins with the establishment of the Soko Guru Pillar. Soko Guru's pillar has a height of 6 meters and stands on 4 pedestals. One pillar of soko guru consists of 4 bamboos with a diameter of 8 cm so that the total needed for the soko guru is 16 bamboo. Each pole is connected by a beam at the top. One beam consists of 2 bamboos with a length of 3.4 meters, so the total bamboo for the beam is 12 stems. On the wall frame, there are 12 support poles with a height of 2.7 meters. Each pole consists of 4 bamboos with a diameter of 8 cm. The frame stands on a pedestal that surrounds the teacher's shop and is connected by 2 bamboos with a diameter of 8 cm and a length of 9.4 meters. On the roof frame used bamboo jurai, there are two parts of the jurai namely jurai

above and lower jurai. The top jurai consists of 4 bamboo stems with a diameter of 8 cm with a length of 3.4 meters, and in the lower jurai consists of 4 pairs of bamboo which each pair consists of 3 bamboo strands which are assembled using bolt nuts. The bottom length is 6.6 meters stretching from the teacher's to the corner of the mosque.

The Bamboo Mosque wall consists of 8 bamboo panel panels. The door used in the Bamboo Mosque is a sliding door which amounts to 4 units, two are on the front and the right and left sides are installed one unit each. The roof of the mosque uses 2 copies and between lids, it is coated with sponati. The upper roof area is 24 m² and the roof area of the bottom / main roof is 144 m². The work of the Bamboo Mosque in addition to the purpose of completing worship facilities is also for the transfer of bamboo construction technology. So that in the process there is an internship program for the surrounding community. The internship program was attended by representatives of the Tenggorong and Belek hamlets, students from SMK 1 Gondang and SMK 1 Bayan. In this internship program, there is a transfer of technology about the cultivation process, harvesting, selection that, preservation, the design of bamboo buildings, to the process of making bamboo-based buildings.

5. Health Care

The initial step was the observation to know the emergency needs of residents and health communities in the region. Observations were carried out by interviewing the community so that the health team got the right location for the work area. The construction of the clinic is located in front of the Kagama Care Command Post in Tenggorong Hamlet, Gumantar Village, Kayangan District, North Lombok Regency, West Nusa Tenggara. Site selection is based on a large area (> 100 m2), distance to the nearest house> 10 m, in an area that can be reached by several families. Gumantar Village, which has 16 hamlets (6366 people), is affected by a significant amount of damage which damages public facilities including public health facilities. Kayangan Health Center is the closest health service that is still operating but has suffered severe damage to the building. The existence of a 24-hour health clinic and mobile puskesmas is expected to reduce the number of morbidity in the working area of the Kayangan Health Center.

Based on the meeting with the Head of Village, Head of Hamlets Beleq and Tenggorong, Kayangan Health Center, Kayangan Health Service, and others, the construction of a 24-hour health clinic was established in the yard owned by Mr. Sahir (Head of Beleq Hamlet). This is because Pak Sahir's yard area is 15 m from the house which has 4 heads of households in one house. The yard has an area of> 150 m2. Visualization of the construction location of the 24-hour health clinic is shown in Figure 2. It is expected that the location can be used by residents of Beleq and Tenggorong Hamlet as healthcare facilities for the community.

6. Medical Team Programs:

In terms of health, most people suffer from skin diseases and upper respiratory tract infections (ISPAI) in addition to several other technical problems such as the destruction of health institutions and the lack of medical personnel. Thus, it is important to overcome some of these problems along with the provision of health counseling activities as an effort to maintain health in a sustainable manner.

a. Home Visit



Home visit activities is aimed to improve health services especially those related to promotive and help in remote areas that are far from the reach of health facilities, in addition to mobile health centers also to monitor the services of the primary health center in general through screening cases of the disease in the local area. The disaster caused at least dozens of casualties and some were injured but due to limited access to people's homes had an impact on the uneven distribution of health services. The team conducted a network of cases of average illnesses in remote areas far from the reach of health services. The initial two weeks of mobile health center activities are carried out 3 times a week, on Monday, Wednesday and Saturday. Two weeks later, the home visit is done every day with a different location. The total number of patients treated by more than two hundred people. Common diseases were skin diseases and respiratory infections. This home visit or mobile health center provides first aid and monitoring of diseases suffered by the community. If you find a disease that requires further treatment, then refer to the nearest health center, namely the Kayangan Health Center.

b. 24-Hours Clinic



The clinic when using tent



After the clinic moved to Huntrap

It was built by the health team and local residents on August 25, 2018. Before that, there was a health service at the previous post but in the spatial and management manner it was not good. The existence of this clinic serves as a temporary health care place if at any time there are residents who need help and have not been netted when a mobile health center is carried out. The health clinic is a 3x6 meter tent built in front of the Kagama Care parent post, but then it moved to

huntrap (Hunian Transisi Menuju Permanen) with safety considerations for both patients and medicines. The clinic is open at 08.00 WITA but the team can still serve patients for 24 hours equipped with a more detailed administration (recording) system. There are experts, namely a doctor-assisted by the koas from the UGM Faculty of Medicine. The medicines available are supplied from Pukesmas Kayangan. The medicine needed by the community is scabimite which is a drug for people with skin diseases (scabies). The total number of people who come to the clinic is an average of 18 people each day. Medicines and medical equipment facilities that support these health clinics are all estimated to require more than 50 million rupiahs. Clinics with small funds can be realized because of the funding from Kagama Care and other donors. In this program, we played a role in the initial assessment of what was already there, the potential for infectious diseases, and what needed to be done besides that we (the first team from Student Community Services) also served in recording or administration and supply of medicines from the Puskesmas.

7. Logistic

a. Distribution of Aid



Aid distribution to Hamlets at Gumantar Village

Aid is one of the important things for postdisaster situations, so that programs carried out is data collection and distribution of logistical assistance obtained from various parties and channeled through the UGM NTB post in Mataram. We collaborated with Kagama Care who had sought donations and collected assistance. This program is carried out by recording logistical in and out and preparing the distribution to the people affected by the Lombok earthquake, especially in Gumantar Village.

In logistics distribution, the postal team conducted a "needs assessment" to all hamlets (16 hamlets) in Gumantar Village. This was done to find information on the needs of the community, so that aid was distributed on target and in accordance with the needs of the community. Assessment was carried out periodically to update data on community needs. The team also needs to record the demographics of other posts spread in Gumantar Village to anticipate overlapping in the distribution of aid. Logistic distribution is carried out routinely through mobile health center programs, counseling, trauma healing, 24-hour clinics, landfill activities, teaching activities, and community service activities. Distribution of large amounts of assistance is done by dropping.

Every incoming and outgoing logistics is recorded in detail and will be processed for distribution to the public. Logistics to be distributed needs to be sorted and sorted according to the distribution plan. Logistics also need to be regulated in order to cover the entire population in need.

b. Management of Post's Kitchen



Cooking activity at UGM Post

Food is an important factor in the disaster management process. In PB PBN in particular, there is a special program for managing nutrition intake and consumption of volunteers and students of KKN through the postal kitchen management program. For a month the kitchen management of the post was carried out alone through the collaboration of KKN and KAGAMA students. These two parties do not depend on the management of the kitchen for the community because they see the postdisaster situation where the community is still focused on the kitchen of their homes.

Through several stages, KKN and KAGAMA students try to carry out the kitchen management strategy independently as follows:

 Conduct a Survey of Availability of Food Ingredients, Prices, and Shopping in Various Markets

Trauma and infrastructure damage mostly affected the course of buying and selling transactions on the market. This disaster also affected large-scale changes in people's consumption patterns. Food surveys are of course needed. KKN and KAGAMA students conduct market surveys to see what materials can be obtained. And most importantly, any market that has carried out its activities after a disaster occurs. This was needed to know food menus that are not only arbitrarily given to parties at the post. Plus, we see that good nutrition will improve the performance of the parties concerned. This survey was also needed because of the urgency of logistics.

However, it was impossible for residents of the post to only rely on the help that comes in but needs to shop to be able to survive without bothering the surrounding community. For a month, we did shopping several times. It can be said that there are significant differences in the availability of materials on the market. This shows the existence of community business progression to maintain life through the activity of buying and selling food.

2. Conducting Various Simulations Schedule Kitchen Posko Managers

Inpractice, the posko's kitchen management strategy emphasizes the collaboration between KKN students as implementers with KAGAMA as donors. In order to foster the same feeling among the residents of the post, KKN students divided the schedule for the postal kitchen management tasks. Not only that, the division of tasks will be very helpful in providing food in a fast and precise time without helping the work program of each team. With the division of tasks, the elements of empowerment and cooperation are trying to be developed so that the students will not always focus on the areas of science they are involved in but also soft skills to survive.

D. MODEL

The presentation on Student Community Services programs shows the role of various parties in the process of repair and reconstruction after the Lombok earthquake which is the main objective of the Student Community Services at Lombok. Students themselves as executors of Student Community Services can not run programs with post-disaster situations without the presence of other parties such as volunteers, alumni (KAGAMA), Kagama Care, donors, and the institutional presence of the UGM campus itself. Especially in the case of post-disaster management in areas such as Gumantar that are far from the city center and tend to be overlooked in handling by the government so that they are more dependent on non-government actors. The presence of the Student Community Services which at the same time plunged into volunteers at Gumantar brought fresh air in the rehabilitation and reconstruction process.

The frequent disasters that occur both disasters make traditional hierarchical and over-administrative or centralized tendencies increasingly ineffective and create urgency to do other ways that are faster and decentralized in disaster management (Kapucu and Garayev, 2011 in Menya, Alice A., and OA K'Akumu, 2016). Collaboration and cooperation are one option in this problem. Collaboration in question is several parties, agencies, or agencies that have different abilities and resources to unite and work together to achieve a common goal of handling disasters. The PB PBN Lombok activities are a tangible proof of the importance of collaboration in disaster management because it involves various

parties such as students, public volunteers, alumni, universities, and donors to work together to revive Gumantar Village.

E. CONCLUSION

The Community Student Service in Lombok was successfully done well, as evidenced by the results of the work that had been done. both those which could be seen directly such as emergency schools, mosques, sanitation facilities or not directly such as the rise of the Gumantar community activities as usual. In addition, the activities we carried out were initiations for further Student Community Services in Gumantar Village through the next period of Student Community Services. Activities carried out with various parties in the form of collaboration in handling post-disaster situations can also be used as models in subsequent disaster management efforts.

Activities like this can certainly be improved and developed such as giving a special or specific debriefing to the disaster area for students to be better prepared in the field later. In addition, although collaboration is tend to be spontaneous and without prior planning, it still can be improved more by clarifying the flow of command and communication from the center to the field, so that the work done can be more effective and efficient.

F. REFERENCES

Journal

- Kapucu, Naim, and Vener Garayev. "Collaborative Decision-Making in Emergency and Disaster Management." International Journal of Public Administration, 2011: 366-375.
- Menya, Alice A., and O.A. K'Akumun. "Interagency Collaboration for Fire Disaster Managementin." *Journal of Urban Management* 5 (2016): 32-38.

Government Publication

Kementerian Kesehatan Republik Indoonesia. *Data dan Informasi Profil Kesehatan 2017.* Profil Kesehatan, Jakarta: Kementerian Kesehatan Republik Indoonesia, 2018.

Website

- Direktorat Pengabdian Kepada Masyarakat. *Tentang Kami.* http://pengabdian. ugm.ac.id/devel/id/tentangdirpkm/ (accessed October 18, 2018).
- Universitas Gadjah Mada. "Dokumen dan Materi." *KKN PPM Universitas Gadjah Mada.* https://kkn.ugm.ac.id/wpcontent/uploads/2017/02/2017-Operasional-dan-Etika-Pergaulan.pdf (accessed October 18, 2018).

Video

Anindita, Dinda Ajing, KKN-PB UGM 2018 LOMBOK UTARA [video]. https:// youtu.be/3U4pbwm6Cwc (published on October 28, 2018)

EDUCATION FOR SUSTAINABLE DEVELOPMENT THROUGH STUDENT COMMUNITY SERVICE PROGRAM FOR ENVIRONMENTAL AND TECHNOLOGY IMPROVEMENT IN JEPARA WETAN, CILACAP

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ABSTRACT Social empowerment applied the principles of Education for Sustainable Development (ESD). The process of solving real problems faced by target communities or development in the midst of community is combined with ESDbased learning. This will strengthen the function of wisdom also role and potential of human and natural resources contained in the community in every activities of problem solving and development. The real problems that occur in the village of Jepara Wetan include lack of street lights, the use of unhealthy sanitation, untreated yards, also non-optimal processing of organic waste. The purpose of this activity is to improve sanitation facilities, educate the importance of sanitation for health, utilize organic waste into compost, optimize yard maintenance, improve road infrastructure as a support for community activities, and technology literacy for the community to encourage changes both in individuals and all citizens. This community service activity is held from June to August 2017. Problem solving is done through community service activities including building healthy sanitation for residents; procurement of trash bins, training in composting, optimization of yard functions, installation of street lights, and basic computer training to village officials.

Keywords community service, ESD, sanitation, optimalization, technology.

A. INTRODUCTION

Students are the ones who will succeed leading, managing, and develop knowledge for improving their nation. Every students are required to have theoretical and practical knowledge in their study, as a way to help them getting used to solving problems inside a society. Theoretical knowledge are conceptual knowledge learned from classes, while practical knowledge is acquired from fieldwork or practices in a lab. One of the approach to face the problems in society is to do a community service to delve into the heart of societal problems.

Community service program is part of the Tri Dharma, in which practice is also linked with the other 2 virtues and involve all academic members; lecturers, students, staffs, and even alumnus. Through community service program, Universitas Gadjah Mada (UGM) involve itself in Indonesian society. (UGM board of community services, 2017).

Social empowerment applied the principles of Education for Sustainable Development (ESD). The process of solving real problems faced by target communities or development in the midst of community is combined with ESD-based learning. This will strengthen the function of wisdom also role and potential of human and natural resources contained in the community in every activities of problem solving and development. Moreover, this process also stimulate community growth and self-sustainability in creating a good management of social, economy, and environment that could sustain the community until generations after.

Community service programs made by UGM board of community services targets communities living in high risk areas. Communities living in high risk areas need to be stimulated to become an independent and sustainable communities, as written in Strategic Plan of UGM 2012-2017. Jepara Wetan Village, Binangun Sector, Cilacap Regency, Central Java became a location in this community service.

Our program, "Improvements in Environmental Management and Technological Literacy in Jepara Wetan Village" has several goals, such as: 1) Improving sanitation accessibility and sanitary education, 2) Optimizing backyard by organic waste as core ingredients for compost, 3) Improving roads as an infrastructure for supporting activities, and 4) Technological literacy as a mean to encourage individual and community change.

B. PROBLEMS

There are several aspects in Jepara Wetan village that are needed to be improved, such as infrastructure, economy, agriculture, education, environment, sanitation, and technology, which are:

- 1. Lack of illumination around the entrance, and inside Jepara Wetan Village. The lack of illumination hinders night activities and mobility. Moreover, it also provide chances for crimes, and dangers when threading the roads.
- 2. People are still using open cesspit, therefore, building a healthy alternative is needed.
- 3. Unutilized backyards
- 4. Lack of knowledge about optimizing organic wastes
- 5. Lack of technological literacy, hence needed to be improved as a way to gain knowledge.

C. METHODS

There are 4 activities that are enacted, provided in table 1.

No	Activity	Goals	Activity Description
1	Utilizing compost for optimizing backyards	Utilizing organic waste as a core ingredients for optimizing backyards	Community service team made compost from organic waste to fertilize soil. Moreover, compost is also used to fertilize plants in backyards
2	Building sanitary toilets	Improving sanitation and providing sanitary education	Community service team built sanitary toilets with the help of community members.
3	Improving public road illumination	Improving road as a supporting infrastructure for community activities	Community service team installed lights around high risk points around Jepara Wetan Village.
4	Basic computer training	Improving technological literacy as a mean to gain knowledge	Community service team provided computer training, especially the usage of Microsoft Office towards Jepara Wetan Village governmental body.

Table 1. Activities in Jepara Wetan Village community service program

D. DISCUSSION

1. Building sanitary toilets

Health is an important factor in human life. United Nations Development Programs (UNDP) described 17 goals for sustainable development. One of those goals is to provide, and manage clean water and sustainable sanitation. According to United Nations Partnership for Development Framework (UNPDF), Indonesia is facing a crisis for clean water and sanitation. Only around 57,2% of population has a sustainable access towards sustainable water source. Around 55 million people (22% of population) still defecate in open spaces (UNPDF, 2016). This also contributes towards the lack of water source, and sanitation. In 2020, poor and most vulnerable communities will have a better and fairer access for social service, comprehensive social protection, and better access to clean water (UNPDF, 2016). One of basic infrastructure for sanitation is toilet.

Toilet is one of basic sanitation needs to support health that is important for communities. Availability of toilets need to be observed as a waste management and for sanitation. The imbalance between population growth and residential areas exacerbate the problem of managing human wastes. Management of human waste is a core problem that needs to be attended for community health (Notoatmodjo, 2003).



Picture 1. Unhealthy open cesspit condition

According to sanitation accessibility and ownership data in Cilacap Regency 2015, there are 317.924 people (17,6% of population) who are still using open cesspit as sanitation system. Meanwhile, according to census by Health Center of Binangun, there are 270 open cesspit, most of them are spread around Dusun Karangbawang, mostly in RT 28. Open cesspits in that area are as presented in Picture 1. According to research by Cilacap Regency Department of Health in 2016, usage of open cesspit are unhealthy and polluting the environment and cause air pollution around the area. Therefore, modern healthy toilets are needed in said locations.

2. Choice of location

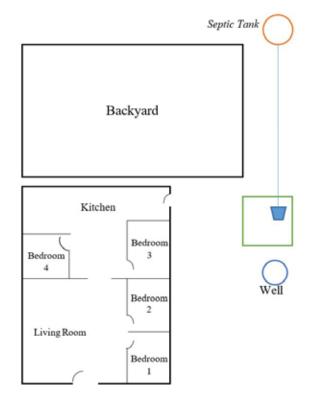
Location was made by doing a discussion and social survey in RT 28. Location was chosen according to its width (>100m²), distance from housing (>15m), and accessible for several families at once. According to discussion and analysis as above, it was decided that the toilet would be build on Mr. Madarjo's backyard. Toilet location is as shown in Picture 2.



Picture 2. Location of toilet

3. Healthy toilet design

Building a healthy toilet means a closed bathroom and a toilet. As shown in Picture 3, the dimension of toilet is 2m x 2m x 2,25m, and septic tank located 10m from the toilet, with 2m depth. The septic tank would contain wastes from the toilet with a pipe. In the restroom, a well is also included to provide water for its patron.



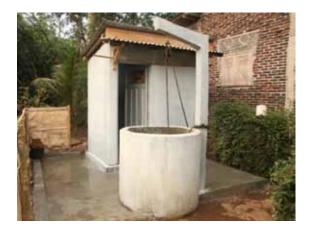
Picture 3. Design for the healthy toilet

4. Building proceedings

The project for building healthy toilet was done from July 22 to 30, 2017. Construction work was done by community service team, with the help of nearby residents, as shown in Picture 4. The result of this construction is a healthy toilet usable by nearby residents as shown in Picture 5.



Picture 4. Construction work by residents and community service team



Picture 5. Healthy toilet after construction

5. Waste separation

Waste separation was done by using trash bin with 5 categories, which are, poisonous and dangerous waste (B3), Paper, Organic waste, Inorganic waste, and incombustibles. This program was done with collaboration with Cilacap Regency Environmental Department and held on SDN Jepara Wetan I and SDN Jepara Wetan III. From these 5 categories, only organic waste is used for the next process.

Collected organic waste will then be utilized to make compost. According to National Standardization (2004) body, there are several factors that affect compost processing, abiotic and biotic, such as:

- Material separation: Waste is separated into metal, rock and plastic waste. Materials that hinders microbe growth will be separated from compost material, such as pesticide residue.
- b. Material shape: Smaller and similar shape would hasten and improve the quality of composting process. With smaller and similar shaped materials, microbe has a wider surface as base for activities. Moreover, material shape affects needed oxygen diffusion and extraction of produced CO₂.
- c. Nutrients: Microbes need carbohydrates for their activities in composting. 20% to 40% of used carbohydrates will be assimilated into cell components, and CO². Composting process, a balance of Nitrogen and Carbohydrate is needed. The optimum division between Carbohydrate and Nitrogen for composting is 25:1, with the maximum of 10:1.
- d. Water content: Water content varies between material shape and type. The optimal water content for composting is between 50% to 70%. There are several exceptions of this rule, for material such as hay, the optimal water content is 85%.

In composting, collected waste are separated into green waste, and brown waste. Carbon rich materials become energy source for microbes. These materials tend to have the characteristics of being dry, rough, and brown coloured. Nitrogen is needed for microbe growth, and breeding. Nitrogen materials tend to be green coloured, and contains water. Separated waste will then be mixed with the ratio of 1 part brown waste to 4 part green waste. Mixed waste will then be put inside a container which has soil as its base, with holes for extracting excessive water. A layer of soil will then be added on top of it. Gunny is used as container lid to maximize composting process. Composting process will take 1 month. Materials need to be stirred once a week. Compost is ready to use in the fifth week after processing starts.

6. Backyard managing with compost.

Compost can be used to fertilize plants in backyards. Backyards are managed in such way that it could be utilized optimally. Backyards before management is shown in picture 8. Backyard was managed by cleaning them from dead plants and wild grass. Areas that are planned for seeding is then tilled. Soil is tilled for helping roots to enter the ground and absorb nutrients. Seeding is then done on tilled soil.



Picture 3. Backyard management

Compost fertilizers will the used to fertilize these plants. Fertilizing plants will optimize

plant growth. Compost usage also has other advantages, such as improving soil fertility, repairing soil structure and characteristics, improving water absorption capacity, stimulating microbes activity, increasing crop yield, providing hormones and vitamins for plants, deterring plant diseases, and increasing nutrients in soil. (Sudiana, 2005).

7. Public road illumination improvement

According to data from Statistics Indonesia (BPS), there are 106,2 thousand traffic accident in Indonesia in 2016. According to data from Cilacap Departmental Police of the Republic of Indonesia, there are 770 cases of traffic accident in Cilacap regency in 2016. Accidents in remote village are not included in this data.

There are several factors that could lead to traffic accidents, such as road conditions, vehicle increase, and violation of traffic laws (Faraby, 2012). In Jepara Wetan Village, human error and road condition become the main reason of traffic accidents. The lack of supporting infrastructure such as illumination, also contributes to the reason of traffic accidents in this area. Therefore, illumination is an important infrastructure for roads. The main goals of illumination is to increase speed, accuracy, visibility at night for drivers and pedestrian (Santoso, 2009). The lack of illumination is one of the issues that need immediate attention from community and government. Road illumination in Jepara Wetan village is only centred in regency main roads. Based on research by community service team found 10 high risk spots for accident and crime in road without illumination.

Road illumination program is made of 3 phase, Planning, Permit, and installation. Planning phase is based on the result of surveys in high risk spots, and installation budgeting. Permit phase is done by asking residents who live near the area to provide electricity. Installation phase is installing street lights based on the plan that has been made.



Picture 9. Street lights installation

Planning phase was done to balance between budget and the community need, in which the amount and quality of illumination can be optimized. The result of that optimization is to install 10 lights in 10 dark areas in Jepara, Dewagang, Karangbawang, and Cengkoreh. The installation process is shown in picture 9.

The light bulb used in this project is 9 watt LED light bulbs, installed in a 2,35m galvanic pole, using NYM 2x1,5mm² cables, with 20m

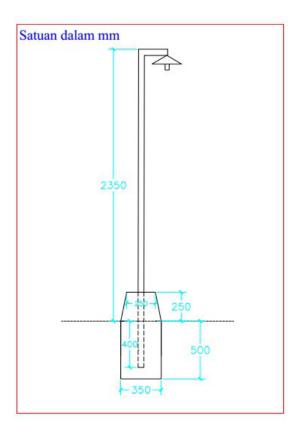
length from resident house, and each poles are based with concrete for durability. Street light design is shown in picture 11.

The building process is described in this list:

- a. Excavating 0,5m deep hole to plant galvanic pole.
- b. Fill the hole with galvanic pole inside it, and wait 1-2 days for it to harden.
- c. Installing bamboo pole for cables.
- d. Installing cable to light fitting and switch.
- e. Installing light housing on the pole by using steel wire and duct tape.
- f. Installing T-Fitting on house porches, as a switch for street lights.
- g. Tidying up cables.



Picture 4. Street light installation location



Picture 5. Street lights design

8. Basic Computer Training

Basic computer training is needed for Jepara Wetan Village public service staff. With sufficient knowledge about Information Technology, staffs can utilize technology to improve their efficiency, and integrate staffs, partners, and residents. Fragmented implementation of e-government also exacerbate the problem of fulfilling public needs and achieving results. Government institution should have had their own information system (Mayowan, 2010).

Internet based government or e-Government implementation was done to ease information sharing related to public service to people, businesses, and other agencies by using information technology. e-Government made it possible for people to interact and receive service from local, regency, and central government in any time (Praditya, 2014). E-government system was made to improve public services. According to survey done to 5 of 10 Jepara Wetan Village public service staff, they aren't capable of utilizing computer even for basic task such as writing a letter or making a financial report. These task, and a lot of other village public service tasks need the use of computer.

The training program consists of 3 phases on 3 days in SMPN 2 Binangun. The first phase is survey, followed by composing module, and direct training of village public service staff as the final phase. The first step was done by interviewing the village public service staffs. The result of this training can be used to compose letters, financial letters, processing village statistics, village assets inventory, and other related village public service activities. The inability of using Microsoft office will hinder work, and public service speed.



Picture 6. Basic computer training in SMPN 2 Binangun computer lab

Documentation of community service in Jepara Wetan Village can be seen through this URL ugm.id/ugmidJPkM17. This link holds documentation of activities and programs explained in this chapter. Other than that, there are video files about other activities done in Jepara Wetan Village in the duration of community service.

9. Conclusion

Community service in Jepara Wetan Village, Binangun, Cilacap regency has been completed successfully. Written here are the conclusion of the community service, and suggestions for the next community service program.

a. Building sanitary toilets

Sanitary toilets were built in areas that has limited accessibility to proper sanitation. This toilet is used by nearby residents for sanitary activities. Education about the importance of sanitation and sanitation facility maintenance is needed.

b. Backyard optimization

Backyard optimization consists of several activities such as waste separation, composting, and backyard management. These activities are linked and related to each other. These activities can be sustained by using the potential that backyard has. This optimization might be able to increase crop yield from backyards.

c. Improvement of public road illumination

Installation of street lights to improve road illumination was done in dark areas. This activity has improved the safety of resident's night mobility and activity. Maintenance of these infrastructure need to be enforced. d. Basic computer training

This program goal is to improve knowledge about the world outside the village through technology. This training is hoped to has a lasting effect towards the younger generation so that they can bring more technology into Cilacap regency.

E. REFERENCE

- Badan Standardisasi Nasional. (2004). Spesifikasi kompos dari sampah organik domestik. Badan Standardisasi Nasional.
- Direktorat Pengabdian Kepada Masyarakat UGM. (2017). Tentang Kami. Diambil dari http://pengabdian.ugm.ac.id/ devel/id/tentangdirpkm/
- Faraby, ishaq (2012). FAKTOR-FAKTOR PENYEBAB KECELAKAAN LALU LINTAS DENGAN MENGGUNAKAN METODE ANALISIS REGRESI. Universitas Jember.
- Mayowan, Y. (2010). Penerapan Teknologi Informasi Dan Komunikasi Di Desa (Studi Kasus di Kabupaten Lamongan).
- Notoatmodjo, S. (2003). Ilmu Kesehatan Masyarakat Prinsip-Prinsip Dasar. In *Rineka Cipta* (hal. 57–65).
- Praditya, D. (Balai P. dan P. K. dan I. (BPPKI)
 B. (2014). Pemanfaatan Teknologi
 Informasi Dan Komunikasi (Tik) Di
 Tingkat Pemerintahan Desa. Jurnal
 Penelitian Komunikasi, 17(2), 129–
 140. https://doi.org/10.20422/jpk.
 v17i2.12
- Santoso, W. J. (2009). *KAJIAN PENYEDIAAN PENERANGAN JALAN UMUM DI WILAYAH JAKARTA TIMUR*. Institut Teknologi Bandung.

- Sudiana, E. (2005). Cara Pembuatan Kompos. Fakultas Biologi Universitas Jenderal Soedirman.
- UNPDF. (2016). Republic of Indonesia and The United Nations System in Indonesia, 2016–2020.
- https://youtu.be/_5ZwTDKWnHA URL for documentation of community service in Jepara Wetan Village.

Theme for BORDER REGION, LESS DEVELOPED REGION

GAMA RAIN FILTER INSTALLATION TO MEET THE NEEDS FOR CLEAN WATER AND IMPROVE THE QUALITY AND QUANTITY OF GROUNDWATER IN BANJARARUM VILLAGE, KULON PROGO REGENCY, YOGYAKARTA

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ABSTRACT The issue of clean water shortages in the city of Yogyakarta and other cities in Indonesia is getting more serious. Groundwater level lowering and decreasing groundwater quality in the city of Yogyakarta are getting increasingly intensive (BLH, 2015). These generally result from increased runoff, reduced rainfall infiltration, and rampant illegal activities in an effort to make domestic wastewater absorbed into the ground. The issues of water shortages and groundwater level lowering also occur in Banjararum Village, Kalibawang Sub-district, the location in which community service was undertaken. In contrast to the existing problems, the enormous potential of rainwater in Indonesia that can actually be utilized, can provide a solution for overcoming the problem of water availability and improving its quality. The magnitude of such potential and the character of high rainfall existing in the service points, which were in Banjararum Village, based on data from BPS (2007 and 2015) have similarities, i.e. the season run from January to April and from November to December, while the rainy season tended to run from May to October. The data indicate the potential to catch rainwater during the rainy season in order that supplies for the dry season can be fulfilled gradually. So far the residents of Kalibawang Sub-district use water from the tributary of the River Progo for consumption and daily activities. In addition to this method, some of them also built drilled wells on their own around their houses with an average depth ranging from 20 to 25 meters per point, which of course cost them much money. The long dry season also forces the community of Banjararum Village to buy water because of groundwater level lowering and insufficient water availability.

> The rainwater harvesting technology (GAMA Rain Filter, Maryono, 2015) is one of the methods that can be used in the adoption of appropriate technology to assist in meeting clean water needs of the residents of Banjararum Village, Kalibawang Sub-district. In addition, the groundwater level lowering in the dug wells of the village residents can be overcome by injecting the remaining rainwater that has been caught. Besides restoring the groundwater level to the normal point, the

injection of rainwater can also improve the quality of dug well water. Thus, it is expected that residents will no longer experience problems meeting their water needs and do not have to be worried about health problems any longer when using the water they have for consumption. In this activity, there were 2 out of 5 points. A point was located in the house of a resident who was also a village official and the other is at Muhammadiyah Vocational High School. The locations chosen to carry out this activity are also compatible with SDG programs, especially point No. 6, which is to be able to manage and conserve water in the area.

Keywords Rainwater Harvesting Technology, Injection, SDGs

A. INTRODUCTION

1. Background

Rapid development has an impact on groundwater level lowering due to uncontrolled use. This poses problems to the surrounding community in their daily lives. Indonesia as a country with high rainfall, with potential rainfall of 2,000-4,000 mm/year, has large water reserves to raise the existing groundwater level. As a result, it is imperative to adopt a rainwater harvesting method. This method has been adopted by ancestors and those people in the past in almost all Indonesian regions. To improve the quality of rainwater to be caught and used as water reserves other than groundwater, appropriate research was undertaken on GAMA Rain-Filter, which functions to filter fine dust and rough dust on the roof of a house. This tool has been installed in various regions in Indonesia with different environmental conditions. In addition, rainwater injected into the community wells can reduce the Fe and Calcium content in groundwater in those areas.

The community of Kulon Progo Regency, precisely in Banjararum Village, have problems regarding water quality. Quality of the water in the area has a high Fe content. This causes the community to develop health problems that are actually not serious if they can be treated immediately. However, if consumption of water containing a high Fe content continues for a long period, this may pose a serious threat to public health. Therefore, it is imperative to conduct installation of and and disseminate information about how to use the tool GAMA Rain Filter in order to reduce the high Fe content using rainwater caught in a container. In addition, the community can also build new rainwater containers or use their wells equipped with such a tool in order to improve the quality and quantity of groundwater. In the future, it is expected that the community of the region will no longer experience water shortages and can use rainwater during the rainy season and groundwater from wells with a low Fe content for consumption. Community Service that is also intended for implementing the tool developed using the appropriate technology GAMA Rain *Filter* was carried out by:

- a. establishing the Standard Operating Procedure (SOP) for the making and application of GAMA Rain-Filter, and
- b. introducing the device by having it installed in accordance with the SOP to facilitate improvement in the future by the community.

The program to implement GAMA Rain Filter equipped with wells or infiltration wells was planned to be undertaken in Kulon Progo Regency with research site in Banjararum Village, Kalibawang Sub-district. The following are the quality assurance steps taken in this community service program:

- a. disseminating information about the activity to the community,
- b. monitoring implementation of the activity,
- c. filtering feedback, and
- d. evaluating the outcome of the activity.

2. Objectives of the Activity

The objectives of the Community Service program through the Installation of GAMA Rain Filter (the Device to Catch and Filter Rainwater Integrated into Community Wells) in order to Meet the Needs for Clean Water, Raise the Groundwater Level, and Improve Groundwater Quality are:

- To reintroduce the concept of Rainwater Harvesting to the community in order to meet the needs for raw water and maintain groundwater availability in the community.
- 2. To apply the method of Rainwater Harvesting using the device *GAMA Rain Filter* to make it easier to collect and filter fine dust and coarse dust on the roof thus maintaining quality of the rainwater caught.

3. Significance of the Activity

The significance and impact of the Community Service program through the Installation of GAMA Rain Filter (the Device to Catch and Filter Rainwater Integrated into Community Wells) in order to Meet the Needs for Clean Water, Raise the Groundwater Level, and Improve Groundwater Quality are:

 a. to raise public awareness to carry out rainwater treatment and use to fulfil water needs,

- b. to improve water quality and quantities in order that it can be fit for human consumption,
- c. to broaden the actors and target users of GAMA Rain Filter in the research site.

B. METHOD OF IMPLEMENTATION

The utilization and planning of an integrated rainwater harvesting installation system in Banjararum Village, Kalibawang Subdistrict, Kulon Progo will provide a solution to the issue of clean water resources for the community. The steps to carry out the activity are presented in the following chart:

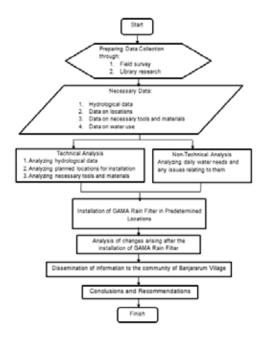


Figure 3.1. Rainwater Harvesting Device Installation Plan Flowchart

1. Hydrological Analysis

The rain data used in this activity are monthly rainfall data for 5 years starting from 2012 to 2016 using data from Kalibawang Rain Station. The data obtained were comprised of data on the height of rain (h) expressed in mm/month.

2. Analysis of Rainwater Collecting Pond

Rainwater collecting ponds refer to ponds that function as a place or container used to store rainwater. The rainwater collected comes from the roof of buildings such as simple houses, school buildings, and several other places. These collecting ponds have several forms such as concrete-casted ponds (i.e. simple ponds traditionally used by the village community) and water tanks as what urban communities commonly use. To determine the need for rainwater collecting ponds in this activity, the following formulas were used (Suyono and Takeda, 1999 modified by Maryono, 2016)

$$Q = \alpha \, x \, I \, x \, A \tag{3.1}$$

where,

 α = runoff coefficient

- I = rain intensity (mm/hour)
- A = area of the building roof (m^2)

The relationship between the intensity (I), duration (t), and height (d) of rain is expressed in the following equation:

$$d = \int_0^t I \, x \, dt = \sum_0^t I \, x \, \Delta t \tag{3.2}$$

The average intensity I can be formulated as follows:

 $I = \frac{d}{t}$

where,

d = height of rain (mm)

t = duration of rain (second)

For rainwater collecting ponds, the average intensity was used. If there are no rain data on an hourly basis, the average monthly rain height can be used.

$$Q = \alpha x \beta x I x A \tag{3.4}$$

The relationship between the discharge, rainwater volume, and rain duration can be expressed using the following equation.

$$Q = \frac{v}{t}$$
(3.5)

The relationship between the discharge, rainwater speed, and section area of the gutter is formulated as follows.

$$Q = v x A \tag{3.6}$$

Based on Equations (3.5) and (3.6) the rational formula to calculate the volume of rainwater that can be harvested can be formulated as follows:

$$\frac{V}{t} = v x A \qquad \qquad V = v x A x t$$

where

$$v = \frac{Q}{A} x V$$
$$v = \frac{Q}{A} x A x t$$

Then, the following formula can be derived therefrom.

$$V = Q x t \tag{3.7}$$

becomes

$$V = \alpha \, x \, \beta \, x \, A \, x \, I \, x \, t \tag{3.8}$$

where,

- V = volume of rainwater caught in the rainwater collecting pond (m³)
- α = runoff coefficient
- β = rain distribution coefficient
- v = water speed (m/second)
- I = rain intensity (mm/hour)
- t = rain duration (hour), where the unit of measurement can also be converted into second
- A = section area of the gutter (m^2)

The use of rainwater catchment ponds on a simple house scale can be built on the ground or underground. The use of this installation or planning model depends on the condition of the house inhabited. The following are images illustrating simple rainwater collecting ponds built on the ground and underground on a simple house scale.



Figure 3.2 Catchment Ponds (1) on the ground and (2) underground (Source: Stormsaver 2017)

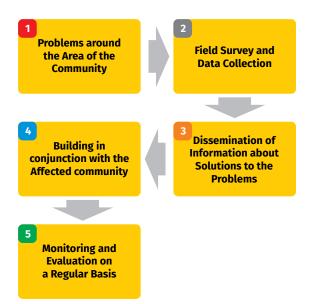
3. Water Quality Analysis

This activity will also test rainwater and well water samples from the agreed points to determine the contents contained therein. Afterwards, the excess rainwater that has been collected will be added to the existing wells in order to examine the treatment or changes that occur after the injection of rainwater. So far the Fe content in the wells of the community of Banjararum Village is high. This will be tested for any changes after the injection of rainwater.

4. Road Map of the Activity

The following is the road map of the activity

to be undertaken in Banjararum Village, Kalibawang Sub-district.



C. RESULTS AND DISCUSSION

1. Field Survey

On 13 February 2018 a field survey was conducted to find out the potential points

to be used as research facilities. This survey was carried out by college students assisted by local village officials. There were a total of 5 points obtained as shown in the map below.

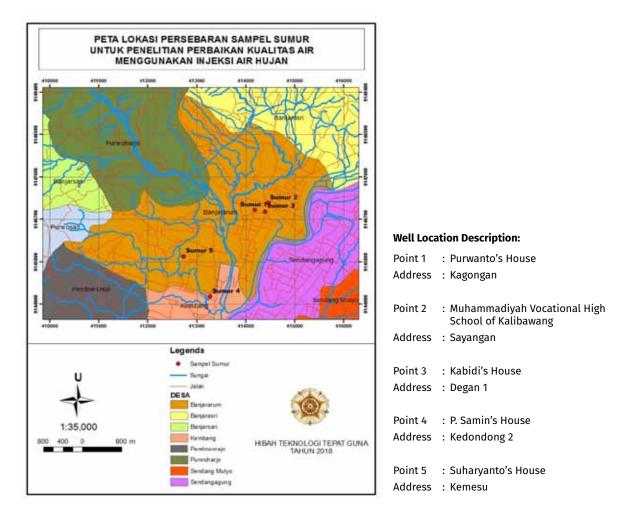


Figure 4.1 A Map of Well Locations in Banjararum Village, Kalibawang Sub-district

The well locations chosen based on the survey are comprised of 4 houses of the local residents and 1 school building with different roof areas. Based on the survey results, rainwater harvesters (PAH) equipped with GAMA Rain Filter will be installed in 2 well locations that will serve as a model for the surrounding environment. The documentation for results of the survei that has been carried out is presented in the following table.

Table 4.1 Well Locations in Banjararum Villa	ge, Kalibawang Sub-district
--	-----------------------------

Point	Owner Name	Address	Coordinate	Documentation Information
1	Purwanto	Kagongan	S 07º43.078' E 110º13.371'	(Front View)
				Well Location
2	Principal of Muhammadiyah Vocational High School	Sayangan	S 07º42.997' E 110º13.524'	(Front View)

Poin	t Owner Name	Address	Coordinate	Documentation Information
3	Kabidi	Degan 1	S 07º43.095' E 110º13.491'	(Well Location)
4	P' Samin	Kedondong 2	S 07º44.075' E 110º12.879'	(Front View)

Point	Owner Name	Address	Coordinate	Documentation Information
5	Suharyanto	Kemesu	S 07º43.611' E 110º12.583'	
				(Front View)

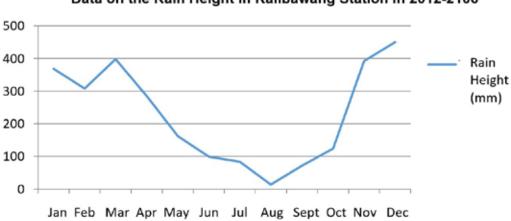
2. Hydrological Analysis of Kalibawang Station

To plan rainwater collecting ponds requires data on rainfall as the source of water to be used. In this activity, monthly rainfall data (mm) for 5 years, i.e. from 2012 to 2016, were used. The source of data used was the data recorded at Kalibawang Rain Station. The following are the rainfall data for 5 years in Kalibawang Sub-district.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2016	328	230	587	277	289	289	212	68	361	352,5	547,9	263
2015	261	258	634	387	38	0	0	0	0	0	436	496
2014	331	346	259	312	145	105	80	0	0	0	227	516
2013	563	344	203	385	211	100	128	0	0	173	240	427
2012	365	365	308	62	128	0	0	0	0	98	508	551
Mean	369.6	308.6	398.2	284.6	162.2	98.8	84	13.6	72.2	124.7	391.78	450.6

Source: Kulon Progo in Figures

The table above shows the characteristics of monthly rain height in Kalibawang Sub-district. In Indonesia the rainy season commonly lasts from October to May while the dry season lasts from June to September and this happens all over Indonesia. The highest monthly rain height took place in March 2015, i.e. by 634 mm, while the lowest monthly rain height took place between June to October 2015 and June to September 2012, i.e. by 0 mm. These data will be used as references to design rainwater catchment ponds to be mounted to the predetermined well locations. The following is a graph illustrating the average rain height from 2012 to 2016 to determine rain characteristics in Kalibawang Sub-district.



Data on the Rain Height in Kalibawang Station in 2012-2106

Figure 4.2 The Graph Illustrating the Height of Rain (mm) in Kalibawang Sub-district in 2012–2016

3. Analysis of Rainwater Catchment Ponds

To determine the amount of rainwater caught to be used, the following formula is used to determine the amount of rainwater availability.

$$V = \alpha \, x \, \beta \, x \, A \, x \, I \, x \, t$$

where,

- V = volume of rainwater caught in the rainwater collecting pond (m³)
- α = runoff coefficient
- β = rain distribution coefficient
- v = water speed (m/second)
- I = rain intensity (mm/hour)
- t = rain duration (hour), where the unit of measurement can also be converted into second
- A = section area of the gutter (m^2)

Rainwater availability in the predetermined points is presented in the following table.

No.	Month	Rain Height (mm) per week	A (m²)	Α	β	Rainwater Availability (m³) per week
1	January	92.4	30	0.9	1	2.49
2	Februrary	77.15	30	0.9	1	2.08
3	March	99.55	30	0.9	1	2.69
4	April	71.15	30	0.9	1	1.92
5	Мау	40.55	30	0.9	1	1.09
6	June	24.7	30	0.9	1	0.67
7	July	21	30	0.9	1	0.57
8	August	3.4	30	0.9	1	0.09
9	September	18.05	30	0.9	1	0.49
10	October	31.17	30	0.9	1	0.84
11	November	97.94	30	0.9	1	2.64
12	December	112.65	30	0.9	1	3.04
		18.62				

Table 4.3 Rainwater Availability (m³) in Point 1

No.	Month	Rain Height (mm) per week	A (m²)	A	β	Rainwater Availability (m³) per week			
1	January	92.4	31.5	0.9	1	2.62			
2	Februrary	77.15	31.5	0.9	1	2.19			
3	March	99.55	31.5	0.9	1	2.82			
4	April	71.15	31.5	0.9	1	2.02			
5	Мау	40.55	31.5	0.9	1	1.15			
6	June	24.7	31.5	0.9	1	0.70			
7	July	21	31.5	0.9	1	0.60			
8	August	3.4	31.5	0.9	1	0.10			
9	September	18.05	31.5	0.9	1	0.51			
10	October	31.17	31.5	0.9	1	0.88			
11	November	97.94	31.5	0.9	1	2.78			
12	December	112.65	31.5	0.9	1	3.19			
	Total Availability for 1 Year (m³)19.5								

Table 4.4 Rainwater Availability (m³) in Point 2

4. Plans

After the primary data and the secondaru data have been processed, the next step was to draw the plans to make it easier for the installation of rainwater harvesting devices in 2 locations that have been predetermined (enclosed). The following are sample plans of one of the locations under construction.

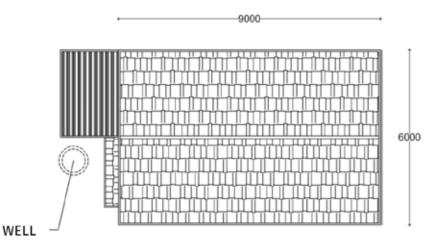


Figure 4.3 The Existing Plan of Mr. Purwanto's House

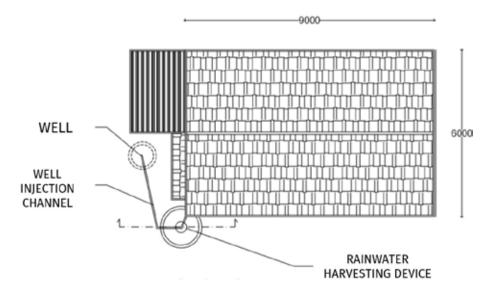


Figure 4.4 The Plan of Mr. Purwanto's House

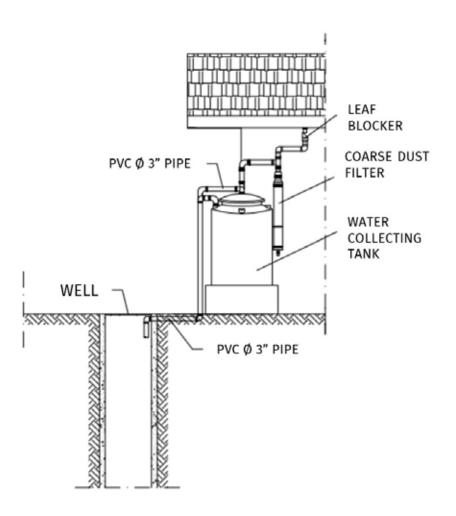


Figure 4.5 Detailed Section Drawing of Mr. Purwanto's House

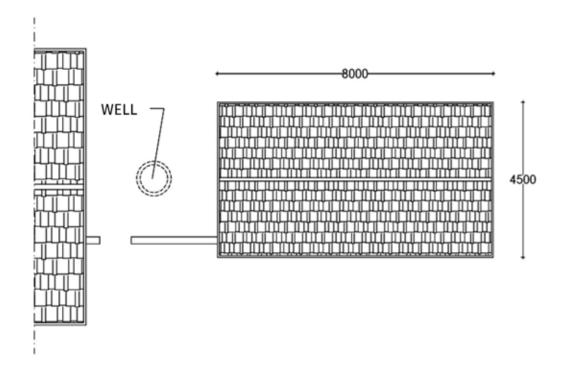


Figure 4.6 The Existing Plan of Muhammadiyah Vocational High School

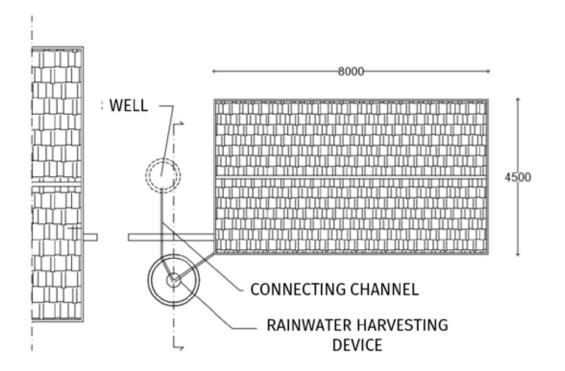


Figure 4.7 The Plan of Muhammadiyah Vocational High School

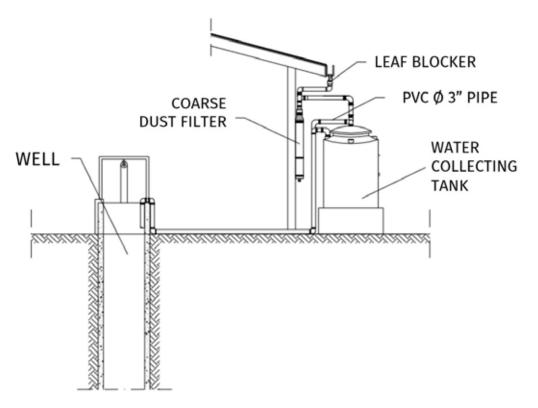


Figure 4.8. Detailed Section Drawing of Muhammadiyah Vocational High School

5. Analysis of the Quantity and Quality of Well Water

To determine what materials contained in rainwater and well water in Kalibawang Subdistrict, the rainwater and well water samples from 2 predetermined locations have been taken and are currently undergoing a test for any materials contained therein at the Center for Disease Control and Environmental Health Engineering (BBTKLPP) of Yogyakarta. The waiting period for the test was \pm 1 month starting from 30 May 2018 until 30 June 2018 (enclosed). The following are results of the test undertaken at BBTKLPP Yogyakarta.

No	Parameter	Unit of	Testing	g Result	Mathad of Tasting
No.		Measurement	Well Water	Rainwater	Method of Testing
1	Detergent	mg/L	0.0152	0.0118	SNI 06-6989.51-2005
2	Iron	mg/L	< 0.0162	< 0.016	SNI 6989.4-2009
3	рН	-	5.8	7.7	SNI 06-6989.11-2004
4	TDS	mg/L	100	146	In-House Methods

No.	Parameter	Unit of	Testing	g Result	Mothod of Tosting
NU.	Falametei	Measurement	Well Water	Well Water	Method of Testing
1	Detergent	mg/L	0.0248	0.0175	SNI 06-6989.51-2005
2	Iron	mg/L	< 0.0162	< 0.0162	SNI 6989.4-2009
3	рН	-	5.2	5.2	SNI 06-6989.11-2004
4	TDS	mg/L	103	99	In-House Methods

Table 4.6 Testing Results for the Quality of Well Water and Rainwater from Muhammadiyah Vocational High School

Based on the data above, results suggest that in both locations, the quality of rainwater is better than that of the well water. But, in order to get valid results, it is necessary to conduct a further test to be compared with results of the first test that has been undertaken.

The activity of pouring or injecting rainwater into the residents' wells was carried out in the rainy season. At the time the community service program was undertaken, rain which was one of the materials to be tested to determine changes in the height of the water level and water quality of residents' dug wells never fell. As a result, the results obtained remain be based on secondary data and data on the test performed at the beginning of the program.

6. Determination of Points and Processes for GAMA Rain Filter Installation

After conducting observation on installation location, roof area, and device maintenance as well as dissemination of information about the function of the device to the surrounding community, locations for the test were determined as follows.

Point	Owner Name	Address	Coordinate	Documentation Information
1	Purwanto	Kagongan	S 07º43.078' E 110º13.371'	(Front View)
				(from view)
2	Muhammadiyah Vocational High School of Kalibawang	Sayangan	S 07º42.997' E 110º13.524'	(included of the second of the

Table 4.7. Locations for Testing Wells Based on Observation Results

160 | Conference Proceeding of The 1st International Conference on Community Engagement and Education for Sustainable Development (ICCEESD) 2018

After obtaining 2 locations above, the next step was to have the rainwater harvesting device installed coupled with GAMA Rain Filter. This was intended to ensure that the rainwater harvesting process runs optimally in accordance with the program to be carried out. This rainwater harvesting installation was assembled on 27-30 June 2018, which took 2-3 days for each location.

The process involved participation of the residents of Banjararum Village. It is expected that their participation could be one of the ways to share the knowledge implemented. Thus, in the future, those residents taking part in the installation of the rainwater harvesting device can duplicate it on another point in the area of Banjararum Village. The following is the process of installing the rainwater harvesting device.

Point	Owner Name	Coordinate	Description		
1	Purwanto	S 07º43.078' E 110º13.371'	<image/>	(50%)	
			<image/>		

Table 4.8. Rainwater Harvesting Device Installation Process



(100%)

7. The Activity of Disseminating Information to the Community of Banjararum Village

On 26 September 2018 at the Hall of Banjararum Village, Kalibawang Sub-district, Kulon Progo Regency, information was disseminated about the use of the rainwater harvesting installation to improve the quantity and quality of groundwater. This activity started from 08.30 to 12.00, which was opened by the Chief of Banjararum Village Mr. Warudi. It was then followed by an explanation from the awardee of the Appropriate Technology grant about the importance of using rainwater to help meet the needs for raw water every day and helping conserve groundwater in the region. Thus, the height of the groundwater level in the region will not undergo lowering and have good quality. In this event, there were various elements who attended such as village officials, hamlet administrators, students all over the village, the youth organization *Karang Taruna*, and so on. There were a total of 42 participants attending that day as proven by the presence list shown in the following figure.

In the course of the explanation on the importance of rainwater use for daily water availability for the community and to maintain the height and quality of groundwater in Banjararum Village, the grant awardee then continue by explaning how to use the rainwater harvesting installation using the patent-worthy Gama Rain Filter 2016 that has been installed in several predetermined points. The explanation-providing activity was also coupled with a two-way question and answer session led directly by the speaker. The residents seemed very enthusiastic about the explanation from the speaker. Banjararum Village, at the time dissemination of information was held, was experiencing drought making the village community have to take water from the River Progo and the River Tinalah. With this dissemination of information, it is expected that the community gain new insights into the importance of the treatment of rainwater falling in their own region. Moreover, the speaker also gave a sample proposal to request assistance in the form of installation of a rainwater harvesting device they can submit to various institutions, either government and private ones. In the future when this appropriate grant program ends, it is expected that the community can independently submit a proposal to request assistance in a sustainable manner. The following is the description of situations

during the dissemination of information at the Hall of Banjararum Village, Kalibawang Sub-district, Kulon Progo Regency.



Figure. 4.10. Dissemination of Information to the Community of Banjararum Village

D. PLAN FOR THE NEXT STAGE

The plan for the next stage to be carried out is to undertake measurement on a regular basis of the level of underground water that has been injected using the rainwater harvesting technology. This is intended to determine characteristics of changes in the height of the groundwater level in 2 predetermined points. Moreover, a test will also be carried out on a regular basis to determine changes in the quality of well water into which rainwater has been injected. In addition to the above technical activitis, another activity that will also be undertaken is establishment of the rainwater treatment community at hamlet level. This community will serve as a forum for sharing knowledge of how to carry out rainwater treatment and technology being developed. The existence of this community is expected to promote public awareness of the importance of the treatment of a source of abundant water, which is rainwater. Once the rainwater treatment community at hamlet level has been established, the next activity is to provide assistance for the community to prepare and write a proposal to request assistance from government agencies or private institutions as to the procurement of the rainwater harvesting technology. It is expected that Banjararum Village in the next 1 to 2 years will have sufficient water availability despite a prolonged dry season.

E. CONCLUSIONS AND SUGGESTIONS

1. Conclusions

The use of the rainwater harvesting technology *GAMA Rain Filter* combined with the injection method constitutes one of the improvements in the existing rainwater harvesting technology. The use and treatment of rainwater undertaken by the community in Banjararum Village

with pilot implementation in 2 points of implementation facilitate the introduction of a good rainwater treatment campaign. In addition to education on the rainwater treatment system, the community also learn the process on how to harvest rainwater where the excess can be injected into wells in order to maintain the height of the groundwater level at the same level despite dry season. Moreover, the quality of groundwater at that point will also improve gradually as good rainwater quality affects the quality of dug wells of the community.

2. Suggestions

Public enthusiasm about the rainwater harvesting technology can be developed into a regular program to be implemented in Banjararum Village, Kalibawang Sub-district set out in the form of a village work program in order to be implemented in 26 hamlets with water availability problems. It is expected that by installing such technology at school, students will learn and think about how to better improve it in order that it can be implemented at their respective house. Hence, the improvement of the rainwater harvesting technology in Banjararum Village can be disseminated quickly and help solve the issue of drought.

F. REFERENCES

- A. Palla, I. Gnecco, L.G. Lanza, 2011 : Nondimensional design parameters and performance assessment of rainwater harvesting systems, Journal of Hydrology, Elsevier : 2011
- Diana, 2016: Studi Rainwater Harvesting dan Sumur Resapan di Asrama Kidang Pamamjumg ITB, Bandung 2016

- DucCanh Nguyen, 2015 : The Effect of Location of Decantralized Rainwater Storage on Flood
- Goam 2015: Rainwater Management in Urban developmetRainwater Harvesting for Water Recources Recovery and The Cooling Effect, Proceeding Multi Purpose of Rainwater Management at 2015 IWA ASPIRE conference, 2015, Beijing, China.
- Maryono dkk, 2001: *Hydromechanik*, Yogyakarta 2001
- Maryono 2013: Laporan Perencanaan dan Implementasi Memanen Air Hujan di Daerah Istimewa Yogyakarta oleh PPE, KLH Jawa, 2013.

- Maryono, 2016: *Memanen Air Hujan*, Gama Press, Yogyakata 2016
- Viet-Anh-Nguyen, 2015: Multi-Purposes Rainwater Management at HUCE Campus, Proceeding IRHM, 2015 The 6th International Rainwater Harvesting and Management Workshop, Beijing China, 2015

Triatmodjo, 1994: *Soal Penyelesaian Hidraulika 1*, Beta Offset, Yogyakarta: 1994

166 | Conference Proceeding of The 1st International Conference on Community Engagement and Education for Sustainable Development (ICCEESD) 2018

Theme for EDUCATION FOR SUSTAINABLE DEVELOPMENT

THE IMPLEMENTATION OF EDUCATION FOR SUSTAINABLE DEVELOPMENT IN THE LOCAL ECONOMIC RESOURCE DEVELOPMENT COURSE: TOWARD SMART VILLAGE FOR AGRICULTURE IN SLEMAN REGENCY

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ABSTRACTThe implementation of Education for Sustainable Development (ESD) in the
course Local Economic Resource Development in Wonokerto Village, Sleman
Regency aims at understanding the concept of ESD and training in preparing
participatory action plans. The action plan was focused on Smart Village for
Agriculture through website development, Instagram, landmark establishment,
YouTube registration, and training on Website and Instagram management.
The selection of the action plan was started by preparing the regional profile by
means of observations, interviews, and focus group discussion. The participants
of FGD were the community, village officials, youth groups, village enterprise
(Bumdes), students, ESD Team and resource persons. By synergizing them, the
implementation of lectures through the application of ESD can provide experience
to students in understanding the real conditions and problems in the field and
solving them together with the community. Besides, benefits can also be learned
by the local people through the development of smart village for agriculture.

Keywords Education for Sustainable Development, Local Economy, Smart Village

A. INTRODUCTION

The Development of Local Economic Resources constitutes an optional course at the Study Program of Regional Development, Department of Development Geography, Faculty of Geography, Universitas Gadjah Mada In this course, besides the material on concepts, methods and study techniques of cases are also given. One of them is in the form of training on composing action plans related to the development of local economy. In composing action plans, the students have so far implemented them through simulation. Through the grant of Education for Sustainable Development (ESD), they are able to do the practice of composing action plans in a participatory way in the village where the study is implemented. They are expected to be able to learn directly from real field cases along with the community.

On the other hand, the community can also get benefits from this study-together process. The realization of ESD in the course Development of Local Economic Resources was implemented in the village of Wonokerto, Sub-district of Turi, Regency of Sleman, Special Region of Yogyakarta, where most of its people earn their living doing farming activities, especially planting Salak Pondoh (Snaky Fruit). Meanwhile, the purposes of implementing ESD in the course Development of Local Economic Resources through farming activities of salak-pondoh agriculture toward Smart Village for Agriculture in the respective village are: 1) to implement the concept of ESD in the course development of Development of Local Economic Resources, and 2) to do ESD-based course activities by composing action plans in a participatory way toward Smart Village for Agricultiure. Previously, the realization of ESD in a course was once implemented in the course Urban Management through community studies in Green Kampongs of the city of Yogyakarta (Rachmawati, 2014). Such an activity is regarded the most effective learning method in giving the comprehensive material on Urban Management since the students were able to learn directly from community in relation to self-environmental management (Rachmawati, 2014). In addition, they were also able to learn about the roles of community figures and leadership as well as form of effective communication in environmental management (Rachmawati, 2015).

B. LOCAL ECONOMIC ACTIVITY PROFILE OF STUDIED VILLAGE

Salak-pondoh plantation is very dominant in nearly all areas in the village of Wonokerto. Besides, there are two tourism attractions called *Wisata Bumi Perkemahan* located in Garongan and *Wisata Alam* located in Tunggularum, managed by both the village administration and local people. However, if both tourism attractions are managed in a more professional way, this will boost the tourism industry that is related to activities of *salak-pondoh* plantation that is very prospective as an economic activity of local people.

In 2009, the Regional Agency for Agriculture stipulated three sub-districts as an intensive cultivation for *Salak Pondoh*, namely subdistricts of Turi, Tempel, and Pakem. This stipulation is based on the fact that the three regions produce *Salak Pondoh* the most if compared to the other regions of the regency. According to the Badan Pusat Statistik (BPS / Central Bureau of Statistics) of the Regency of Sleman (2013), the sub-district of Turi has the largest number of *Salak-Pondoh* productive plants, i.e. 2,212,555 clumps producing 255,893 quintals of *Salak Pondoh*, meaning at the average of 11.57 kg/clump.

The village of Wonokerto is one of the four villages in the sub-district of Turi that is considered as the largest number of *Salak Pondoh* producing area. This shows that *Salak Pondoh* has a promising prospect to cultivate and that it needs to be marketed both in the forms of fresh fruit and processed products, such as crackers, *wajik* (rhomboid shapes), *bakpia* (fruit pie), *dodol* (porridge), etc. Meanwhile, the product reaches up to 1,588 quintals in 2012 (BPS of the Regency of Sleman, 2013).

In the context of production, Salak Pondoh was found abundant during the big harvest in the villagewherethisstudywasconducted. Because Salak Pondoh is considered an agricultural produce that is easily spoiled, most farmers sell their Salak Pondoh to the nearest collecting merchants. local. Such a potential needs to be balanced with the growing creativity of local people in processing Salak Pondoh through the local economic empowerment. Thus, this will increase the duration of Salak Pondoh itself and the selling price of it through various processes. Therefore, this will also be able to improve the economic condition of the farmers in the area. In the activity of ESD, the potency of enterprise development of Salak Pondoh through an action plan that is composed in a participatory way is also going to be studied.

C. THE IMPLEMENTATION OF THE COURSE EDUCATION FOR SUSTAINABLE DEVELOPMENT

According to Balai Penyuluh Pertanian Kecamatan Turi (Center for Agricultural Counseling) of the sub-district of Turi (2014), Sleman's Salak Pondoh has been widely marketed through cooperation with modern supermarket Carrefour and has also been exported to China.. This will be expected to be increase the living standard of the Salak-Pondoh-producing farmers. However, not all farmers in fact understand the marketing procedures so that they only sell it to the nearest collecting merchants. It is suggested that the marketing process should make use of technology like internet to enlarge the marketing network of Salak Pondoh. The use of technology needs also be accompanied with

the education of using ICT-based media to community in order that they are able to make use of ICT independently toward Smart Village for Agriculture. Several important aspects in LED are information, communication and co-operation, innovation and increasing competitiveness (Zwannenburg & Fransen, 2006). It can be done throug Interfirm relations, particulartly in clusters or business agglomerations, government role through regulations, policies, and services, also public-private cooperation (Zwannenburg & Fransen, 2006). In this case the aspects of information and communication are part of an important element in developing local economic resources.

The benefit of implementing the activities of ESD in the course Development of Local Economic Resources through the agricultural activity of *Salak Pondoh* toward Smart Village for Agriculture in the village of Wonokerto is that it is expected to support the efforts of reaching Sustainable Development Goals (SDGs) and to encourage the spirit of UGM in implementing the curriculum containing ESD. The method of conducting this course is shown in Table 1.

Focus Group Discussion is done along with the related communities in potency and problem mapping. However, the students have done field observation before to obtain the description of village profile and its problems (Figure 1). Students also practice to actively participate in the FGD with community (Figure 2). In the FGD session, resource persons from both UGM, a lecturer specializing in agriculture, and the Agency Head for Agriculture of the Regency of Sleman are also present to give their view of the subject.

Subject Matter	Target	Learning Method	ESD Implementation
Elements of local economic development	Students are expected to comprehend the elements of local economic development	Lecture and Discussion	Concept of ESD in the development of economic resources
Development of Local Economy through UKM (Usaha Mikro Menegah / Small Medium Enterprises)	Students are expected to be able to comprehend the profiles of regions and local economic activities	Field Activities	Students learn from field condition by collecting data of region profile of the studied village and profile of activities of agricultural economy of Salak Pondoh.
Regional Analysis and Local Economical Activities	Students are expected to be able to make analysis on region and local economic activities	Presentation and Discussion	Students present the result of field learning process related to profiles of region and community"s economic activities
Composing action plan in a participatory way	Students are expected to be able to compose action plan in a participatory way	Field activities	Composing action plan in a participatory way through field activities by conducting focus group discussion with the community from the studied village
The formulation of the result of analysis and action plan	Students are expected to be able to present the result of analysis and action plan	Presentation and discussion	The presentation of the result of action plan, findings, and result of analysis and action plan toward smart village for agriculture
Implementation of action plan	Students are expected to be able to assist and motivate the villagers to participate in the implementation of action plan.	Program implementation in the action plan	Students implement the action plan toward smart village for agriculture

Table 1. Method of Implementing the Course



Student Observation Activity at Salak Pondoh Plantation



Interview of Students at Salak Pondoh Trader

Figure 1. Survey in the Study Area to Get an Overview of Village Profiles and Community Activities of Salak Pondoh Farming



Figure 2. Students Practice Doing Focus Group Discussions with the Community

The survey and FGD results show that Wonokerto Village has approximately

23 Salak Pondoh Farmer Groups. The international market demand for Salak Pondoh Super is quite high. Delivery can be up to 5-10 tons per shipment, for example to Cambodia. Local marketing covers Jakarta, Bandung and Bali. The marketing of Salak Pondoh has reached the domestic and export markets abroad such as China and Singapore by cooperating with private partnerships. Marketing of Salak Pondoh products can be developed more widely by utilizing online marketing. The facilities provided by the government are quite numerous, including various kinds of training for farmers, cultivation support tools, assistance for farmers/ farmer groups, marketing, stimulant funds from the government.

D. ACTION PLAN AND ITS IMPLEMENTATION

presence information The of and communication technologies (ICT) has somewhat carved out an alternative path to development in Afrika, such as the use of new medium for economic change through the use of internet (Nirmala et.al., 2012). However, the use of gadgets in most countries Africa is constrained by the costs of purchasing and maintaining it much more expensive for them when compared to situation in the West (Nirmala et.al., 2012. This is one reason why the internet will take a long time before being vital communicative media in Africa (Nirmala et.al., 2012).

In preparing the action plan for the development of the smart village for agriculture, it also prioritized the use of ICT. By accommodating the results of the FGD,

several programs will be implemented in the action plan in order toward Smart Village for Agriculture, namely: 1) development of the Village Website, 2) development of Instagram accounts, 3) creation of YouTube accounts, 4) making landmark Smart Village for Agriculture in Wonokerto Village, and 5) socialization and training on making and managing websites and Instagram. All of the program close linkage with the use of ICT. Even so, it is possible that obstacles can occur due to the ability of some people in the village and farmers of Salak Pondoh who still have limited ownership of gadgets and access to the internet and other uses of ICT. At least there are village governments, community leaders, village youth or ICT movers in the village who are able to own and use it.

The realization of action plan is implemented by: first, inaugurating the landmark of Smart Village for Agriculture and declaring the village of Wonokerto as a Smart Village for Agriculture, second, uploading the video of the inauguration of the landmark of Smart Village for Agriculture and the declaration of the village of Wonokerto as a Smart Village for Agriculture on YouTube, as well as uploading the video on the potency the village possesses, and third, monitoring the management of website and instagram. The results of action plan are shown in Figure 4.

Previous research has examined about the digital small medium enterprises (SMEs) kampong of Omah Salak located in the village near with the location of the study with community activities which also as Salak Pondoh farmer. The village is designed to be an information center for farmer groups

and has developed into a place for tourism study, by introdusing technology to *Salak Pondoh* farmers so that they can help and introduce internet use for product promotion (Rachmawati *et al.*, 2018). Utilization of ICT in Omah Salak Kampong such as the web, Facebook and Instagram is used by farmer groups to share information so that products can be promoted in a much faster way to use the internet (Rachmawati *et al.*, 2018). The take-up of e-business by SMEs needs to be seen as a means to an end and not an end in itself and tempered with a more realistic view of how small firms operate (Taylor and Murphy, 2004).

The marketing socialization by making use of a means of communication is expected to be able to help the local community market the existing processed products of their own. The module on the Making and Managing Website is intended as guidance to help community of *karang taruna* (youth community) of Wonokerto village in making and managing Website of Wonokerto Village. Through social media, it is expected that the potency found in Wonokerto village can be seen publicly so that they are interested in visiting and finding out the village as a smart Village for Agriculture. Indirectly, it is expected that the developmental growth for the village, especially in agro tourism, can be realized.. The development of the landmark of Smart Village for Agriculture in the respective village is intended to socialize the Village of Wonokerto as a Smart Village for Agriculture and that it will become an attraction for various tourism activities in the region.

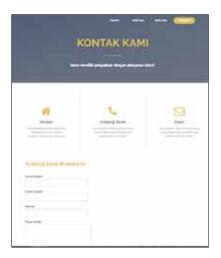


Front page of Website of Wonokerto Village



Instagram account of Wonokerto Village

Figure 3. Results of Action Plan



Website pages of Wonokerto Village



Landmark Smart Village for Agriculture Desa Wonokerto

E. CONCLUSION AND SUGGESTION

Through the activity of synergizing the course and the application of the concept Education for Sustainable Development (ESD), it is expected that students will get experience in implementing sustainable education. Another benefit is that students will really understand the real conditions and problems on the field and along with community they are expected to be able to solve them. Meanwhile, composing action plan can also be done through a direct practice on the field, usually done through simulation. Continuation can also be reached by delivering the results of composing the action plan and its realization to community in order that other activities will follow. It is suggested that ESD activities in the respective region be continued for optimum result.

F. ACKNOWLEDGEMENTS

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G. REFERENCES

- BPS Kabupaten Sleman. 2013. *Sleman Dalam Angka Tahun 2013*. Badan Pusat Statistik Kabupaten Sleman, Indonesia.
- Nirmala, M., Karthikeyan, K, Appalabatla, S., Patharaj, J. 2012. The Role of ICT in the Economic Development of North East Africa: Eritrea. *Journal of Emerging Trends in Computing and Information Sciences.* VOL. 3. NO. 3. March 2012. ISSN 2079-8407.

- Rachmawati, R. 2014. Komunitas Kampung Hijau di Kota Yogyakarta: Implementasi Education for Sustainable Development dalam Mata Kuliah Manajemen Perkotaan di Fakultas Geografi, dalam Baiquni, M. dan Pujiastuti (ed). 2014. Merajut Pengalaman Pendidikan Untuk Pembangunan Berkelanjutan Universitas Gadjah Mada, ESD Seri 1.
- Rachmawati. R. 2015. Community Participation in Managing The Space and Settlement Environment on The Riparian Area: A Case Study in Yogyakarta, Indonesia. KKU International Journal of Humanities and Social Science, Vol. 5 No. 1, Januari-April 2015, ISSN 2350-9767.
- Rachmawati, R., Hapsari, S.A., Cita, A.M. 2018.
 Virtual space utilization in the Digital SMEs Kampongs: Implementation of Smart City and Region. Human Geographies – Journal of Studies and Research in Human Geography, Vol. 12, No. 1, May 2018.
- Taylor, M. and Murphy, A. 2004. SMEs and e-business. Journal of Small Business and Enterprise Development. Vol. 11 Issue: 3. pp.280-289. https://doi. org/10.1108/14626000410551546
- Zwanenburg, M. and Fransen, J. 2006. Concepts of Local Economic Development. Institute for Housing and Urban Development Studies. Training Material.

EMPOWERMENT OF GREEN CHEMISTRY COMMUNITY FOR TRANSFER TECHNOLOGY OF PATCHOULI OIL PROCESSING TO MSMES IN SLEMAN AND KULONPROGO

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ABSTRACT Sustainable education on green chemistry among activists will be more effective and valuable if implemented by following the Education for Sustainable Development principles, namely through developing academic and leadership capacities of green chemistry activists, through education about how to respect the rights of others and nature and training on how to make decisions responsibly. Green Chemistry activists will be deployed directly to be able to transfer knowledge and technology to the community. The development of the sustainable education system is based on the 4 main pillars of ESD, namely: Social, Cultural, Economic and Environmental. The four pillars must be explicitly stated in the module of the green chemistry education system. This activity involved 9 institutions that involving academic, business and government institution. The Micro, Small and Medium Enterprises are involved to receive training from Green Chemistry activists in the processing of patchouli oil with green chemistry principles and SNI standardized products. Empowerment activities carried out include: Making Learning Modules, Making Learning Videos, Socialization, Making Leaflets, and Scientific Publications on Patchouli Oil Processing and Empowering MSMEs. In order for the activities to be right on target and to succeed well, the activities will be carried out sustainably after the project. Empowerment sustainability can be carried out by activists of the Green Chemistry Community by providing training to SMEs on a regular basis, by marketing their products and updating the web / blog empowerment.

Keywords community empowerment, green chemistry, patchouli oil processing

JEL Classification: D10, D11, J3

A. INTRODUCTION

Patchouli oil is an essential oil that is obtained by steam distillation or hydrodistillation of the dried leaves of Pogostemon cablin (Blanco) Benth (Van Beek and Joulain, 2017). The potential of this essential oil is increasingly shining in national even global fine chemical market. Indonesia is one of the largest patchouli oil producers in the world and supplies almost 90% of the world's needs (Setiawan and Rosman, 2013). Patchouli oil has good prospects because it is needed sustainably, among others, in the perfume, cosmetics and medicine industries. The fact is that this oil has been stated as one of the most important materials to the perfumer (Haarman and Reimer, 1958). Patchouli oil in the perfume industry is used as a perfume binder, so the fragrance of perfume can last longer. Furthermore, Anonis (2007) mentioned that until today, there has been no synthetic material that can completely replace the role of patchouli oil in perfume production. Indonesia supplies the world patchouli oil needs up to 2,000 tons per year (Suarniki, 2009). One of the biggest and even the biggest patchouli oil producing areas in Yogyakarta is Gerbosari Village, Samigaluh District, Kulonprogo Regency. One of patchouli oil MSMEs can produce 30 kilograms of patchouli oil in one run. Moreover, there are still many patchouli oil producers who have become suppliers of patchouli oil for national and export needs. With that great potential, patchouli oil processing plays a crucial role. In order to enter the perfume industry market and other industries, the quality of processed patchouli oil must at least meet the Indonesian National Standard (SNI).

Currently various patchouli oil processing techniques have been developed by researchers, however, there are still few techniques and materials that can truly satisfy patchouli oil MSME industry players, especially those related to the technique of decreasing acidic and iron levels and also increasing the patchouli alcohol content. Unfortunately, the understanding of patchouli oil business actors towards green chemistry or green chemical processes in patchouli oil processing is still limited or still not in line with the expectations of researchers and policy makers. One of the main causes is the absence of a continuous education system about green chemistry among green chemistry activists both in campus and out of campus. Education for Sustainable Develoment (ESD) which was initiated by Prof. Dr. Hans J. A. Van Ginkel, former Chancellor of the United Nations (UN) University and Expert of the Secretary General of the UN are educational concepts that have been proven to have been successfully applied in various fields of education in the world. This concept will be adopted and applied to educate Green Chemistry activists in the Chemistry Department of FMIPA UGM who will later be sent to MSMEs in Sleman and Kulonprogo to introduce green technology to process patchouli leaves into patchouli oil.

The community service activities are expected to establish and empower the Green Chemistry Community in Universitas Gadjah Mada who are then ready to transfer knowledge and technology of patchouli oil processing which is based on sustainable green chemistry principles so that it can produce patchouli oils that meet Indonesian National Standard (SNI). Finally, MSMEs as the ultimate target of empowerment will be able to obtain useful knowledge to improve their patchouli oil processing technology so that can meet the Indonesian National Standard (SNI) and developing marketing strategies in product marketing.

In the end, the output to be achieved through this activity includes the development of Green Chemistry activists who are not only limited to Chemistry students of the Faculty of Mathematics and Natural Sciences but extends to all Departments within the Faculty of Mathematics and Natural Sciences and the communities. Green Chemistry activists were prepared to educate MSMEs actors as well as industry and society about green chemistry through various media in a sustainable ways. In addition, supporting objects and media were produced such as training modules, leaflets, videos and posters. Moreover, program article will be published on both campus and regional in order to disseminate information about the activities carried out and patchouli oil processing.

B. IMPLEMENTATION

These sustainable education system development activities are based on 4 main pillars of ESD, namely: Social, Cultural, Economic and Environmental. The four pillars are listed explicitly in the syllabus of green chemistry education system. These activities involved 3 institutions namely Lab. Physical Chemistry FMIPA UGM as a representative of academic institutions, Surya Wulan MSMEs and CV. Fruitanol Energy as representatives of business institutions, and also local village governments as representatives of government institutions. This program was implemented for one year which is divided into three phase.

1. Phase I

Phase I was the process of establishment of Green Chemistry Community in chemistry undergraduate students, Faculty of Mathematics and Natural Sciences. This community would later be sent directly to the business actors of patchouli oil MSMEs in Sleman and Kulonprogo. The next activity was the preparation of Green Chemistry patchouli oil processing training modules for training activists. The material for writing modules was taken from the author's experience in developing method of patchouli oil processing and purification process using environmentally friendly adsorbents. The training module contains activities that trainees must be followed during training. In addition, a complementary module was also made which contains the theory and method of processing patchouli leaves into patchouli oil. This module contains stuffs that must be done and prepared by students or trainees so that it serves as a handout during training.

In addition, a training video was made as part of the training material for patchouli leaves processing into patchouli oil based on green chemistry principles. This video contains a demonstration of patchouli oil production by green chemistry activists who have joined the Green Chemistry Community. Moreover, other supporting materials was made in stage I were making Leaflet of Patchouli oil processing which was based on Green Chemistry principles. Training leaflets were used as part of the material and publication of this Education for Sustainable Development activity. The leaflet contains a summary of the material about green chemistry, patchouli oil processing steps and documentation of ESD activities start from green chemistry activists establishment to direct socialization of patchouli oil processing. This leaflet was the guideline for participants during socialization and demonstration of patchouli oil production.

2. Phase II

In phase II, Green Chemistry activists received training on processing patchouli leaves into Indonesian National standardized patchouli oil both in class and outside the classroom. Training outside the classroom was direct demonstration of patchouli oil production starting from the preparation of tools and raw materials to become patchouli oilfinished products. The preparation of tools started from distillers to patchouli oil purifier installations was carried out at CV. Fruitanol Energy. Dried patchouli leaves were also prepared in the same place for training in producing patchouli oil for Green Chemistry activists. The activists were trained in the process of distillation of patchouli leaves and purification of patchouli oil using environmentally friendly adsorbents. The purification process used zeolite and bentonite clay. Participants received training include from mixing ingredients, molding adsorbents to pellets, and refining patchouli oil.

3. Phase III

In phase III of the ESD program, green chemistry activists were sent directly

to patchouli oil MSMEs in Sleman and Kulonprogo. They made direct observations of the partner's problems and conditions. Authors and activists provided direct learning and demonstration of patchouli oil production so that patchouli oil that was produced could meet Indonesian National Standard (SNI). The authors collaborated with the Gerbosari village government to gather local people and business actors of patchouli oil MSMEs. The socialization of patchouli leaves processing into patchouli oil was carried out gradually through two visits to village partner. The transfer of knowledge and technology included the selection of good patchouli seeds, the use of efficient and environmentally friendly distillation fuels, the use of affordable and environmentally friendly adsorbents, and the steps that could be taken to increase the content of patchouli alcohol.

C. RESULTS AND OUTPUTS

The program was conducted by researcher and green chemistry activists during its one year of activity, this program has been successful in establishing of Green Chemistry Community in chemistry undergraduate students, Faculty of Mathematics and Natural Science Universitas Gadjah Mada. These activists has done technology transfer of patchouli oil processing to the business actors of patchouli oil MSMEs in Sleman and Kulonprogo. Patchouli oil MSMEs targeted for the program have unique characteristics and potential which are presented by these following SWOT analysis:

Strengths	Weakness	Opportunity	Threats	
 Company expertise Qualified to Indonesian National Standard Strategic location Large quantities of production 	 Minimal marketing knowledge (marketing) Products produced cannot be distinguished from competing products Location of a remote company or institution Low product quality 	 Market that continues to grow Company merger The emergence of new market segments International markets Market emptiness because of competitors' inability to meet customer demand 	 New competitors in the same market segment Price competition with competitors Competitors issue better quality products Competitors dominate the largest market share MSMEs still play a price taker role 	

Tabel 1. SWOT Analysis of MSMEs in Kulonprogo

This Green Chemistry Community empowerment program has been reached the outputs i.e. successfully established Green Chemistry Community including the trainings, learning modul and videos, leaflets, poster and published article both in campus media and Yogyakarta media.



Figure 1. Green Chemistry Community



Figure 2. Socialization to the communities in Kulonprogo



Figure 3. Training in class



Figure 4. Direct Demonstration in CV. Fruitanol Energy



Figure 5. Authors and patchouli oil business actors



Figure 6. Direct demonstration in Kulonprogo



Figure 7. Patchouli Oil gained during demonstration

While this education for sustainable development program had been successfully conducted; analysis of the implementation that more involvement suggest by and government partners researchers (Ministry of Research, Technology and Higher Education, Ministry of Industry, Manpower and Community Empowerment Agency in Yogyakarta would improve the technology and human resources potential due to great prospects of patchouli oil MSMEs. This suggests that the government, through related agencies, and university researchers could provide further mentoring to the ESD program so it would be sustainable and eventually it will become the biggest patchouli oil producer area in Indonesia. Sustainable efforts should not only focus on the production aspects, but also on the marketing aspect. For the community, they were very creative and enthusiastic in producing patchouli oil but has little network on marketing their products.

D. CONCLUSION

Education for sustainable development can work effectively through collaboration between elements of the academic-businessgovernment.Education about patchouli oil processing that is based on green chemistry has become very important in patchouli oil processing industry. ESD can be achieved by empowering the green chemistry community in the campus environment to transfer patchouli oil processing technology to business actors of MSMEs and communities. This program achieved targeted outputs, namely the establishment of Green Chemistry Community which was formed in the scope of chemistry undergraduate students as agents of knowledge and technology transfer to MSMEs actors in Kulonprogo and Sleman. The supporting objects produced were learning modules, videos, leaflets, posters and media publications.

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F. REFERENCES

- Anonis, D. P. (2007). Woody Notes in Perfumery: Patchouli in Fragrances Part II. *Perfume Flavor*, 32, 30-35.
- Haarman & Reimer (1985). *Guide to Fragrance Ingredients* (Vol. 4). Hamburg: Gloess Publishing.
- Suarniki, N. N. (2009). Potensi dan Permasalahan dalam Pengembangan Komoditi Nilam melalui Pendekatan Klaster di Kabupaten Tanah Laut. *Jurnal Aplikasi Manajemen*, 7(2), 315-325.
- Setiawan & Rosman, R. (2013). Status Penelitian dan Upaya Peningkatan Kadar Patchouli Alkohol pada Minyak Nilam. *Prespektif*, 12(2), 101-111.
- Van Beek, T.A., & Joulain, D. (2017). The essential of patchouli, *Pogostemon cablin*: A Review. *Flavour and Fragrance Journal*, 33(1), 6-51.







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