



The 36<sup>th</sup> Indonesian Postgraduate Programs Forums  
The Role Of Higher Education In Mainstreaming Disaster Mitigation Research Towards Sustainable Development  
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**INTERNATIONAL CONFERENCE  
THE 36<sup>TH</sup> INDONESIA POSTGRADUATE PROGRAMS FORUM  
THE ROLE OF HIGHER EDUCATION IN MAINSTREAMING  
DISASTER MITIGATION RESEARCH TOWARDS SUSTAINABLE  
DEVELOPMENT**



**Keynote Speaker**

**Prof Dr. Ir. H. Gusti Muhammad Hatta**

**Dr. Syamsul Maarif, S.IP, M.Si**

**Editors :**

**Ir. Prakoso**

**Yasuo Tanaka, BRUNSFIELD Prof.,**

**Prof. Dr.-Ing. Joern Birkmann**

**Prof. Dr. Philip Stokoe**

**PROGRAM STUDI MAGISTER ILMU KEBENCANAAN  
UNIVERSITAS SYIAH KUALA**



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## Welcome message From Rector

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On December 2004, Earthquake and tsunami killed 220,000 people. 585,000 people lost their houses and damage estimated was US\$4,5 billion in Aceh and Nias Islands. On March 2005, 1,000 people perished by earthquake, 50,000 people displaced and damage estimated was US\$390 million at Nias Islands and Aceh. Until nowadays there are various disaster happen in many places in Indonesia. This is the time for higher education institutions to play their role to make our place and communities more resilient.

In 2004, at Syiah Kuala University, there are 113 staff and 243 families perished and 330 house damages. It proves that we need knowledge to make us stronger and knowledge can be our investment to make sustainable development can be better planned. Our investment of disaster area has started since 2005, when we established Unsyiah for Aceh Reconstruction (UAR) and followed the establishment of Tsunami and Disaster Mitigation Research Center (TDMRC) as the combination of the two centers (Tsunami Research Center and Mitigation Center) at 2006. Then in 2010, we got mandate to establish the Disaster Science Magister Program from Directorate General of Higher Education Ministry of Education and Culture.

Last but not least, we hope that this international conference will give benefit results. On behalf of Syiah Kuala University, I express my sincere thanks and wishes to the organizers and participants of the conference and I hope that we can learn each other to find out the right direction of the role of higher education in mainstreaming disaster mitigation research towards sustainable development.

Thank you for joining us. I hope all participants will take opportunity to enjoy this conference and have sweet memories staying at our campus, Banda Aceh and Weh Island.

Banda Aceh, June 2014

Rector, Syiah Kuala University

**Prof. Dr. Samsul Rizal, M.Eng.**



## Welcome from Director Postgraduate Program

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Welcome to our Postgraduate Leaders Forum of Indonesia State University and International Conference. We are honored to co-host this year's event at our prestigious meeting. I would like to express my sincere gratitude to our collaboration forums which has been walked together since 1978 and it becomes 36 years age nowadays. Syiah Kuala University has established Postgraduate program since 2 December 2002 and in 2014 it has 6 Doctor Program and 27 Magister Program.

To commemorate the 10 years of 2004 Indian Ocean Tsunami, at this time, we try to combine our meeting with the disaster current issues which the topic is "The role of Higher Education in Mainstreaming Disaster Mitigation Research towards Sustainable Development". Nowadays, various knowledges of disaster are explored by researchers through multidisciplinary and how to break down the barrier between discipline in order to find the appropriate solution for helping our community and country.

Through the discussion in this forum, we hope we can learn how the future directions of social, science and technology and culture can contribute toward more sustainability in environment and human activities to make better development.

Banda Aceh, June 2014

Director of Postgraduate Program

Syiah Kuala University

**Prof. Dr. Samsul Rizal, M.Eng.**





## Welcome from Organizing Committee

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It is a great pleasure to welcome delegations of international conference 2014. This international conference is a part of Postgraduate Leaders Forum of Indonesia State University activities.

During the conference, there are 33 papers in three parallel sessions, four papers will be read by keynotespeakers and two keynote speakers from the State Minister for Research and Technology and the Head of National Disaster Management Agency, Republic of Indonesia. Three parallel sessions are for science and engineering, social science, and disaster education. Invited speakers are Prof. Agus Subekti, MSc.PhD from Director Research and Community Services of Higher Education and Culture, Dirjen Dikti; Yasuo Tanaka, Brunfield Prof, Geotech Engineering Department of Civil, UTAR, Malaysia; Prof. Dr. Philip Stokoe, Senior Health Consultant and Governor Aceh Advisor; Dr. Ian Singleton, PanEco Foundation, Australia. The topic of this international seminar is The Role of Higher Education in Mainstreaming Disaster Mitigation Research towards Sustainable Development, held by Postgraduate Program, Syiah Kuala University.

I would like to thank all the members of the committees and our students as secretariat of postgraduate program and disaster science magister program for their hard work, time and effort in organizing this conference. Also, I would like to thank to all of our partners for their generous support and contribution in greet long-term cooperation and find the solutions for disaster in the implementation of sustainable development.

Banda Aceh, June 2014

Head, Graduate Program of Disaster Science

**Dr. Ir. Muhammad Dirhamsyah, MT**



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# ABO AND RHESUS BLOOD GROUP DISTRIBUTION IN THE POPULATION OF TWO ISLANDS IN ACEH PROVINCE

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## Abstract

We conducted a survey for distribution of ABO and Rhesus (Rh) blood groups in the population of Sabang and Simeulue District, two small, earthquake and tsunami affected islands in Aceh Province in about two years after the disasters hit Aceh on December 26, 2004. Subjects were 369 unrelated, adult male and female apparently healthy individuals and up to 3 generation had the same local mother language affiliation, consisting of 168 Sabang individuals and 201 Simeuleu individuals. As far as genetic counseling concerned subject were selected purposively from students of high school, voluntarily participated in the study after completing the informed consent. Blood aliquots were obtained using Terumo disposable syringe and used for ABO and Rh blood groups determination using standard methods. The results showed that the most prevalent blood group was O (55.3%), followed by blood groups B (24.4%) and A (16.5%), whereas the least common blood group was AB (3.8%). The majority of subjects (99.5%) were Rh positive, and 0.5% were Rh negative. In conclusion, blood group O is the most prevalent blood group in Sabang and Simeuleu populations, followed by B, A, and AB. More than 99% of the study population is Rh positive.

**Keywords:** ABO, rhesus, blood group, Aceh

## INTRODUCTION

Blood classification into groups is based on the presence or absence of inherited antigenic compound on the surface of erythrocytes and other cells, and in body fluids (Hartmann, 1941; Calhoun and Petz, 2001). Almost 400 blood group antigens have been identified (Bauer, 1982; Sigmon, 1992; Khan et al., 2004), and are responsible for more than 30 independent blood group systems characterized by the International Society of Blood Transfusion (ISBT) today (ISBT, 2008). From these, the ABO and rhesus remain the most clinically important blood group systems from the view of transfusion to avoid morbidity and mortality (Omotade et al., 1999; Khan et al., 2004).

In addition to resolving medico legal issues and testing blood compatibility for transfusion practice (Enosolease *et al.*, 2008), the hereditary characters ABO and Rh blood groups are useful and become the most frequently studied genetic markers in a large population groups for investigating population genetics and population migration pattern (Worlledge *et al.*, 1974; Bakare *et al.*, 2006; Ndoula *et al.*, 2014). This relates to specific distribution of these blood groups' gene and phenotypes in certain populations. For the ABO blood system, high prevalence of B group is characteristic of Mongolid populations

and that of A group is specific to Caucasians (Sofro, 1992). Since difference in the distribution of ABO and Rh blood groups exist from race to race, global distribution of the blood groups A, B, O, and AB as well as Rh-positive and Rh-negative varies according to the population, within subpopulation or ethnic (Jaff, 2010), and by geographical area (Hoffbrand 1981; Talib 1991). Some variations may even exist indifferent areas within one small country (Potts, 1979).

Aceh is the most Northern Province in Indonesia and has been known its heterogeneity of people and demography (Azhar and Husin, 2001), but with limited data on population genetics. Despite our previous study on G6PD deficiency prevalence and ABO blood group distribution in the population of Aceh Besar (Great Aceh) and Aceh Tengah (Middle Aceh) (Azhar and Husin, 2001; Husin *et al.*, 2002), there are no information about genetic constitution of Acehnese, a population belongs to the western Indonesian cluster (Sofro, 1982). In this paper, we present results of our surveys on ethnic distribution of ABO and Rhesus blood groups in the population of Sabang and Simeulue, two small tsunami affected island in Aceh with different level of isolation.

## METHODOLOGY

This study was performed over a period of 3 months (June-August 2006) in Sabang and Simeulue of Aceh Province. These islands were directly affected by huge earthquake and tsunami 2004 and had relatively different level of isolation. Subjects were 369 unrelated healthy adult male and female individuals and until 3 generation have affiliation of the same local mother language (tribe). All subjects were, therefore, of known Acehnese ethnicity tribes from Sabang or Simeuleu. These representing 168 Sabang individuals (60 male and 108 female) and 201 Simeulue individuals (78 male and 123 female). As far for genetic counseling, the majority of subjects were students from high schools in Simeulue (Public Vocational High School 1 of Sinabang and Public Junior High School of Lamting) and Sabang (Ibnu-Sina Nursing Academy and Public Junior High School 1, and Public Islamic High School 1), voluntarily participated in this study after completing informed consent.

Blood samples, 1-3 ml, were drawn from antecubital vein using Terumo disposable syringe with EDTA as anticoagulant. All samples were kept cool (4-6 °C) before examination. The blood typing was performed by slide method, using ABO and Rh (D) Typing Antisera, Biotec Laboratories, United Kingdom. Manufacturer's procedural instructions were followed. Here, one drop of whole blood mixed with one drop of appropriate anti-sera and rocked gently. In case of doubt, the test was examined under a microscope, or the results were confirmed by reverse grouping using known group A and B red cells (Dacie and Lewis, 2001) Data on the frequency of ABO and Rh-D blood groups were reported in simple percentages. Results were compared with similar group prevalence studies from neighboring regencies, provinces and world ethnic groups and races.

## RESULT AND DISCUSSION

The prevalence of O, A, B, AB, and Rh phenotypes in Sabang and Simeulue populations in 2006 is shown in Table 1. The results showed that blood groups A, B, AB and O were found in 39 (23.2%), 51 (30.3%), 70 (41.7%), 8 (4.8%) of Sabang individuals, respectively. In Simeulue individuals, the respective blood groups were found in 22 (10.9%), 39 (19.4%), 134 (66.7%) and 14 (3.8%) individuals. The allelic frequencies of O, A and B genes were 0.5528, 0.2629 and 0.1843, respectively. Rhesus negative was only found in 2 (1.2%) of Sabang individuals. Overall, the most prevalent blood group was O (55.3%), followed by blood groups B (24.4%) and A (16.5%). Blood group AB present at lowest prevalence (3.8%). The majority of subjects (99.5%) were Rh positive, and 0.5% was Rh negative.

**Table 1. The distribution of various ABO and Rh-D phenotypes among the samples studied**

Regency/ District	Number of subjects involved		Age (Year)	Blood group					
				ABO blood group phenotypes				Rhesus blood group phenotypes	
	Male	Female		A	B	O	AB	Positive	Negative
Sabang	60	108	15-21	39 (23.2%)	51 (30.3%)	70 (41.7%)	8 (4.8%)	166 (98.8%)	2 (1.2%)
Simeulue	78	123	12-18	22 (10.9%)	39 (19.4%)	134 (66.7%)	6 (3.0%)	201 (100%)	0 (0%)
Total	138	231	15-21	61 (16.5%)	90 (24.4%)	204 (55.3%)	14 (3.8%)	367 (99.5%)	2 (0.5%)

Although antigens involved are stable throughout life, distribution of ABO and Rh genes and phenotypes may vary greatly across races and geographical limitations (Strickberger, 1976; Race and Sanger, 1979; Burns, 1980). The resultant polymorphism remains important for effective management of blood banks inventory and for population genetic studies as well as for evaluating possibility of antenatal haemolytic disease, resolving paternity/maternity problems and forensic confirmation (Mollison, 1979; Hoftbrand, 1981). The study presented here, therefore, importance in providing information on the status of ABO and Rh blood groups distribution in the Aceh subpopulations.

In this survey performed during the period between June and August 2006, we screened for ABO and Rh blood groups distribution on a total of 369 blood samples collected from Sabang and Simeulue of Aceh in both sexes. All of these were from medical sampling performed at regular and vocational high schools as well as university students. The frequency of group O phenotype comprised over half (55.3%) the samples, while group AB was the least encountered phenotype with a frequency of less than 4% among the samples studied. The frequency of groups A and B accounted for 16.5% and 24.4%, respectively.

The relative frequency of the various ABO blood groups does not seem to deviate from those which have been previously recorded in Aceh populations of Great Aceh and Middle Aceh Districts. In these populations, Husin *et al.* (2002) found that the phenotypes of ABO blood group distributed in the order of O > B > A > AB. This is the general

pattern ABO blood group phenotypes distribution in the majority of Indonesian populations, except for West Java individuals whose have more A blood group than B (Sofro, 1992). Some world populations also have this pattern of ABO blood group distribution (Falusi *et al.*, 2000).

Generally, group O is the most dominant in human populations, with AB being the rarest (Marzban *et al.*, 1988; Talib, 1991; Falusi *et al.*, 2000; Shamim *et al.*, 2002). An exception, where blood group B is more dominant than O, has been reported in Pakistani and Indian (Hoftbrand, 1981; Yousaf *et al.*, 1988). A distribution with  $B > A > O > B$  has also been reported in Pakistani (Khan *et al.*, 2004). In some populations, blood group B is the second commonest, resulting in an  $O > B > A > AB$  blood group distribution (Sofro, 1992; Husin *et al.*, 2002; Falusi *et al.*, 2000), but others have more number of A blood group than B (Worledge *et al.*, 1974; Lyko *et al.*, 1992; Omotade *et al.*, 1999; Bakare *et al.*, 2006; Egesie *et al.*, 2008; Enosolease and Bazuaye, 2008; Hamed *et al.*, 2012; Ndoula, 2014). These differences were influenced by racial (genetic) and environmental factors (Kalmakov and Kononova, 1999; Swerdlow *et al.*, 1994; Khan, *et al.*, 2004). Relative isolation and endogamicity may also increase certain ABO phenotypes in the population of small islands. This phenomenon was observed Sabang and Simeulue investigated in this study. The higher prevalence of O but and lower prevalence of A and AB in Simeulue population compared to that in Sabang population suggested the former was more isolated and had higher endogamicity rate than the latter.

In terms of presence of Rh antibodies, the comparatively the dominance of Rhesus positive obtained in this study was in agreement with those obtained from Mongolid populations across the globe including Pakistani, certain African populations, Indonesians (Lyko *et al.*, 1992; Gaertner *et al.*, 1994; Omotade *et al.*, 1999; Subhan *et al.*, 2000; Shamim *et al.*, 2002; Enosolease and Bazuaye 2008; Hamed *et al.*, 2012). In only very rare cases, such as in Caucasian or Caucasia descendant populations, the comparatively higher percentage of Rh negative observed (Sofro, 1992). Globally, the number of Rh-negative individuals is still very low and being significantly rarer than Rh positive individuals.

## CONCLUSION

Our study provide the first data on ethnic distribution of ABO and Rhesus blood groups in the populations of Sabang and Simeulue of Aceh province and suggest that blood group O is the most prevalent blood group in Sabang and Simeuleu populations, followed by B, A, and AB. More than 99% of the study population is Rh positive.

## ACKNOWLEDGMENT

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# IMPACT OF SHADING TO CHANGES IN AGRONOMIC TRAITS, PRODUCTION AND MORPHO-ANATOMICAL STRUCTURE OF SOYBEAN (*GLYCINE MAX* (L.) MERRILL)

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## Abstract

Light stress is one of the constraints in increasing soybean production through intercropping system. This study aimed to determine changes in agronomic traits, production and morpho-anatomy of soybean plants at low light stress due to shade. This research was conducted at the experimental farm of Agriculture Faculty, Teuku Umar University Meulaboh in West Aceh, from August to November 2013. This study uses split plot design with three replications where separated subplot (varieties: Anjasmoro, Kipas Merah Bireun, Grobogan, Burangrang, Sinabung, Kaba) nested in the main plot (shade: without shade, 25% and 50% shade). The results showed that 25% and 50% shade resulted in an increase in plant height, trifoliolate leaf area, and reduce the number of nodes, number of trifoliolate leaves, specific leaf area, total leaf area, dry weight and accelerate flowering compared to the environment without shade. In terms of anatomy, shade 25% and 50% resulted in an increase in the amount of chlorophyll a and b but has no effect on the ratio of chlorophyll a/b. Effect of shade on the characters of production resulted in a decrease in the number of pods containing, the number of empty pods, dry seed weight and harvest index, but did not affect the weight of 100 seeds. The results showed the level of shade 25% and 50% production decline on average by 29,51% and 50,22% on a wide range of varieties tested. This indicates that 25% are already creating shade agro-climatic conditions are not suitable for the cultivation of soybean varieties tested.

**Keywords:** Intercropping, shading, soybean, yield

## INTRODUCTION

Soybean is the third major food commodity after rice and maize are becoming commodity priorities in agricultural revitalization program. Special efforts are needed to increase production through the acceleration of national soybean productivity improvement and expansion of planting area. The development of soybean plants as intercrops under stands of plantation crops or mixing it with other seasonal crops is a strategy to improve the national soybean production. However, efforts to develop a soybean crop intercropping interrupted or encounter obstacles, one of them due to lack of light shade.

Based on research in rubber ages 1, 2, and 4 years in a row gives shade 26%, 67%, and 72% of the open area (Sukaesih, 2002). Meanwhile, 20% shade has been classified into agro-climate is not suitable for soybean (Adisarwanto *et al.*, 2000). Intercropping with maize, the intensity of light received soybean crop is reduced 33%, with 30-50% yield

reduction (Asadi *et al.*, 1997). The decrease in grain yield is determined by the intensity of light in addition, is also determined by the length of shade (Jiang and Egli., 1995). Other studies prove that the lack of light results in a reduced number of pods formed (Kurosaki and Yumoto, 2003). The adaptation can be learned through specific response at various levels such as a change in anatomy, morphology, physiology, biochemistry and molecular (Bruce *et al.*, 2001).

Therefore, the development of adaptive soybean biophysical conditions under stands of perennial crops and annual crops with low lighting penetration rate in the system is interrupted or intercropping plants need to be done. This experiment aims to determine changes in agronomic traits, production, morphology and anatomy as an identifier soybean adaptation to low light stress due to shade.

## MATERIAL AND METHODOLOGY

The study was conducted at the Experimental Faculty of Agriculture, University of Teuku Umar Meulaboh from August to November 2013. Area of research lies at a height of 1 meter above sea level. The average temperature ranges from 25.9 -26.7 °C, 288.65 mm rainfall / month and 87% humidity.

The materials used are the seeds of soybean varieties Anjasmoro, Kipas Merah Bireun, Grobogan, Burangrang, Sinabung and Kaba. Paranet 25% and 50% as a shade was installed to create light stress. This study uses a separate plot design (split plots design). The main plot consists of three levels, namely shade without shade, 25% shade and 50% shade and subplot consisted of varieties is Anjasmoro, Kipas Merah Bireun, Grobogan, Burangrang, Sinabung and Kaba. This experiment used three replicates where subplot (variety) nested within the main plot (shade). Each varieties planted in polybags and at age 1 WAP growing media were given a dose of fertilizer urea 0.3 g urea, TSP 1,25 g, and 1 g of KCl per polybag, which is equivalent to 34 kg N, 144 kg P<sub>2</sub>O<sub>5</sub> and 150 kg K<sub>2</sub>O ha<sup>-1</sup>

## RESULT AND DISCUSSION

**Plant height.** Shade causes increased plant height. The results showed that in 25% shade Anjasmoro varieties have the highest plant height (85.02 cm) with a change of 32.49% which is different from the other varieties except with Grobogan. Similarly, at the rate of 50% shade (Table 1). Plant height differences on the various varieties at different levels of shade indicates that each variety has a different tolerance levels in response to environmental stress due to shade. The increase in plant height in shaded conditions is an attempt to improve the plant so that the light absorption efficiency of light that can be absorbed into a more optimal. The increase in plant height due to shade is also reported by Soverda (2012).

**Number of nodes.** Shade causes decreased number of nodes. The results showed that the highest number of nodes at the rate of 25% shade found in variety of Anjasmoro (13.89) with no reduction in the number of nodes that are different from other varieties except with Grobogan (13.89) with a decrease of 6.76%. While in the shade 50% no difference between varieties (Table 1). The decrease in the number of nodes on the shaded



conditions associated with efforts to increase the absorption of light by a decrease in the number of trifoliolate leaves, because the nodes is where the discharge leaves.

**Number of trifoliolate leaves.** Shade causes trifoliolate leaf number decreased (Table 1) results showed that the highest number of trifoliolate leaves at 25% shade found in variety of Grobogan (50.11) with a decrease of 6.44% which is different from other varieties. Similarly, at the rate of 50% shade. Reduced number of trifoliolate leaves on shaded conditions is an attempt to improve the plant light capture efficiency by reducing wastage of light absorption by decreasing the number of trifoliolate leaves. The decrease in the number of trifoliolate leaves of soybean due to shade paragnet 55% also reported the results of research Kisman *et al.* (2007).

**Dry weight.** Shade cause dry weight decreased. The results showed that in 25% shade Grobogan varieties have the highest of dry weight (115.10 g) with a decrease of 5.19% which is not different from the varieties of Kipas Merah Bireun (108.95 g) and varieties Anjasmoro (106.90 g) with a 15.55% decrease, respectively, and 10.62%. While in the shade 50% dry weight highest found in variety of Grobogan (103.76 g) were not different from the variety of Kipas Merah Bireun (103.76 g) with a decline of 16.69% respectively and 21.33% (Table 1). The decrease in plant dry weight due to stress caused by low light plants in shadedphotosynthesis so that the optimum result in decreased plant dry weight produced.

**Leaf area.** Shade causes trifoliolate leaf area increased, but reduced the total leaf area and specific leaf area. The results of this study indicate the shade 25% and 50% trifoliolate leaf area increased 8.91% respectively and 42.15%. Different test results between varieties at different levels of shade indicates that varieties Anjasmoro has the largest trifoliolate leaf area (23.67 cm<sup>2</sup>) were no different from other varieties except with Kaba. Shade 25% and 50% resulted in a decrease in total leaf area, respectively 13.14% and 18% and a decrease in specific leaf area, respectively 10.82% and 34.43%. Total leaf area found in most varieties Anjasmoro (585.89 cm<sup>2</sup>) are no different from other varieties except with Grobogan, while specific leaf area found in most varieties Sinabung (18.73 cm<sup>2</sup>) were no different from other varieties except with Grobogan. Trifoliolate leaf area increase and decrease in total leaf area and specific leaf area in a shaded environment to stress adaptation mechanisms to improve the light absorption efficiency of light so that the light can be used optimally limited. This is in accordance with the opinion of Levitt (1980) which states that the mechanisms of plant adaptation to low light intensity, there are two ways to increase the total light interception by the increase in leaf area and increase the percentage of light that is used in photosynthesis through a reduction in the amount of light reflected and transmitted. The increased specific leaf area by 50% light intensity treatment was also reported by Logan *et al.* (1999) and Atwell *et al.* (1999).

**Age at flowering.** Varieties of shade and very significant effect on flowering. The results showed that the shade causes flowering faster than an open environment. The data (Table 2) shows that the condition without shade gives the longest flowering time is 37.5 DAP is significantly different from the shade 25% and 50%, respectively 34.25 and 34.03 DAP. This is due to reduced light intensity in shaded conditions that increase the plant

experienced a dark period that stimulate flowering. The results of the study Widiastuti *et al.* (2004) also showed that the shade can accelerate flowering and harvesting.

The fastest flowering varieties found in Grobogan with age ranging flowering 28.50 DAP is significantly different from other varieties. While the Kipas Merah Bireun varieties that flower later than 38.50 DAP appear different to other varieties (Table 2). This study showed that each variety has a different age flowering time. This is presumably due to the factor of genetic diversity varieties tested. Results of this study are consistent with the research Soverda *et al.* (2012) which states that the character of flowering in several soybean genotypes differ between genotypes.

**Chlorophyll.** The results of the data analysis showed that the shade effect on the amount of chlorophyll a and b and chlorophyll not significantly affect the ratio of chlorophyll a / b, varieties very significant effect on the amount of chlorophyll a and no real effect on the amount of chlorophyll b and the ratio of chlorophyll a / b. The results showed that increasing levels of shade resulted in an increase in the amount of chlorophyll a and chlorophyll b. While the ratio of chlorophyll a / b showed a tendency to decline due to increased shade although no statistically significant differences (Table 3). The highest increase in the amount of chlorophyll a was found in 50% shade with an average amount of chlorophyll at 1.49 mg / ml with a change of 38.37% which is significantly different from the rate of 0% shade (1.08 mg / ml) but not significantly different with 25% shade level (1.16 mg / ml). The same condition occurs in chlorophyll b where the rate of 25% shade changes of chlorophyll b was 42.53% and 65.09% at the 50% level of shade. This is due to the low light plants will work to improve the efficiency of light harvesting by an increase in chlorophyll a and chlorophyll b as a light-harvesting organs.

The results showed that the varieties are generally no effect on photosynthetic character. It is need to reaffirm that the light is environmental factors that influence the character of photosynthesis when other environmental factors in optimum condition.

**Character of production.** Shade causes a reduced number of pods containing the number of empty pods, dry seed weight plant<sup>-1</sup>, and harvest index, but did not affect the weight of 100 seeds (Tables 4 and 5). At 25% shade the highest number of pods found in varieties Kipas Merah Bireun (141.13) which is different from other varieties with a reduced number of pods was 28.27%, while the 50% shade highest number of pods found in varieties of Kipas Merah Bireun (62 , 86) and are different from other varieties except with Sinabung with a decrease of 68.05%. Greatest number of empty pods in shade 25% found in varieties Kaba (7.78) with a decrease of 40.46% while the 50% shade largest number of empty pods found in varieties Sinabung (5.11) with a decrease of 63.20%. Dry seed weight plant<sup>-1</sup> in shade 25% of the largest varieties found Grobogan (33.19 g) which is different from the other varieties except with the Kipas Merah Bireun with a decrease of 23.78% in the shade as well as 50%. The decrease in the number of pods and seed dry weight caused by the inhibition of metabolic processes of plants due to low light intensity which implies a decrease in the amount of photosynthate supply to the seed resulting in a decrease in the number of pods. The decrease in seed production due to the shade on a variety of crops was also reported by several investigators. Asadi *et al.*, (1997) and Supriyono *et al.*, (2000). Adisarwanto *et al.*, (2000) and Sasmita *et al.*, (2006). The

decrease in the number of empty pods on shaded conditions associated with a decline in the number of pods due to shade. The number of pods were slightly shaded conditions will encourage the plant to maximize the utilization of photosynthate to pods are formed so as to reduce the number of empty pods. The decrease in the number of empty pods on shaded conditions were also reported by Muhuria (2007).

The weight of 100 seeds was not affected by shade, but is strongly influenced by varieties. The lack of effect of shade on 100 seed weight due to the shaded conditions (25% and 50%) of soybean plants can still carry out photosynthesis and produce seeds with the seed size according to their genetic character. Similar results were also reported by Polthane *et al.* (2011) which says that the shade treatment had no effect on 100 seed weight of soybean in the dry season and wet experiments. Research Tang *et al.*, (2010) mentions, shade treatment led to a decrease in grain yield but does not affect the size of the seed.

The data (Table 5) shows the different weight of 100 seeds in different varieties. Weight of 100 seeds found in most varieties Grobogan (17.78 g) which is different from other varieties. This is thought to be caused by genetic diversity.

Shade causes a decrease in harvest index in shade 25% and 50% respectively at 10.64% and 29.66%. Test showed that the difference between varieties of the highest harvest index found in the varieties Kipas Merah Bireun (0.271) which is different from the other varieties except with Grobogan and Sinabung. The decrease in harvest index in shaded conditions due to plant photosynthesis rate decreased so that the distribution of photosynthate to the plant parts harvested crop is reduced, which implies decreasing harvest index. This is evident from the decrease in dry weight of plant due to shade. Anggarani (2005) also reported that the decrease in harvest index due to reduced seed weight per plant, root dry weight and dry weight of the canopy. Differences between varieties harvest index is closely related to differences in seed weight decrease due to interactions plants and varieties in the dry seed weight affects plant-1 (Table 4). The diversity between varieties harvest index also simultaneous with the diversity of plant dry seed weight due to the interaction of shade and varieties. This is presumably due to genetic diversity varieties tested so that each respond differently to low-light stress due to shade.

## CONCLUSION

Low light intensity stress 25% and 50% due to the shade resulted in a change in morphology and anatomy of the soybean crop in the form of higher stems, flowering faster and decrease the number of nodes and stover dry weight. Leaf structural changes occur in the form of a decrease in the number of trifoliolate leaves and total leaf number, as well as increased trifoliolate leaf area and specific leaf area. The amount of chlorophyll a and chlorophyll b increased, while the ratio of chlorophyll a / b is not affected by low light intensity stress due to shade.

Low light stress 25% and 50% resulted in a change in the character of production in the form of a decrease in the number of pods, number of empty pods, dry seed weight

and harvest index. While the weight of 100 seeds was not affected by low light stress due to shade.

Low light intensity stress 25% and 50% resulted in a decrease in the amount of production in all varieties tested. Varieties of Kipas Merah Bireun and Grobogan showed consistency as varieties with the highest production than other varieties in conditions without shade and 25% shade and 50%. Shade Stress due to low light by 25% and 50% resulted in a decrease in the production of an average of 29.55 % and 50.22%.

## TABLE

**Table 1. Plant height, number of nodes, number of trifoliolate leaves and dry weight of some varieties at some level of shade**

Varieties	Plant height (cm)			Number of nodes		
	Without shade	Shade 25 %	Shade 50%	Without shade	Shade 25%	Shade 50%
Anjasmoro	64,17dA	85,02dB (32,49)	135,03cC (110,42)	13,89 bB	13,89bB 0	12,11aA (-12,81)
Kipas merah bireun	53,79bcA	63,32a B (17,72)	100,06aC (86,02)	14,33bC	13,22aB (-7,75)	12,00aA (-16,26)
Grobogan	56,88cA	84,25cdB (48,12)	130,32cC (129,11)	14,89cC	13,89bB (-6,72)	12,22aA (-17,93)
Burangrang	54,26bcA	78,39bcB (44,47)	116,68bC (115,04)	13,33aB	13,11aB (-1,65)	11,89aA (-10,80)
Sinabung	49,99bB	72,61bB (45,25)	111,36bC (122,76)	13,11aB	13,00aB (-0,84)	11,89aA (-9,31)
Kaba	47,72aA	72,41aB (51,74)	110,73bC (13,04)	13,00aB	12,89aB (-0,85)	11,78aA (-9,38)
Varieties	Number of trifoliolate leaves			Dry weight (gr)		
	Without shade	Shade 25%	Shade 50%	Without shade	Shade 25%	Shade 50%
Anjasmoro	46,67bC	34,11aB (-26,91)	32,00aA (-31,34)	118,25cdC	106,90bcdB (-10,62)	79,17aA (-49,37)
Kipas Merah Bireun	52,6dB	35,00aA (-33,35)	33,56aA (-36,28)	125,89dC	108,95cdB (-15,55)	103,76cA (-21,23)
Grobogan	53,56dC	50,11eB (-6,44)	41,78cA (-21,99)	121,07cdB	115,10dB (-5,19)	103,76cA (-16,69)
Burangrang	42,89cC	41,33cB (-3,64)	32,89aA (-23,32)	105,21abB	97,72abB (-7,76)	93,03bA (-13,10)
Sinabung	49,00cC	47,89dB (-2,27)	37,89bA (-22,67)	98,82 aB	92,20aB (-7,18)	73,84aA (-26,21)
Kaba	41,67aC	36,89bB (-11,47)	32,44aA (-22,15)	113,15bcC	102,64bcB (-10,24)	82,26aA (-37,56)

**Table 2. Trifoliolate leaf area, total leaf area, specific leaf area and some varieties flowering at some level of shade**

Shade (%)	Trifoliolate leaf area (cm <sup>2</sup> )	Total leaf area (cm <sup>2</sup> )	Specific leaf area (cm <sup>2</sup> )	Age at flowering (day)
0	20,43 a	601,67 b	29,12 a	35,75 b
25	22,25 b	522,61 ab	32,32 a	34,25 a
	(108,91)	(-13,14)	(10,82)	
50	29,04 c	492,22 a	39,21 b	34,03 a
	(142,15)	(-18,00)	(34,43)	
Varieties	Trifoliolate leaf area (cm <sup>2</sup> )	Total leaf area (cm <sup>2</sup> )	Specific leaf area (cm <sup>2</sup> )	Age at flowering (day)
Anjasmoro	23,67 b	585,89 b	16,90 ab	34,39 b
Kipas Merah Bireun	20,93 ab	510,33 ab	17,26 ab	39,72 c
Grobogan	20,83 ab	459,78 a	12,62 a	28,50 a
Burangrang	22,44 ab	540,44 ab	17,47 ab	35,33 b
Sinabung	19,80 ab	570,56 b	18,73 b	35,50 b
Kaba	16,44 a	566,00 b	17,72 b	34,61 b

Description: Figures followed by the same letter in the same column are not significantly different at 5% DMRT further testing. Figures in parentheses are values relative to control (%)

**Table 3. Amount of chlorophyll a, chlorophyll b and the ratio of chlorophyll a: some soybean varieties at different levels of shade**

Variables	Shade (%)					
	0	25	50			
Chlorophyll a (mg/ml)	1.08 a	1.16 ab (7.92)	1.49 b (38.37)			
Chlorophyll b (mg/ml)	1.06 a	1.51 ab (42.53)	1.75 b (65.09)			
Rasio a : b (mg/ml)	45.5	41.26	42.86			
Variables	Varieties					
	Anjasmoro	Kipas Merah Bireun	Grobogan	Burangrang	Sinabung	Kaba
Chlorophyll a (mg/ml)	1.15 a	1.14 a	1.48 b	1.33 a	1.16 a	1.21 a
Chlorophyll b (mg/ml)	1.31	1.36	1.67	1.55	1.32	1.43
Rasio a : b (mg/ml)	43.4	42.7	43.69	43.23	43.39	42,82

Description: numbers followed by the same letter in the same row are not significantly different at 5% DMRT further testing. Figures in parentheses are NR = value relative to control (%)

**Table 4. Number of pod contains, the number of empty pods and dry seed weight plant<sup>-1</sup> several varieties at different levels of shade**

Shade (%)	Number of contain pods					
	Anjasmoro	Kipas Merah Bireun	Grobogan	Burangrang	Sinabung	Kaba
0	118.76b C	196.75d C	128.32b C	37.54a A	142.79c C	145c C
25	85.72b B (-27,46)	141.13c B (-28,27)	91.84b B (-28,27)	59.28a B (-31,36)	96.38b B (-32,50)	96.80b B (-33,37)
50	41.43abc A (-64,940)	62.86d A (-68,05)	37.54ab A (-70,75)	35.61a A (-58,96)	54.88cd A (-61,57)	48.52bc A (-66,60)
Shade (%)	Number of empty pods					
	Anjasmoro	Kipas Merah Bireun	Grobogan	Burangrang	Sinabung	Kaba
0	7.56 ab B	10.44ab C	5.67a C	8.78a B	13.89c B	14.89c C
25	6.44b B (-14,710)	6.89b B (-34,34)	5.67a B (-41,18)	5.78ab A (-34,18)	7.33b A (-40,20)	7.78b B (-40,76)
50	4.44a A (-41,18)	4.78a A (-54,26)	5.67a A (-54,90)	3.00a A (-65,820)	5.11a A (-63,20)	4.44a A (-70,15)
Shade (%)	Dry seed weight plant <sup>1</sup> (Gr)					
	Anjasmoro	Kipas Merah Bireun	Grobogan	Burangrang	Sinabung	Kaba
0	33.88b C	45.99c C	43.54c C	29.00a C	29.00a C	30.30a C
25	23.99b B (-29,90)	31.80c B (-30,86)	33.19c B (-23,78)	20.42ab B (-29,18)	20.42a B (-32,39)	20.13a B (-33,57)
50	10.98a A (-67,60)	16.44b A (-64,26)	13.84ab A (-68,22)	11.14a A (-61,59)	20.42a A (-64,34)	11.53a A (-61,95)

Description: Figures followed by the same letter (uppercase) in the same column and the same letter (lowercase) in the same row are not significantly different at 5% DMRT further testing. Figures in parentheses are values relative to control (%)

**Table 5. Weights of 100 seeds and harvest index several varieties at different levels of shade**

Shade (%)	Weight of 100 seeds (Gr)	Harvest index
0	13.55	0.29 c
25	13.81	0.26 b (-10,64)
50	13.61	0.20 a (- 29,66)
Varieties	Weight of 100 seeds (Gr)	Harvest index
Anjasmoro	12.08 b	0.246 abc
Kipas Merah Bireun	12.08 b	0.271d
Grobogan	17.78 d	0.264 cd
Burangrang	16.58 c	0.237 a
Sinabung	10,51 a	0.250 abcd
Kaba	10.26 a	0.239 ab

Description: numbers followed by the same letter in the same column are not significantly different at 5% DMRT further testing. Figures in parentheses are NR = value relative to control (%)

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# THE STUDY OF BIODEVERSIY ABOUT THE PRESENCE OF SOIL AND WOOD FUNGUS ALSO POTENTIAL BREEDING IN SIBOLANGIT FOREST TOURISM, NORTH SUMATERA

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## Abstract

This study aimed to obtain the data about the presence of soil and wood fungi and the types of soil and wood mushrooms in Sibolangit Forest Tourism, North Sumatera. This study used an exploratory survey method in qualitative descriptive data. The sampling technique was done by using "Purposive Sampling". The Data is obtained to explain the presence of Wood and Soil Fungus, along with the poisonous test of fungus using garlic to identify poisoning ability of fungi being sampled. The fungus sample is also taken on the need of identification and documentation of the data. The result of this study showed that in Sibolangit Forest Tourism, North Sumatera, found soil and wood fungus as much as 24 genus, such as: *Gyroporus sp.*, *Cantharellus sp.*, *Phellinus sp.*, *Ganoderma sp.*, *Tremella sp.*, *Craterellus sp.*, *Marasmius sp.*, *Nalanea sp.*, *Inocybe sp.*, *Crepidotus sp.*, *Stereum sp.*, *Calocera sp.*, *Fomes sp.*, *Auricularia sp.*, *Clitocybe sp.*, *Polyporus sp.*, *Aleuria sp.*, *Caprinus sp.*, *Coriolus sp.*, *Microglosum sp.*, *Corticium sp.*, *Clavaria sp.*, *Calvatia sp.*, *Pholiota sp.*, and 1 genus of soil fungus is *Amanita sp.* At the time of the study physical data of Sibolangit Forest Tourism showed that soil temperature approximately 22,5<sup>0</sup>C – 25,5<sup>0</sup>C, soil pH is 6,2 – 6,8. Air moisture is 84% - 92%. Light intensity is 400 – 900 Luxmetre, and wood pH approximately 6,3 – 6,9.

**Keywords:** Fungus, Biodeversity, Soil, Wood, Breeding.

## INTRODUCTION

Covering a large group of living things, Fungi include the estimated 300,000 various types that can be found in Indonesia (Tjirosoepomo, 2002). It can grow anywhere, either on foodstuffs, soil, rotted logs, or even in human body (Suriawiria, 1986). Mushrooms (fungi) can be beneficial and detrimental to humans. In relation to profitable aspect of fungi, it can be used as food, cosmetic, drugs, and food-beverage starter ingredients.

Many of Fungus that grows on the surface of the soil and on the rotten wood can be consumed by human. But there are still many people who do not understand the characteristics of considered safe fungi to eat. For people who live in the forest areas, it is necessary to know how the characteristics of mushrooms for a safe consumption. The mushrooms have high protein content when it served as a food (Bakhrun, 2007). Smith (1980) states that the edible mushrooms can be easily collected from the wood of a natural or open area during rainy season. So in order to obtain satisfactory results, maintenance or cultivation the fungus is indeed required. Devastating ability of a fungus, as stated by Baker (1982), can be seen when it cause a harmful effect to plants, such as fungi that found

live in the leaves of a forest plant and the one that live in the bark of plants, roots, and stems.

Mushrooms act as decomposers that help the process of decomposition of organic matter and helping for a matter recycling process in the forest ecosystem. Wood fungus is a large number of fungi that can be found in the wood and forming a decayed wood. Most of mushrooms that have a very strong cellulosic activity can grow on still alive wood and trees. They can also be found live on dead wood. These types of fungi are belonging to the Basidiomycota (Ganjar, et al. 2006).

Bukit Barisan Forest Park, which is located in Tahura Sibolangit, North Sumatra province, has the potentially diverse fungi that grow inside it. Mushrooms grow easily either at ground level or on plant stems, trunks or the decaying matter. Therefore, research is necessary to reveal both the diversity of fungi that live on the surface of the soil, as well as those that grow on the surface of the wood/stem of the plant. The study is limited to a distance of 200 meters to the south of the Tahura Sibolangit gate entrance. The studies have analyzed morphology, diameter, colors and shapes, and the classification of mushroom at the genus level. The problem in this study are: (1) What Group of wood fungi and soil fungi that can be found in Tahura Sibolangit?; (2) What is the potential of the wood mushrooms and mushroom land cultivation that can be found in Tahura Sibolangit.

## METHODOLOGY

The research was done in Sibolangit tourism forest, Sibolangit, Deliserdang District, North Sumatra. The area of study is of approximately 40 km from the city of Medan. The topography of this area is located at an altitude of 480 meters above sea level and slightly tilts toward the northeast with the overall area of 110 hectares and the tourist area with a total area of 28 hectares.

The Location of Sibolangit tourism forests consists of a plateau with a wet condition and the approximately 50 species of plants biodiversity potential, fauna such as mouse deer (*Tragulusejavanicus*), owa (*Hylobates moloch*), siamang (*Hylobates syndactylus*), and owls (*Bubo sumatranus*) can be found here. Another potential that were possessed by this forest is as a source of water for Medan and surrounding areas, in addition to having a potentially steep cliffs to sport climbing (Anonymous, 2000).

Exploratory survey was conducted by using research object sampling techniques, over a period of 2 months. Morphological observation, the observation of shape, color, and toxicity test were done to the object being sampled. Collections of fungi were found to be matched with the images and data from manual classification of fungi (Smith and Weber, 1980).

Ecological data that were measured, including soil pH, range from 6.2 to 6.8, soil temperature that range from 22.5 to 25.50 C, air humidity which range from 84-92%, was done, along with identification of light intensity which range from 400-800, calculated using lux-meter. Besides that, soil texture was also identified. The condition of the cover

of forest canopy in Sibolangit Tourism found to be unevenly covered the surface of the ground.

## RESULT AND DISCUSSION

Based on the data obtained: (1) Genus *Auricularia*. These fungus habitations are on rotten wood. Fungal fruiting bodies found to have reddish color with a slimy texture, size ranging from 6-10 cm. These types of fungi are usually the edible one. (2). Genus *Clitocybe*. This one is a type of wild living mushrooms, the young fungi is edible one while old living one can cause dizziness when someone consumed it. This type fungus has a cap that opens out or the umbrella-shaped one with color ranging from white, yellowish, to light brown. (3) Genus *Microglossum*. These fungus habitations are on rotten wood and found to have black color, the size of this fungus approximately 2-4 cm, and they include poisonous mushroom. (4). Genus *Clavaria*. These fungus habitations are on decaying logs. In addition they are also found to grow on the top soil. This fungus can be found in color ranging from white or yellowish and white-bluish too. The young mushrooms are edible (5). Genus *Corticium*. This fungus has an even body fruit and attached to the crust-like substrate and slightly wrinkled fruit body. These fungus habitations are on wood and most live as parasites. (6). Genus *Coriolus*. This fungus is similar to genus *Polyporus*, shaped like a fan and also lives in rotten wood or an already dead wood. The fungus is white in color and possesses hard texture.

(7). Genus *Polyporus*. This fungus fruit flesh is hard. Size of less than 10 cm, the fungus also called board fungi because of its widening appearance. These including the wild mushrooms that grow attached to the trunks of dead wood and there are also living on rotten wood, greenish yellow in color with an unclear stem but and a fan-like cap. (8). Genus *Pholiota*. This fungus grows on a pile of leaves and also attached to the rotten wood. Shaped like an umbrella, the color of these types of fungi are brownish in its trunk-like part, with the cap also has the same color as the trunk. (9). Genus *Calvatia*. The colors of these fungi are ranging from white to yellowish white. The inside part of the old one turn into powder that can be waft out and fly to any direction if we press the body.

(10) The genus *Ganoderma*. Upper and lower surfaces of this fungus found to have shiny appearance and edge of white color that surround it. The diameter of this type of fungus is less than 4 cm, while the stalk is less than 2-4 cm in length, this fungus can also be used as a drug. (11). Genus *Gyroporus*. These mushrooms have a black stalk, dark brown mushroom fruit body, with a serrated edge, and can be found on twig with a diameter of approximately 3.5 cm. (12). Genus *Cantharellus*. This mushroom has a white stalk, an evenly round shape fruit body, jagged edges, and gray to brown color of fruit body. It can be found to live on the twig (diameter of approximately 6.5 cm).

(13) The genus *Phellinus*. This fungus has an irregular shape with a diameter of less than 5 cm. These fungus habitations are on rotten wood, the color of the front part of this fungus is white and shaped like velvet, while the top of it has the color ranging from creamy to gray. (14). Genus *Fomes*. This fungus found to have a board like appearance, hard flesh, dark red shiny, of the upper surface while the lower surface is dark brown, semi-

circular shape, with a diameter of approximately 6 cm.(15). Genus *Aularia*. This fungus has a soft pulp, glossy red color of the upper surface, the lower surface are somewhat blackish on the edges, while the center is white, round shape with a diameter of approximately 4.3 cm. (16). Genus *Craterellus*. White fungus stalk, a trumpet-like shape, smooth light brown surface, flat edge and roll up, while the lower surface is white, with a diameter of approximately 6.5 cm. (17). Genus *Marasmius*. White stalk of the fungus with a size of approximately 1 cm, the colors of surface edge are ranging from white to light brown, with the soft flesh, the lower surface have brownish white or yellowish white range of color with a diameter of approximately 1.8 cm, this type of fungus can be found on rotten wood.

(18). Genus *Nolaena*. Mushroom stalks is black in color, with a size of approximately 0.9 cm, found to have light brown color of its talus surface, have a cup shape and fungus habitations are on weathered wood with a diameter of approximately 1.2 cm. (19). Genus *Inocybe*. This fungus habitation are on wood, with a diameter of approximately 0.8 cm, and the talus is found to have dark brown color, also with a cup shape. (20). Genus *Crepidotus*. This fungus forms a round, soft flesh, russet, and wrinkle white lower surface, fungus habitations are on twig with the approximately 3 cm in diameter.(21). Genus *Amanita* Sp. This fungus has a diameter less than 1.2 cm, upper surface insulated and white, while the lower surface is flat and white. (22). Genus *Tremella*. This fungus has a hard flesh, white edge, and gray color with black bottom. The diameter of this fungi is 1.1 cm can be found also to live on the twig. (23). Genus *Stereum*. This is an ellipse mushroom shaped, with a white flat edge while the middle part of it is found to have a wrinkle shape, shriveled under the surface, the habitat on decayed wood with a diameter of approximately 1.5 cm.

(24). Genus *Calocea*. These mushrooms have a stalk that is approximately 1.3 cm in size, irregular shape talus-like leaves, white color, and a diameter of approximately 1.7 cm. (25). Genus *Caprinus*. This mushroom stalk is yellowish white in color with a size of approximately 3.5 cm, having a light brown talus, with brown edges, an umbrella-like shape and lower insulated part with a diameter of approximately 1.6 cm. This fungus can be found to have white (yellowish white) in younger age with also some of it found to have bluish white color.

From the 25 genera found in Tahura Sibolangit, two of which found are poisonous one, genus *Amanita* and genus *Microglossum*, while the other 23 genera have the potential to be cultivated. Genus *Tremella* and *Clavariaceae* are the genera that dominate the Tahura forest area, in which this genus of fungi live on a little bit open area, with a bit of light intensity, and temperature of 16-18°C, and a very high humidity. Rahayu (2004) states that environmental factors determining the spread and growth of an organism and make them able to live in certain circumstances on certain tolerance range suitable for that organism. Carlile and Watkinson (1994) explained in addition that the fungus generally grows best in a moist place.

Tahura forest area, in Sibolangit, possesses a potential for habitat growth of macroscopic fungi, because of the types of vegetation that includes the shrubs. This area has a high rainfall. This is in line with the opinion of Tjirosopomo (1989) and Arora

(2000) that the forest with 7200 mm rainfall / month, temperatures range between 16.8-230C, and high humidity (over 80% kurag) can give the optimum growth for fungus. Similarly Tahura sibolangit foresr has the potential for mushroom cultivation because of environmental factors that support it.

If a mushroom cultivation is established without destroying the forest, it will have an impact on the growth of economic activities in the surrounding communities. This is in line with the opinion Suriawiria (2000) that success in agribusiness of wood fungus will increase ones incomes. Thus, Tahura as tourism object in Sibolangit village has the potential for mushroom cultivation, in which cultivation can be done without deforestation by utilizing rotten wood and the branches of trees as a means for the growth of fungi. To support this, both management of forest along with functional management is needed to be performed optimally.

## CONCLUSION

Based on the research findings, it can be concluded that the region of Sibolangit Forest Park has a diversity of wood and soil fungi with the most dominant Genus are Tremella and Clavariace. Wood mushroom cultivation potential for foodstuffs, cosmetics, and pharmaceuticals can be done without destroying the forest by optimizing the management of forest functions.

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# GEOPHYSICAL INVESTIGATIONS ON ARCHEOLOGICAL SITE OF KUTA LUBOK TSUNAMI HERITAGE

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## Abstract

The giant tsunami 2004 that hit Aceh not only lead disasters but also caused political changes in Aceh Province. Two events of Paleotsunami in 13<sup>th</sup> and 14<sup>th</sup> centuries are also believed to be the cause of the collapse Lamuri Sultanate in Aceh at the time. One of the historical Lamuri heritages is Kuta Lubok in Lamreh, Aceh Besar, which can be considered as one of paleotsunami heritages. Kuta Lubok was a fortress as well as a trading center during the Sultanate time. In this paper we have examined and mapped structure of the former fort building using geophysical methods including Very Low Frequency (VLF), Magnetic, and Ground Penetrating Radar (GPR). Based on data interpretation, we have been able to locate some remaining buildings structures buried below the subsurface, i.e. the fortress walls, roads construction, and cemeteries' area. We believed the results of this research are important to support further studies of Paleotsunami in the area.

**Keywords:** Paleotsunami, tsunami heritage, geophysical methods.

## INTRODUCTION

Aceh is the gateway to the Southeast Asia which plays an important role of sea transport traffic in the past. Therefore, the fame of Aceh in the past is not only recorded by historical documents around the world, but also it proved by some physical evidence remains of its former glory in the form of archaeological sites. Along the beach of Banda Aceh and Aceh Besar, for examples, we can found many historical heritage sites; one of them is legacy of Lamuri Sultanate the 9<sup>th</sup> century (McKinnon, 1998).

The Lamuri was established a long time ago before the two great kingdoms in Aceh were started; i.e. Samudera Pasai and Aceh Darussalam. Based on recently investigation, it is believed that the Sultanate Lamuri disappeared after a giant tsunami disaster hit Aceh in the early 14<sup>th</sup> century (Majalah Tempo, February 10<sup>th</sup> 2014). The existence of the sultanate is proved in Village of Lamreh Area, Masjid Raya Sub-District, Aceh Besar. One remaining fortress that partly preserved until now is Kuta Lubok. We can also find Kuta Inong Balee Fortress (15<sup>th</sup> century) and some ancient cemeteries in the area. Along the times Lamreh Areas are not only interesting in terms of historical heritages but also planning to be developed as a golf court because of their landscape (Serambi Indonesia, May 20<sup>th</sup>, 2012). On the other hand, in the areas are also found some natural resources such as iron ores deposit that potentially to be exploited. Both of these prospects should be considered as a challenge as well as a threat to the existence of the historical paleotsunami

heritage sites of Lamuri Sultanate. In this paper we explain preliminary results of geophysical studies on the area. We have mapped back some historical remnants buried beneath the surface. We used geophysical methods, i.e. Very Low Frequency (VLF), magnetic, and Ground Penetrating Radar (GPR) techniques for subsurface mapping in the area. Application of geophysical methods to archeology has been widely used, but using the methods for archaeological studies related to Paleotsunami is very rare.

The VLF method makes use of electromagnetic waves in the low frequency band of 15-25 kHz generated by radio transmitters. The transmitters are normally used for long-range communications and navigational systems. At large distance from the transmitter the wave is planar and horizontal. When the wave passes over a conductor, induced eddy currents cause secondary electromagnetic fields and the primary field is tilted. By mapping this tilt, anomalous conductors can be observed. Using the VLF method to archeological studies was quite rare, since the method is more suitable for detecting large conductive structures. The accuracy of the method is not sufficient for detailed prospecting. However it has been used to find buried pyramids by Deletie, *et al.* (1988).

A GPR system consists of antennae, a control unit and a display. The GPR technique is based on transmitting electromagnetic pulses from a dipole antenna into the ground and measuring the time until the reflected waves reach a receiver antenna. Usually frequencies between 200 and 500 MHz are used in archaeological investigations. Since the frequency is proportional to the inverse of the wavelength, a low frequency used implies a low resolution, although the depth penetration increases. Amplitude of the reflected wave can give information about the difference between the properties of two adjacent layers. Increasing difference between the dielectric permittivity of adjacent layers in the soil profile gives increasing amplitude of the reflection (Conyers and Goodman, 1997).

## MAGNETIC METHOD

The magnetic method involves the measurement of the earth's magnetic field intensity. Typically the total magnetic field and vertical magnetic gradient is measured. The Earth possesses a magnetic field caused primarily by sources in the core. The intensity of the Earth's field is customarily expressed in S.I. units as nanoteslas (nT). The Earth's magnetic field dominates most magnetic measurements made at or near the surface of the Earth. The Earth's total field intensity varies considerably by location over the surface of the Earth. The magnetic method has been widely used in archeological site such as discovery of an ancient pharaoh's temple (Elharabi, 2009).

## RESULT AND DISCUSSION

In order to obtain a detail image of the fortress which is mostly buried at shallow depths, we have collected geophysical data densely so that all of the fortress areas were covered. In the VLF survey, we used VLF measurement built by IRIS that resolved data into horizontal  $H_y$  and vertical magnetic  $H_x$  with frequencies 18.3 kHz and 22.2 kHz. Tilt and ellips data were calculated using the measured horizontal and vertical magnetic data. The profiles length is 60 meters, with station separation was 5 meters and profile



separation was 10 meters, the total of overall data was 156 points, as seen on Fig. 1. The current density values were calculated using the Karous Hjelt filter (karous Hjelt, 1956) based on the magnetic fields intensity. Figure 2 shows current density data. The data reveal some structures of fort buildings by low current density values. Based on field observation, the fortress structures were composed by volcanic rock that is mostly resistive.

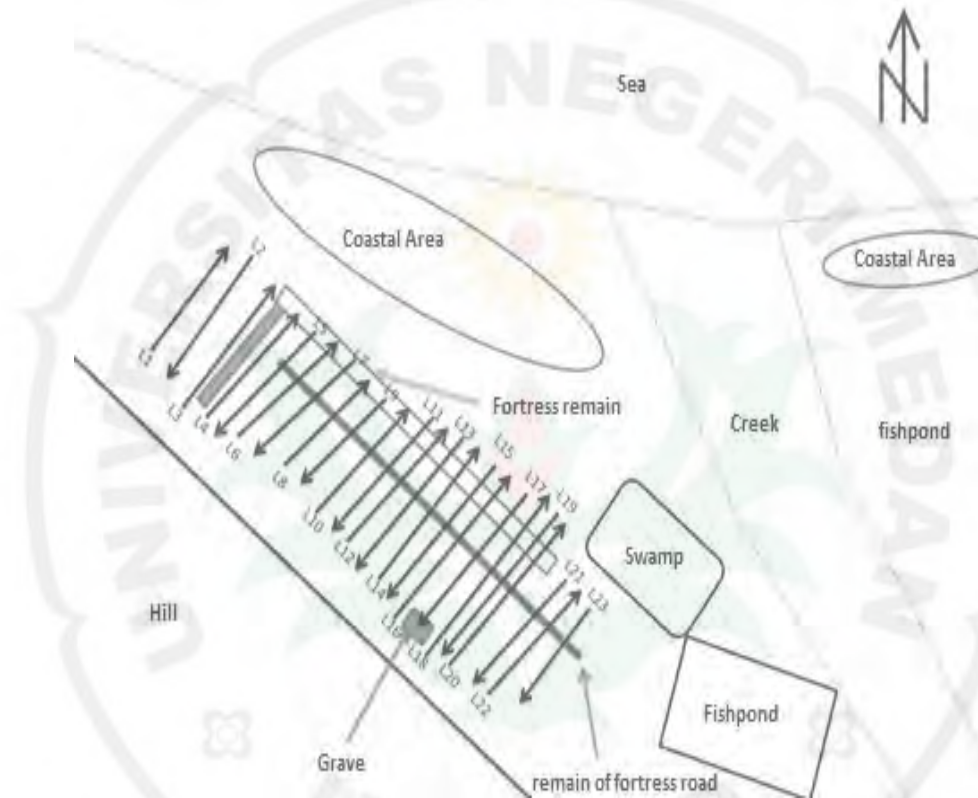


Fig 1. Location map of the archeological site Kuta Lubok and the selected locations for the geophysical methods work.

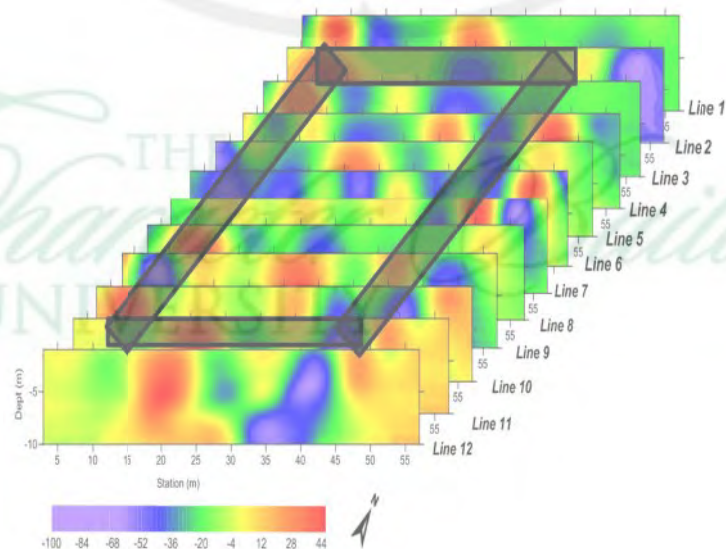


Figure 2. Current density anomalies of VLF-EM data.

As a complementary method for the VLF method, Magnetic survey was applied at the same locations of the VLF area, but with a very tight profile (i.e., station separation was 5 m and the profile separation was 5 m). The magnetic PPM measurements, including the total magnetic field have been conducted in the study area. Regional anomalies have been removed from the magnetic field data so that the local anomalies represented shallow depth structures.

The residual anomalies data (Fig. 3) shows the fortress structures by contour lines of the residual anomalies. The closure anomalies mostly follow geometry of the remaining fortress and former road structure entering the fort as well as cemeteries area.

As a complementary of the two former methods, magnetic and VLF, the similar structures were also found in GPR measurement (Fig. 4). We have been able to show two reflectors from the GPR images. The first is a flat reflector (A) was suspected as the man-made structure such as old road material and the stepping reflector (B) starting from the beginning of the profile was estimated as bedrock structure.

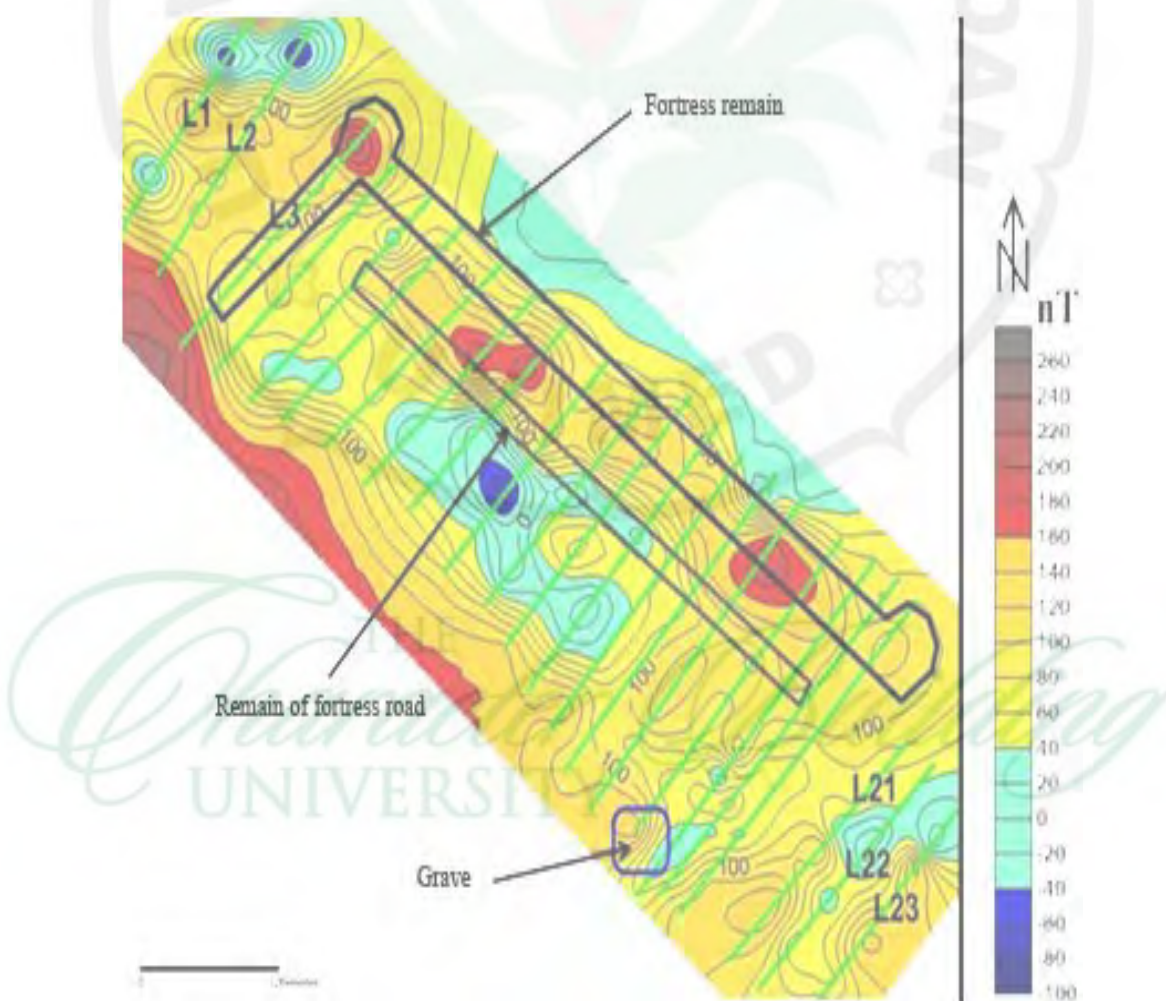


Figure 3. Image view of value anomalous residual total magnetic field

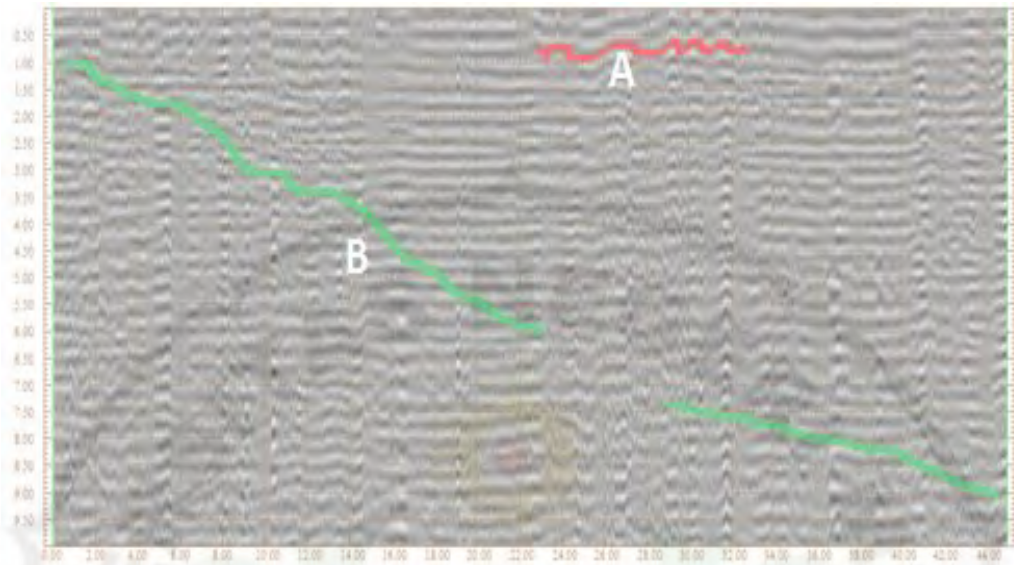


Figure 4. Two reflectors of GPR method that estimated the fortress structure

### CONCLUSION

VLF, magnetic, and GPR methods have been able used to map Kuta Lubok site. Based on data interpretation, we have constructed Kuta Lubok fortress map including the outcrops, buried fortress structures, old road, cemeteries, and depth of bedrock at the subsurface (Fig. 5). The information gathered from our interpretation can be used for paleotsunami studies on the area as well as for conservation of Kuta Lubok paleotsunami heritage.

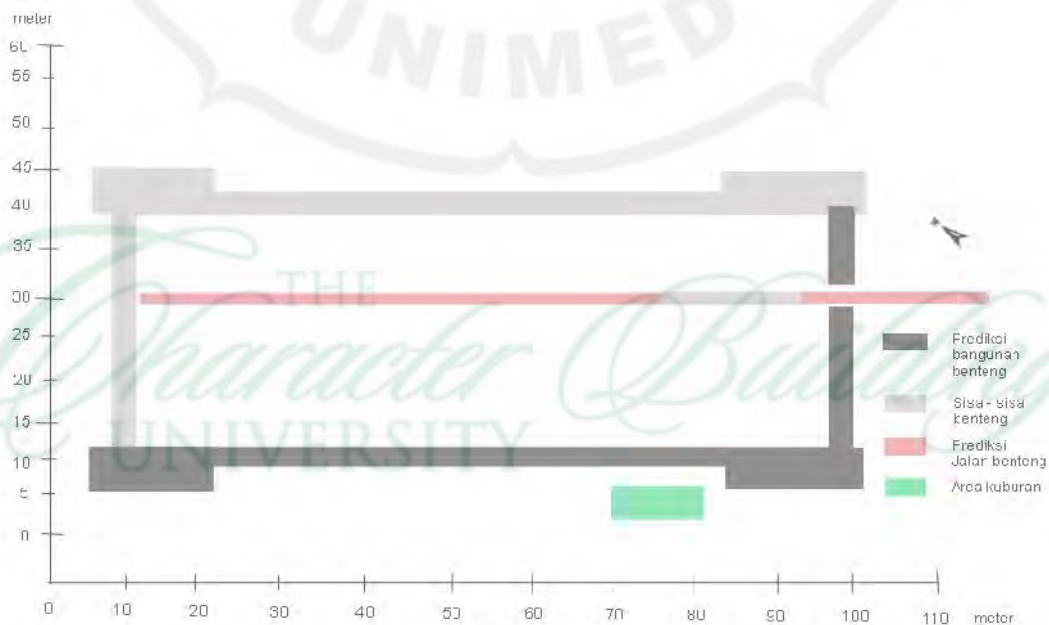


Figure 5. The reconstruction model of Kuta Lubok based on geophysical methods

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# EFFECT OF DOSAGES ARBUSCULAR MYCORRHIZAL FUNGI (AMF) ON P UPTAKE, GROWTH AND YIELD OF SOYBEAN IN ULTISOLS SOIL

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## Abstract

This study was aimed to determine the effect of AMF dosage within Ultisols soil onto AMF infection, P uptake, growth and yield of soybean. This research was conducted in Keutapang village, Syamtalira Aron district, North Aceh, on April to October 2013. Statistical design used in this study was randomized block design. The dosages of AMF consisted of six levels, namely 0, 10, 20, 30, 40, and 50 g per pot in 3 replications and 2 experimental units which were the vegetative phase and the generative phase. The result showed that the dosage of 50 g per pot of AMF was the best result. The dosage of 50 g per pot could increase AMF infection up to 66,7%, P uptake 1,35 mg per plant, dry root weight 0,63 g per plant, dry shoot weight 2,61 g per plant, pod number 8,33 pod per plant, seed number 16,33 seed per plant, and seed weight 1,05 g per plant. Ultisols soil which was taken from Buket Rata had correlated highly to AMF dosages. The dosages of AMF positively correlated to AMF infection degree, P uptake, dry root weight per plant, dry shoot weight per plant, pod number per plant, seed number per plant, and seed weight per plant.

**Keywords:** Ultisols soil, arbuscular mycorrhizal fungi , P uptake, growth, and soybean

## INTRODUCTION

Ultisols disseminating in Aceh is 699,000 ha. Ultisols soil problem is due to the level of advanced weathering and lead leached content of bases which reacts becoming to acidic soil (pH 4 – 5,5) (Darmawijaya, 1997) and has high Al saturation (Subagyo *et al.*, 2000). Macronutrients, especially P, K, Ca, Mg and organic matter content are low in the Ultisols soil (Hardjowigeno, 2003). The reaction of acid soil causes low P availability through clay fixation, Al and Fe forming Al-P and Fe-P which are poorly soluble and they can not be used by plants (Hakim *et al.*, 1986).

The increment of domestic soybean demand is not equivalent to domestic soybean production. Furthermore, it affects to increment of imported soybean. Therefore, government afford to increase soybean production through intensification and extensification. Extensification is done by utilizing soil having low fertility rate. The effort for improving soil fertility, improving soil characteristics, and maintaining the environmental balance is done by using the Arbuscular Mycorrhizal Fungi. AMF working synergically with plant roots can form external hyphae for improving the physical properties of the soil, releasing the fixed nutrients, and increasing the nutrient uptake for plants (Setiadi, 1999). According to the result of Ross (1971), soybean which is given

phosphate fertilizers and mycorrhizal infection can increase the absorption of phosphate content and harvested yield of soybean. Jalaluddin (2005) and Yaseen, *et al.* (2012), they observed that AMF significantly effect when compared with non-mycorrhizal plants on the growth and productivity of legumes. Based on the described problems above, it is necessary to study about the influence of AMF dosage onto P uptake, growth and yield of soybean in Ultisols soil. The purpose study is aimed to determine the best dosage of AMF on growth and yield of soybean in Ultisols soil.

## MATERIALS AND METHODS

The experiment was conducted in Keutapang village, Syamtalira Aron sub-district, North Aceh district. The experiment also took place in Laboratory of Plant and Soil Agriculture Faculty, Syah Kuala University and Agroecotechnology laboratory Agriculture Faculty, Malikussaleh University. The research was conducted during April until October 2013.

Materials used in this study were soybean species certified as Kipas Merah as indicator plants, Arbuscular Mycorrhizal Fungi in which the species was *Glomus moseae*, the carrier medium composed by a mixture of zeolite, sand and mediterranean soil from the Laboratory of Plant Disease, Brawijaya University, Malang, Rhizobium, Urea 75 kg per ha, SP-36 100 kg per ha, KCl 100 kg per ha, and Ultisols soil (Buket Rata, Lhokseumawe). Furthermore, the equipments of this research were scales, tools for the analysis of soil and plant.

The statistical analysis used in this study was randomized block design (RBD). The different dosages of Arbuscular Mycorrhizal Fungi as factor of research consisted of 0, 10, 20, 30, 40 and 50 g per pot. The research was done in three replications and two units which were vegetative (45 days after planting) and generative (harvest). The initial research was done by analyzing soil samples on physical and chemical soil properties. Preparation of planting medium, Ultisols soil, was done by taking from Buket Rata (Lhokseumawe). Soil samples used in this research were compositely taken from the ground as deep as 20 cm. Soil sample was dried for 5 days and sieved by using a sieve with the diameter 0.5 cm, then soil was put into the pot for 15 kg.



Figure 1. Research experiments with 2 units: vegetative and generative

Primary fertilizers were given to plants in one third of recommended fertilizers in which urea at dosage of 25 kg per ha (0.19 g per pot), SP-36 at a dosage of 33.33 kg per ha (0.25 g per pot) and KCl at a dosage of 33.33 kg per ha (0.25 g per pot). Dosage application of AMF was given together with fertilizer in planting time. Three seeds were planted in each pot. At the age of 10 days after planting, thinning was done for two plants per pot. Maintenance included mechanical watering and mechanical weeding, beside pest and disease control in an integrated manner.

Observation included Arbuscular Mycorrhizal Fungi infection at the age of 45 days after planting and staining method of Kormanik and Graw (1982). P uptake was analyzed by wet destruction method using  $H_2SO_4 + H_2O_2$  (45 DAP). Observation was done by seeing on plant growth (dry weight of the canopy and root dry weight per plant) and yield of soybean (pod number, seed number and seed weight per plant). Data analysis used was randomized block design followed by the Least Significant Difference test (LSD) at the 0.05 level (Gomez and Gomez, 1995). Regression and correlation calculation also were analyzed by using the program Minitab released 14 (Minitab Statistical Software, 2003).

## RESULT AND DISCUSSION

The result of analysis of soil samples before treatment was presented in Table 1. The results showed the increment of AMF dosages within Buket Rata Ultisols Soil could increase the degree of AMF infection and increase P uptake on soybean root at age 45 DAP. The dosages of 50 g per pot AMF was the highest degree of AMF infection on soybean roots which was 66.67%. This degree of AMF infection was 30% higher than without AMF (Table 2). The ability AMF for infecting the roots at dosages of 50 g per pot AMF is high criteria (Rajakakse and Miller, 1992). AMF dosages could influence the degree of AMF infection on Buket Rata Ultisols soil which was due to the compatibility of both AMF and soybean roots. This result was caused by mutualisme symbiosis between soybean roots and AMF on soil conditions with low nutrients level. The plants provide yield of photosynthesis to be used by AMF which is carbon, so that AMF can developed around the roots (Harrison, 2005). Increased energy source taken from the host plant would improve the AMF infection level on the roots of soybean plants.



**Figure 2.** Dosage of 50 g per pot AMF onto Infection AMF at the age of 45 days after planting soybean roots in soil Ultisols. A. external hyphae (magnification 10 x) B. vesicles (magnification 40 x).

**Table 1. The result of soil chemical and physical properties analysis before treatment (baseline)**

Soil Properties	Ultisol <i>Buket Rata</i>	Criteria <sup>2)</sup>
pH H <sub>2</sub> O (1 : 2,5)	5,09	Acid
pH KCl (1 : 2,5)	4,78	Acid
P <sub>2</sub> O <sub>5</sub> - Bray II (mg kg <sup>-1</sup> )	1,01	Very low
C-Organic (%)	0,60	Very low
N-Total (%)	0,04	Very low
C/N ratio	15	Medium
CEC NH <sub>4</sub> OAc (cmol kg <sup>-1</sup> )	29,20	High
Ca-dd (cmol kg <sup>-1</sup> )	4,08	Low
Mg-dd (cmol kg <sup>-1</sup> )	0,41	Low
K-dd (cmol kg <sup>-1</sup> )	0,30	Low
Na-dd (cmol kg <sup>-1</sup> )	0,43	Medium
Base saturation (%)	17,88	Very low
Al-dd (cmol kg <sup>-1</sup> )	1,06	Very low
H-dd (cmol kg <sup>-1</sup> )	2,14	High
Ec (mmhos cm <sup>-1</sup> )	0,58	Low
Texture		
Sand (%)	18	
Silt(%)	41	
Clay(%)	41	
Texture class	Silty clay	

- 1) The results of soil analysis in Soil and Plant Research Laboratory Faculty of Agriculture Syah Kuala University (2013)
- 2) Soil Chemical Properties assessment based on PPT, 1993 (*in* Hardjowigeno and Widiatmaka,2007)

**Table 2. Effect of dosages AMF onto infection AMF, P uptake and the percentage increased.**

Dosages AMF	Infection AMF (%)	Percentage increased (%)	P uptake (mg plant <sup>-1</sup> )	Percentage increased (%)
0 g per pot (F0)	0,00 d	0,00	0,51 c	9,41
10 g per pot (F1)	23,33 c	10,60	0,67 bc	12,36
20 g per pot (F2)	26,67 c	11,82	0,87 b	16,05
30 g per pot (F3)	50,00 b	22,73	1,01 ab	18,63
40 g per pot (F4)	53,33 ab	24,24	1,01 ab	18,63
50 g per pot (F5)	66,67 a	30,30	1,35 a	24,91
LSD (0,05)	7,97		0,35	
CV (%)	12,71		14,99	

Mean value followed by the same letter are not significantly different based on least significant difference test (LSD) at the 0.05 level Dosages of 50 g per pot AMF is the highest P uptake of 1,35 mg per plant. The Increased dosage of 50 g per pot AMF was able to increased P uptake reaching 24,91 %. It was higher than without AMF (9,4 %) (Table 2). The increment of AMF infection could increase P uptake which was due to AMF external hyphae absorbing P in low fertility soil. AMF is able to increase the absorption of nutrients through the expansion of the external hyphae (Setiadi, 1999), and



produce the phosphatase acid enzyme that can hydrolyze complex phosphorus become soluble phosphorus which is available for plants (Fakuara 1988; Feng et al., 2003). The increment of nutrient uptake in plants inoculated by AMF is caused by the reduction of nutrients distance entering the plant roots, the increment of root absorption capacity expansion, the increment of chemical nutrients overhaul so it can be more easily absorbed by plant roots (Abbott and Robson, 1984).

#### *Plant growth (Dry root weight and Dry shoot weight)*

The result showed that increment of AMF in Ultisols soil could increase dry weight of roots and shoots of soybean at age 45 DAP. The dosage of 50 g per pot AMF was highest the dry root weight and dry shoot weight of 0,63 g and 2,61 g. The increment dosage of 50 g per pot AMF was able to increase the dry root weight reached 19,7% and dry shoot weight reached 25% compared to without AMF that obtained 13% dry weight of roots and dry shoot weight 10,2% (Table 3).

Applied AMF was able to increase AMF infection, nutrient uptake P, so that it led to increase the root growth rate or equivalent to the shoot growth of the plant. Cardoso and Kuyper (2006) stated that the role of AMF commonly is physical exploration onto plant roots colonized AMF, not only lengthening the plant root system. AMF colonization on plant roots do not always increase the length of root, but generally change the architecture of root system (Berta et al., 1995). According to Widiastuti (2004), AMF infection on plants will lead some changes in morphology, physiology, biochemistry, and molecular on plant roots that may increase the nutrient absorption. The increment of P uptake and water absorption can lead the increment of photosynthesis rate and also increase the dry weight of the soybean shoot. Improvement of photosynthesis process is equivalent to the increment of total plant biomass (Kaschuk et al., 2009).

**Table 3. Effect of dosages AMF onto dry root weight, dry shoot weight and percentage increased**

Dosages AMF	Dry root weight (g)	percentage increased (%)	Dry shoot weight (g)	percentage increased (%)
0 g per pot (F0)	0,44 d	13,75	1,07 c	10,25
10 g per pot (F1)	0,45 cd	14,06	1,28 bc	12,26
20 g per pot (F2)	0,51 bcd	15,94	1,65 bc	15,80
30 g per pot (F3)	0,56 abc	17,50	1,76 bc	16,86
40 g per pot (F4)	0,61 ab	19,06	2,07 ab	19,83
50 g per pot (F5)	0,63 a	19,69	2,61 a	25,00
LSD (0,05)	0,11		0,83	
CV (%)	10,92		26,33	

Mean value followed by the same letter are not significantly different based on least significant difference test (LSD) at the 0.05 level

#### *Crop yield (pod number, seed number, and seed weight)*

The result showed that increment of AMF dosage on Ultisols soil could increase the number of pods per plant, number of seeds per plant and seed weight per plant. The

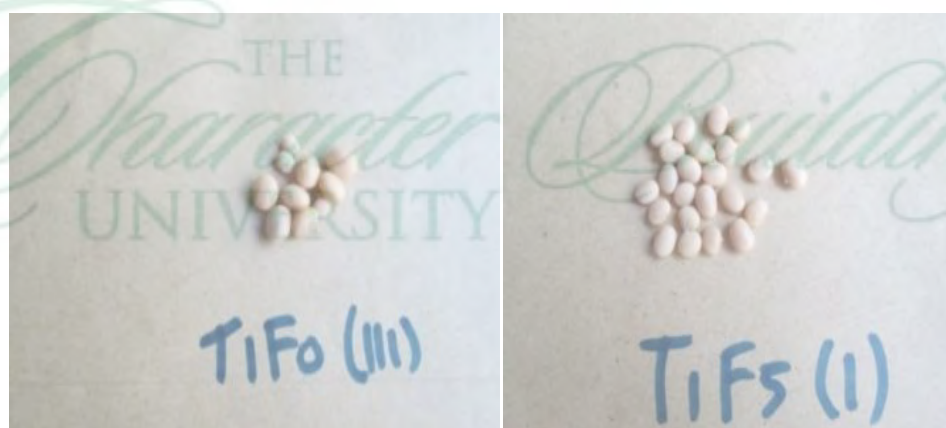
dosage of 50 g per pot FMA was highest the number of pods, number of seeds, and seed weight of 8,33 pods, 16,33 seeds, and 1,05 g (Table 4).

The increment dosage of 50 g per pot AMF was able to increase the number of pods reached 26,44%, the number of seeds reached 24,68% and 29,05% seed weight compared to without AMF that was 10,06% pod number, seed number 8,81% and 6,37% seed weight (Table 4). This result was caused by lower fertility level of the soil more AMF dosages needed to improve nutrient and water uptake in soybean plants. The Increment of AMF dosage was able to increased infection of AMF and P uptake so that it impacted on growth and yield of soybean. According to Cruz et al. (2004), AMF may improve growth and crop yields on marginal lands. AMF infects the root system of plants by forming external hyphae which are able to penetrate the layers of the soil, so that it can increase the capacity of roots in nutrient and water absorption (Cruz et al. 2004). The availability of nutrients and water encouraged the plant to carry out photosynthesis to produce enough photosynthate for forming pods and seed.

**Table 4. Effect of dosages AMF onto pod number, seed number, seed weight, and percentage increased.**

Dosages AMF	Pod number (Pod)	Percentage increased (%)	Seed number (Seed)	Percentage increased (%)	Seed Weight (g)	Percentage increased (%)
0 g per pot (F0)	3,17 d	10,06	5,83 c	8,81	0,23 d	6,37
10 g per pot (F1)	3,33 d	10,57	6,00 c	9,07	0,33 cd	9,14
20 g per pot (F2)	4,00 cd	12,70	10,33 b	15,61	0,53 cd	14,68
30 g per pot (F3)	5,50 c	17,46	12,17 b	18,39	0,61 bc	16,90
40 g per pot (F4)	7,17 ab	22,76	15,50 a	23,43	0,86 ab	23,82
50 g per pot (F5)	8,33 a	26,44	16,33 a	24,68	1,05 a	29,05
LSD (0,05)	1,87		3,15		0,31	
CVS (%)	19,59		15,70		28,07	

Mean value followed by the same letter are not significantly different based on least significant difference test (LSD) at the 0.05 level



**Figure 3. Seeds of soybean in Buket Rata Ultisols Soil. A). no applied AMF. B). Dosages of 50 g per pot AMF**

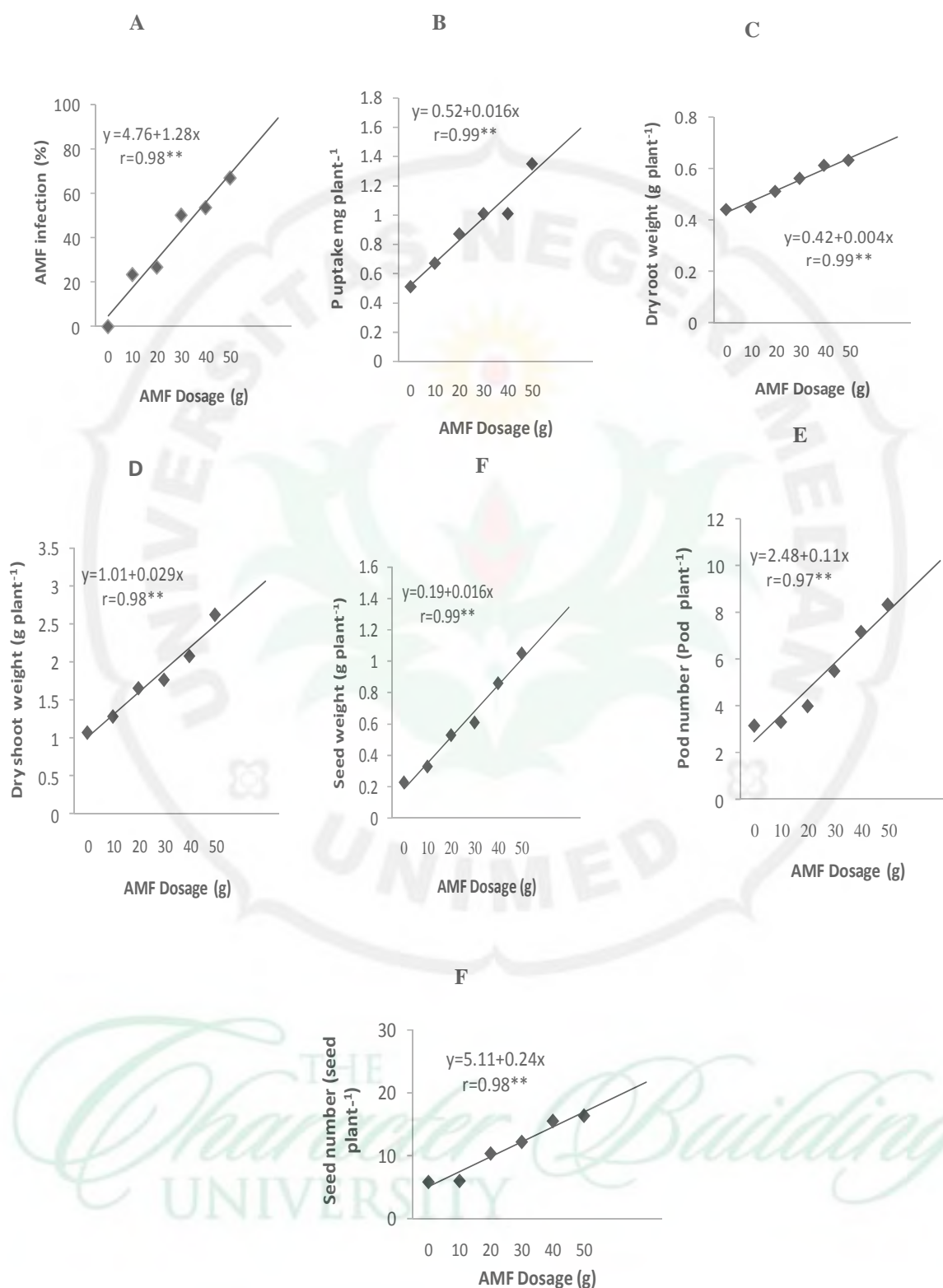
*The relationship of AMF infection degree, P uptake, dry root weight, dry shoot weight, pod number, seed number and seed weight*

The relationship of among AMF dosages of AMF infection degree, P uptake, growth and yield of soybean in Buket Rata Ultisols soil was shown on Fig. 4 A-G. Regression equations showed that AMF infection degree, P uptake, dry root weight, dry shoot weight, pod number, seed number and seed weight per plant were highly significant to dosage of AMF in Buket Rata Ultisols soil (Fig. 4 A-G). Ultisols soil from Buket Rata had a strong correlation with the level of AMF dosages. Therefore, increasing dosage of AMF could increase the degree of infection AMF, P uptake, dry root weight, dry shoot weight, number of pods per plant, number of seeds per plant and seed weight per plant. In Ultisols soil from Buket Rata, the correlation of AMF dosages and AMF infection, P uptake, dry root weight, dry shoot weight, number of pods per plant, number of seeds per plant and seed weight per plant was positive.

The dosage of 50 g per pot AMF given on soybean plant could increase AMF infection level and P uptake. Furthermore, it gave highest result and affected to increment of dry root weight, dry shoot weight, number of pods per plant, number of seeds per plant and seed weight per plant. High correlation was occurred between Ultisols soil and AMF dosages, AMF infection and P uptake in where ultisols soil had low soil fertility. In marginal soil, hyphae AMF had active role in supplying nutrient and water absorption. According Sieverding (1991), FMA forms external and internal hyphae on root of host plant, thus it increases the contact between plant roots and growing medium. Furthermore, according to Smith and Read (1997), P uptake of AMF infected root was three to five times higher than in the roots of plants without AMF infection.

The increment of P uptake was influenced by AMF infection in Ultisols soil from Buket Rata, so that higher P uptake more increased yield components such of number of pods per plant, number of seeds per plant and seed weight per soybeans plant. The role of phosphorus is to improve root growth, to accelerate maturity, and to produce fruit and seed (Prasad and Power, 1997).





**Fig. 4 (A-G):** A). The relationship between AMF dosages and AMF infection. B). The relationship between AMF dosages and P uptake. C). The relationship between AMF dosages and dry root weight. D). The relationship between AMF dosages and dry shoot weight. E). The relationship between AMF dosages and pod number. F). The relationship between AMF dosages and seed weight. G). The relationship between AMF dosages and seed number.

## CONCLUSION

Dosage of 50 g per pot AMF was the best dosage in Ultisol soil from Buket Rata. It was increased of AMF infection, P uptake, dry root weight, dry shoot weight, pod number per plant, seed number per plant, and seed weight per plant. The dosage of AMF was correlated strong with Ultisols soil. Dosage of AMF was correlated positively of AMF infection, P uptake, dry root weight, dry shoot weight, pod number, seed number, and seed weight per plant. Recommendation

This study is expected to be a reference for further investigation in order to increase the knowledge between teachers and students.

It also could provide a reference to all concerned parties in improving the knowledge of disaster.

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# THE STRATEGIES OF THE IMPLEMENTATION QANUN KHALWAT TO PREVENT MISBEHAVIOROUS OF BANDA ACEH ADOLESCENT

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## Abstract

Although the Syariat Islam has taken place more than thirteen years, the adolescence's behavior is not decreased, but showed an increase, such as some cases of teenagers who discovered lately, from drugs, khalwat till to freesex, all those can be categorized as juveneli deliquence, the case similarly the report of Dinas Syariat Islam Aceh Province since 2006 shows that it has occurred the increasing of khalwat violation significantly. It required a variety of studies to find answers how to apply Islamic law, one of them is Qanun of khalwat number 14 of the year 2003, The method is a descriptive exploratory study, the techniques of collecting data are, questioners, observation and in-depth interviews, the data is processed by triangulation approach by approaching various sources for answers to research problems. The result of data processing was found that there were more violation of khalwat done by the adolescence as level as university students, this event is very worry, for example SMA students of Banda Aceh have done free sex 6,42%, while students of university 12,02%. This indication shows that the adolescence in Banda Aceh have conducted the heavy violation of Qanun Khalwat/Meusum. This case is suited to Dinas Kesehatan dan Unicef finding that 10% of PSK in Aceh were university students. There are several strategies could be covered to optimize the implementation of Qanun Khalwat, among others : the development of a village structure proportionally, the village structure which has been existed during this time having five Kaur, namely Kaur Pemerintahan, Kaur Pembangunan, Kaur Keuangan and Kaur umun and Kesra. It is necessary to add one more kaur that is Kaur Syariat Islam, That kaur should be led by its figure arising from each village which possesses various criteria suited to characteristic of their duties, the addition of Kaur Syariat Islam could be concentrated especially to the village that has done more violations, it is also necessary to make a working contract with owners of the hostles, renting houses, hotels, guest houses, cafeterias, barber shops/saloon, warnet, warnang and others concerning their consistence of implementing and keeping Syariat Islam in their regions, As it was implied in Qanun No. 5 Syariat Islam and Qanun No. 14 about Khalwat especially section 6 and 7 along with section 25, verses a and b. It is essential to exist a good team work with various elements in the community, it is important to guide them especially to the adolescence either to the adolescence as level as senior high school or university, because 70% of the adolescences at the stage of educational institution mentioned have done misbehaviour. The responsibility of the related institution during this time is only as a suggestion provider, for the next time, this could be formed to be more light or binding and possesses sanction for the leader if he makes violations, even, it begins from administrative sanction to taking out of a legalization letter. The sanction given during this time is not serious, the comperation of giving sanction do not refer to violation of Qanun Khalwat and Syariat Islam but it is more tendency to the comperation of economics, so, the implementation of Syariat Islam at the institution always become a problem. There were not a legalization of Qanun Jinayat, actually WH do not have existed a formal legalization in making successful the implementation of Syariat Islam, therefore, it is important to provide a law umbrella that more adequate to implement Syariat Islam completely, beginning from catching, BAP, till to the Court, most of the part of the cases have been provided in Rancangan Qanun Jinayat Syariat Islam in 2009, that written in 22 chapter and 253 sections, nevertheless until now, it is not legalized by Aceh Governor without real reasons.

**Keywords: Qanun Khalwat, misbehaviorous and adolescent**

## INTRODUCTION

Since 1957 Aceh Province has been known as to have three privileges: they are, education, customs, and religion. In the act of actualizing the three privileges, continuing efforts are still being undertaken. The affirmation of constitution no 44 of 1999 on the implementation of the privileges of Aceh province and shariah law which are then followed by Qanun No 5 of 2000 about the implementation of shariah law and is then followed by various qanun which support the implementation of the law, one of which is qanun no 14 of 2003 concerning khalwat.

Although the Khalwat Qanun has been implemented for more than 10 years, the violations did not decrease but increase to some extent, for example in 2005 there were 107 cases of jinayah, there were 8 cases of khalwat, in 2006 there were 85 cases where there were 21 cases of jinayah, from 254 cases in 2007 there were 127 cases of khalwat and in 2008 there were 491 cases and 211 cases of Khalwat in 2013, khalwat is the most violated violation. From the total number of cases found, 90% of them are done by teenagers. That is why it is needed to have some efforts to actualize the city of Banda Aceh to be free of all violations including khalwat.

## LITERATURE REVIEW

### Definition and function of the Qanun

In the legislation number 18 of 2001 article 31 (1) states that "the implementation of Act which relates to the government's authority is determined by Government Regulation," while in act (2) it is stated that "the implementation of the enforcement of this Act which relates to the government's authority of NAD is determined by Aceh province's qanun." Qanun number 1 and 8 states that "Aceh province's qanun is the enforcement of regulations in Aceh province's region which is connected to the implementation of its special autonomy".

It appears that NAD's Qanun (in short qanun) is regulation which needs to be implemented in special autonomy which becomes the duty of Aceh province.

Thus, while on one hand qanun is a local regulation, but on the other hand qanun is not subjected to governmental regulation because qanun is under the legislation in its relation to the implementation of Shari'a as one of special autonomies which are granted to Aceh. Qanun has functions as follows:

1. Conducting the regulatory matter which are not clear yet by the implementation of required law for qanun to arrange.
2. Organizing regulations which will not contrary with the laws that are in higher position.
3. Organizing regulation which has not been enacted by the higher law, that is the enactment.



## Factors Affecting Defiant Behaviour/Khalwat

Deviant behavior is a behavior that is commonly practiced by teenagers which is seen as out of the provisions of both the norms of society (religion) and discipline that is usually used as a general guideline for them to act in daily basis. Deviant behaviors such as premarital sex, alcohol drinks, drugs, pornographic VCD and other disciplinary violations that may be harmful to themselves and to their environment are evil, the evil form, of course does not present itself but more as a product of a state and society with social approval (James Coleman and Donald Cressy 1986: 409), these behaviors can be referred to as social diseases (Kartini Kartono 1986: 4).

These behaviors are part of behaviors' irregularity which is against the good norm established in school and religion. These behaviors are indeed very disturbing because they are the source of personal and moral achievement's decline.

Teenagers who can not gain control of their behaviors or *super-ego* as Freud's explained, they will often misbehave and thus considered those misbehaved behaviors as accepted and advance, whereas in fact it is a matter of social symptoms (*social pathological*). This happens due to lacking values and other factors that later develop into deviant behaviors. These behaviors commonly occur in people under the age of 21 years old, while the highest rate occur to people at the age of 15-19 years, and will decrease again when they reach the age of 22 years (Kartini Kartono 1996: 8-9).

Studies conducted on adolescent have identified several factors that cause teens to develop defiant such as:

### 1). Family Factor

Family is the smallest unit of society that provides the foundation for the development of child's personality. While deviant behavior is a product of mental of those around him, whether parents, immediate family members or neighbors, it is definitely a factor that can affect the mental and the development of the child and in the future this process will turn him into defective as a result the child living in the bad environment.

Therefore, family plays an important part in the development of child's behavior because the good and the bad of a family structure and its immediate family's environment can provide a good and a bad influence on the development of the child's personality. If the child lives in an environment where the neighbors are nice then the possibility of him having bad behaviors won't occur. Another thing that is important in the child's development is the status of the family. Those who live with a family which has the lowest status and are raised by single parent in social structure will indirectly force them into doing crimes in the future, (Coleman and Cressy 1994: 414-415), even Kartini Kartono (1990: 26) say that approximately 90% of children who commit deviant behavior comes from *broken homes*.

Therefore, the worse the quality of the family is, the greater the possibility of the child developing deviant behaviors, because:

- a. Lacking the attention, affection and guidance of their close family or relative
- b. Physical and psychological needs are rarely met so they try to find other ways that are less legitimate.

- c. The family doesn't value religions so the child can't control himself when they are left unattended
- d. The supervision of islamic values in the family is weak.
- e. Lack of parentel supervision to the child socially
- f. To dear not in please

## 2). *Social Status*

Statistics showsthat the lower social status of the family is, the greater the likelihood of adoloncents having deviant behavior (Marvin Wolfgang 1990: 402) this may occur where the adolescent live in a family which has good social status but then he himself was lacking value, this may later lead to deviant behavior such as stealing, deceiving friends and so on.

However, some other researchers argue that, deviant behavior could have occurred regardless of the social status of the family, but they agree to some extent that those who have bad family status will do more crime in the future than those who have good family status.

## 3). *Lacking Spiritual Faith*

The fist prevention of deviant behavior actually depends on the teens themselves, to strenghttheir faith against those behaviors which are prohibited by religion. The prevention needed to keep the child from doing unwanted behavior should have been develop since they are kids, it can be begun by teaching them slowly and increasing the quantity of the teaching later. This will become like a fort that is not easily affected by the bad environment.

PP. No.NAD. 5 of 2000 on the implementation of Islamic lawhas been collated as a basic guide on the development of Islamic law in all aspects of life including education aspect, as stated in Chapter IV Article 5 paragraph (1): To actualize the privileges of Aceh in the field of organization of religious life, every person or legal entities living in Aceh, is obliged to enforce the implementation of Islamic law in their lives, as well as other law including khalwat qanun.

The basic of PP and various other laws serve as a control over a variety of behaviors, including adolescent behavior, which in this case is necessary because it is in accordance with Islamic law which is being promoted in an effort to manage teens' behaviors. Therefore the basis of faith needs to be planted early in teens' lives, for example by selecting the primary and secondary schools which are better in teaching Islamic values compare to other school, or with variety of teaching and other educational faith that allows the child to be well fortified.

## 4). *Socialization*

Teens are usually moving in groups, whether by group that is the same age, class or school and pick friends who agree and share something in common with them. In these groups they then develop their behaviors or they will just use it as a symbol. (Coleman and Donald Cressy 1984: 411). Models became popular among the group, that is why we often see symbols: "the cool kids", countrified, hick, old fashioned and so on.

They will make fun of the labels that they think are not modern and outdated, if a child chooses a friend with that concept then the child will tend to behave according to the members of the group, this is because:

- a. To have a feeling of acceptance in the group as one of its members.
- b. To prove that they are grown up and therefore can't be told what to do anymore by people. If they don't do it then they will be perceived as not good and be deprived of their role in the group.
- c. To mark differences between they're era and the era of their fathers. They will say something like this to their parents "It's like you've never been a child, your era is different than mine"

#### 5). *Gender*

Men are more likely to do deviant behaviour than women. Even Sutherland and Cressey (1984) compared the number teenage perverts of boys and girls with 15: 1. It means that in fifteen cases of aberrant behavior, it is found that only one of which occurs in adolescent females. It can be inferred in the following statement: Males dominate the world of crime. The crime rate for men greatly in excess of the rate for women in all nations, all nation communities in Canada for example, the ratio of male to female convicted of serious offenses is about 15:1. the difference is even greater in Traditional Societies. This figure in the difference will be even greater if viewed in the traditional and underdeveloped countries.

#### 6). *Social Structure*

People in general are entities that have relationship with their culture, which also contains the knowledge, values and norms. Shaping a culture will give the feel of the model of behavior of every individual to manifest in the form of personality.

The whole behavior and the roles of each *personality* is a form that is internalized within a person's personality, therefore every individual's *personality* is a reflection of the social structure that is generally predictable. As revealed in the following statement: *Social structure is the ordering of everyday behavior and social relationships in a Relatively predictable way* (Beth B. Hess Dkk 1985: 89). Therefore, if the child's mind develops in an unfavorable environment, and without adequate supervision from parents, it can be predicted that children are likely to misbehave.

## RESEARCH METHODS

### Research Site

This research is a cross-agency and a descriptive explorative study. It will be focused on adolescents and institutions in Banda Aceh. The adolescents in this study were students from various colleges and high school students in the city of Banda Aceh,

## Research Respondents

Research data consists of primary data and secondary data. The primary data was obtained through interviews, questionnaires and observation. Secondary data was obtained through documentary studies and literature.

The population of the study is all teenagers from various universities / private, and all high school students in Banda Aceh, as well as from relevant agencies such as MPU, WH, communal leaders and the Department of Islamic Law. The sample is determined by purposive sampling

## Data Collection Techniques

Data collection will be obtained in accordance with the group sample that has been determined early, The phases of collecting data will be conducted as follows:

### 1). Questionnaire

Deploying a listed number of questions in accordance with the purpose of the study to the respondents who have been determined early.

### 2). Interview

Interviews are used to find out the answers in as detailistic as possible that is not completed yet and may be missed through a detailed questionnaire. Interviewe will only be done to the respondents mentioned earlier and other elements associated with the problems studied.

## Data Processing and Analysis

The collected data is processed by a using "Triangulation '. That is approaching the various sources of data in accordance with the issues discussed, so that the data collected will be able to answer the research problem in a comprehensive manner.

## RESULTS AND DISCUSSION

### Khalwat Qanun Abuse by Teens in Banda

#### *Level of Khalwat Violation*

The Results illustrate that all forms of aberrant behavior still occur in high school students, such as Exstasy, marijuana, methamphetamine, alcohol, and it is found that 6.42% of high school teens in Banda Aceh has ever done *free sex*, these things happened because there has not been adequate efforts to minimize this from happening from all side of society. After this study is done, there needs to be a concept of synergistic patterns to be formulated.

The results shows thatkhalwat violation among high school teens in Banda Aceh is high, have done free sex is 6.42% while college students reaches up to 12.02%, and 1.82% high school teens Banda Aceh had slept together, and 14.72% had had hugs and kisses on the lips, this indication shows that Banda Aceh teens has committed serious violations of khalwat / meusum.

### *Mandate Violation of the Quran and The Islamic teaching*

Khalwat violation in Banda Aceh occurred in various places, particularly in places frequently visited by teens and various entertainment venues, beaches and boarding houses, identification of those areas is very important for the researchers to discover how qanun is implemented by cooperating all element together, or by finding the right formats as mandated in Chapter IV, article 8, paragraph 1 and 2 with concrete, so that the qanun violation can be significantly reduced

To answer the problems we need to observe theoretically, based on sociological perspective, that any violation of the qanun actually can be classified into three forms of abuses.

First Violation, violations caused by ignoring orders and obligations implied in every chapter and verses in the Qanun, for example on the khalwat qanun Article 5 states that any person is prohibited to conduct khalwat / meusum, in this article it is clear that every person who violates this section is going to be punished, as stated in the terms, they deserve uqubat whip to the highest form of 9 (nine) times and a minimum of three (3) times and / or a maximum fine of Rp. 10,000,000 and the least fine is Rp. 2,500,000, this understanding is quite obvious, because the purpose of the punishment is for the perpetrator of khalwat/ meusum.

To prevent violations, a system is needed so that everyone does not violate qanun. Qanun was also set up and provides opportunities for everyone to not violating in their environment, even it is a must to him abide the bylaws of Islamic law such as the Qanun No. 12 of 2003 on the role of community and the like which contained in section IV of article 10, paragraph 1 and 2, Qanun No. 13 of 2003 on Gambling in section IV of article 9, paragraph 1 and 2, as well as the Qanun No. 14 of 2003 on Khalwat / Meusum is also in Article 8, paragraph 1 and 2 as follows: 1. Society participates to prevent and eradicates khalwat acts / meusum, 2. Society must report both orally and in writing, if they are aware of any violation khalwat / meusum.

It is implied In the first paragraph that public has the opportunity to participate and has the opportunity in the prevention and eradication of khalwat / meusum happening in their environment. Thus, if people do not act to report and so on, as mandated earlier (legally binding Article 10), it means that they do not participate, that way they can also be understood as violators themselves even though they do not do khalwat / mesuem.

From the perspective of this second offense, it is also evident that some people unbenknown to them that they are in some ways encouraging the violation of khalwat, for example, those who have or work in the following places, such as business owners, cafe, Warmang, Salon, Hotel even some educational institutions, as mentioned earlier can be included in the offense.

The law concerning the powers and role of the community in fact is already implicit and explicit in Islam for example in Surah Ali Imran 110, Allah says which means: "You are the best of people who are born as humans, and sent to the ma'ruaf preventing it from being unjust, and believe in Allah .... (Al 'Imran 3: 110), in addition to a hadith narrated by Imam Muslem which also clarify the role of the community in

preventing violations of the teachings of Islam, which means: "Imam Muslem narrated from Abu Said Al Khudry-ra, I've heard the Messenger of Allah said: 'Whoever of you who heard munkar and let him away with his hand, if not able, to let his tongue, if still not able, let the heart. But it is a change in his heart as low faith ".

Muslims must understand Hadith and Qur'an are their obligation is preventing the violation, the people of Aceh and other Muslims today are ignorant to just assume such liability, this is due to the imitation of foreign culture that are againts their religious values. Thus its forbidden obligation and its meaning are interpreted from the weak point of view. Understanding the role as it is already included in offenses, many of us who have the powers to prevent it, but do not bother to do so always rely on WH power alone.

Islamic Law can be implemented perfectly if all sides work together in accordance with the mandate of the quran and the Hadith embodied in real action, it is very naive if we leave that up all on WH alone, and let the offense around him to occur, and does not regard it as a sin because they always refer to the weakest basis of Islamic law which is "gut feeling"

### ***Implementation of Strategy in the Khalwat Qanunto prevent Khalwat among Teens Banda Aceh***

Shari'a is the responsibility of all parties involved and the entire community, in act No. 5 of 2000 on the implementation of Islamic law. Chapter IV Article 5 paragraph (1): To actualize the privileges of Aceh in the field of religious lives, any person or legal entity living in the Aceh region is obliged to enforce the implementation of Islamic law in their lives.

There is no such thing as perfectly prevention act of khalwat which work effectively in Banda Aceh. Also the lack of adequate cooperation from schools and villagers to prevent khalwat and increase community participation. The following strategies need to be taken into account for it to work:

(1). Establishing the Village Movement Alert (GAMSIA). Gampong is the smallest community organizations in the organizational structure of Aceh, people travel from one place to another, passing through various villages, the role and function of the village as khalwat control and prevention is an important element in shaping Islamic behavior effectively in all groups of society. Although we are aware in general that all acehness people support the implementation of Shari'a in Aceh and in particular village, but in todays' busy world with a variety of economic activities, people start to not care because they think it is none of their business, and feel lazy. And they are often confronted by the khalwat violater with violent words and other distraction. (Porch Indonesia, June 26, 2007)

It would be a different story if there is a validation that the elements of the village or a person or group are functioned as WH with the full functions, roles and duties in accordance with applicable regulations and also in accordance with regulating of Islamic law, so that the elements are always in each of their villages, so every village will become the Village of Sharia Alert (GAMSIA). One of the basic laws of the formation of WH is Qanun No. 11 of 2002 on the implementation of Islamic Law Article 14 paragraph (2), Qanun number 14 of 2002 on khalwat chapter IV.

(2). There has to be a contract with the owners of boarding houses, rental houses, hotels, guesthouses, Cafe, Cafeteria, Breakfast, barbershop, salon, cafe and others about their consistency and keep the law in place to be implemented as stated in the Qanun and Shari'a No 5 Qanun No. 14 about khalwat, especially chapters 6 and 7 and Article 25 paragraph a, and b as mentioned above. Thus there will be social contracts with the owners of the venues so that deviant behavior which is likely to occur in these places can be eliminated.

Several factors that cause cases of khalwat:

- a. Allowing some offenses occurring in various places, because most of the time we don't care to prevent such violations.
- b. The lack of involvement from local communities in monitoring various deviant behaviors and the application of Islamic law.
- c. The owner shop / restaurant, cafe etc, give a wide opportunity for guests to do violating behaviors as a way of attracting more customers.
- d. Parents' control towards their children is very weak, both in clothes that they wear, friends that they mingle with, and even places where they go.
- e. WH's legal regulation for the task is not clear yet, because WH is only entitled to investigate the violation but doesn't have the right to arrest the offenders, they often escape when they are about to be moved by WH.

(3). There has to be a real working mechanism with the entire management of the institution in the city of Banda Aceh so that every leader has some power for this problem. This strategy according to WH is very effective because it can be thoroughly monitored throughout agencies in Banda Aceh, the concept is called *Top Down Sharia Controller*, and in case of violation, the employer of any organization should be held responsible.

(4). There has to be a social contract with the owner of the variety of recreational, entertainment stage and ceremonies, both religious ceremonies, weddings. Deviant behavior violations are common in these areas particularly in recreational areas such as beaches and entertainment venues.

Place - where teens prone to doing violation of Islamic law in Banda Aceh, where the infringement happens in places such as at the bank of a river, Blang padang, beaches, shopping centers, KFC, Pizza Hut, physician practices, Es Teller 77, Pizza House, cafes and some other shopping centers, boarding houses, Electronic Media / Internet Café, Jalan T. Throughout Nyak Arief, residences, schools and campuses, kedah terminals, places of entertainment and water boom.

Shari'a law is not partial and half-arse, but overall in all aspects of life, including the clean and pure food. In general young people in Banda Aceh do not choose food from pure source which are based on Islamic law, for example, they buy food and beverages from non-muslim and they eat it because they think they are halal. This kind of food is processed by non-muslims which doubted the purity of the food. They don't know for sure if the food and the beverages that they drink have been contaminated with non hallal ingredients like pork fat, dog and mice meats, and a lot more ingredients to attract more customers. In general, teens and people who reside in banda Aceh do not see and observe

how the food and the drink are being processed so they will not know for sure what they get themselves into.

Therefore, there has to be a bolder decision, through a fatwa, or some positive guidelines for Muslims not to consume food from non-muslim, of course, with the perspective of Islamic law and not with economic perspective, because both perspectives sometimes are contradictory, and often economic perspective is stronger because the impact of it is directly felt, while the impact of religious perspective will be felt in the hereafter.

### ***The implementation Concept of Qanun among Banda Aceh Teen to work effectively.***

Khalwat qanun can not be separated from the discussion of Sharia Qanun as a whole, because Qanun. 14 of 2003 on Khalwat is one of important portions in the application of Islamic law in Aceh and Banda Aceh in particular.

The implementation of Khalwat qanun on teens is the procedure of sharia law and the procedure of implementing qanuns which have something to do with Khalwat by all elements which are seen as effective and can prevent the deviant behaviors in general or teens in particular. Everything is done not only by WH but by family, community, and related elements such as school and other educational institutions as well.

The shari'a law which is much discussed today is more theoretical, the practice has not been done directly to the target communities. There has not been a lot of practice to be implemented to the target communities, for example for the qanuns to be succeeded, they need to have public participation, but every qanun does not have a clear framework and format, or what kind of community role is intended for.

Based on the results of the study, it can be concluded that there are things that can be done for sharia law to work effectively especially regarding Qanun No. 14 of 2003 on Banda Aceh teens, and they are:

### ***Special Approach to Teens***

There has to be a concept and a system that focuses on the prevention of violations of Shari'a on adolescents, in all educational institutions, especially at the secondary and higher education, there has not been a special system that aim for the adolescents. This is very important because 70% of deviant behaviors occurred in adolescents, especially those who are still in high school.

### ***Cooperation of All Elements***

Each formulated concepts needs each element's cooperation and they all need to be involved because each group has different functions and duties. If they all cooperate then they will always be vigilant at all times. This is one of the most solid pillars as the prevention of deviant behavior system.

Various Qanun of Islamic Sharia law must be accompanied by jinayat, so that each element has its role and can be fully function without having to go through the other elements of bureaucracy to a particular variety, so the process is very slow as it seems to be.



### *The making of WH Checkpoints*

There has been a talk on the need for the establishment of checkpoint in the regions which are known as to have prominent areas for khalwat and behavioral aberrations, this talk has been delivered solely by Danton WH to the related elements, but they realized that the number of WH is also limited so it is not possible to distribute its each members to each checkpoint, if the checkpoint to be built then each has to be guarded by at least 2 Wh, and they need to be accompanied by the police, because some offenders that they often encounter turn out to be police members and they will give a fight, though the plans of building these post have not been taken seriously by the related agency.

### *Development of Structural Organization*

Community participation in Chapter IV, Article 8 is viewed by many is very difficult to be actualized, because it does not have a clear format, the message contained in the article is more like an appeal, the question that arises is what kind of role they want from the society? Because society itself has no formal authority in it, the people mentioned also do not have operational restrictions..

Because the community does not have legal space and formal accountable authority it is so far very difficult to achieve community's role, as well as the role that is expected to be done is only limited to the Khalwat Qanun and offenders, for example, people would report that there is an Islamic violation around their area, today's society has changed their thinking into a more pragmatic thinking. Often time they think that there are a lot of people around them so they will just let other people to report the violations instead of reporting it themselves.

On the other hand the role that is understood by most people is infinite, so often times they will legalize their various acts and violate human rights in the process, society itself can be tried in courts, they are worried about it which of course will lead to the confusion and the freakiness and ultimately leave everything for others to take care of.

The only villagers' legal involvement is to join in the structure of the village, each village has five groups for the field of management, namely the Governmental Kaur, Kaur Development, Finance Kaur, Kaur and Kaur Public Welfare, but there is no kaur Islamic law, so it needs to be added. So the monitoring, prevention and reporting can be immediately detected.

Kaur leaders must be from a respected community in their villages, noted for their religious knowledge, also noted for their influences and charismas, and were given the honorarium like other kaur, thus monitoring violations of khalwat as desired by the qanun can be run intensively, because the public has been given formal authority through a qualified person.

To reduce the burden on local budgets due to the addition of this kaur, it is necessary to have a more selective policy, for example, Sharia kaur can only be formed on villages which have the highest rate of khalwat.

Of course this structural development efforts need the supports of all parties, including the House of Representatives of the various levels and require the discussions in a more detailed and comprehensive manner.

### *Qanun Jinayat*

The function of WH as police shariah has its weak points and strategies, ranging from the raids and decision making process in the courtroom, and in various regulatory over the WH authority is not considered as the procedural law so their authority is the same as police's. WH's control is on open places only (Danton City WH 2010).

Therefore it is necessary to provide legal protection for WH from the first arrest to the prosecution in the courts. It has largely been available in the draft of Qanun Jinayat Islamic law in 2009 that are in chapter 22 and chapter 253, Though The draft Qanun Jinayat has been in thought over and an expectation of all parties in enforcing Islamic law, but has yet to be used as qanun because it is not authorized by the Governor of Aceh for no apparent reason, this proves that the implementation of Islamic law and various other qanun is yet fully supported by all parties, including the part of local government itself, so that in today's society itself appears the speculation, there is a breakdown of Qanun Aceh because there is a wide range of interests of political elites at the provincial level, the relationship of its foreign policy, will occur various infringement on human rights so that Americans will not give more attention to development in Aceh from the previous conflict resolution, this understanding includes understanding from people who do not understand the interpretation of Islamic law and the draft of qanun which had been discussed.

## **CONCLUSION AND RECOMENDATIONS**

### **Conclusion**

From the various results of the above description, it should be born in mind that some of the conclusions are drawn are as follows:

Juvenile offense level of khalwat in Banda Aceh has reached an alarming rate, which is 2.64% in adolescents and 12.02% high school teens in Banda Aceh have been doing Free sex. 85% of teens who have gone to internet café have ever accessed porn sites, this is caused by various factors, among others: lack of parental supervision, availability of places that encourage to do freesex , such as salon, caf é with dim lights (warmang), boarding houses which are only inhabited by a student or student without guards, economic needs, the role of the community is still weak, the role of formal institutions is very limited, no involvement of educational institutions in the prevention of seclusion on learners, no socialization of khalwat qanun in the target groups as well as the weakening of teens' religious knowledge in Banda Aceh.

Based on the conclusion that one of the keys that must be done to prevent khalwat from happening in adolescents is the implementation of khalwat qanun as optimal as possible, which can be done in several ways, such as:

Proportionally developing the structure of village, to maximize the community in each village to have more Islamic kaur which is led by role models in every village, especially in villages prone to khalwat.

The establishment of WH's checkpoint in areas that are prone to khawat violation, each post needs to monitored by WH to the fullest professionally, on certain locations they

also need to be accompanied by police, and they can travel through various places with police's cooperation, from the police station to the polres and and polda.

There has to be a contract with the owner of a boarding house, rental houses, hotels, guesthouses, Cafeteria, barbershop, salon, cafe, warmang and others about their consistency to keep the law in place to be implemented as stated in the Qanun and Shari'a no 5 Qanun No. 14 of khalwat, especially chapters 6 and 7 and Article 25 paragraph a, and b.

There has to be an earnest and intense cooperation from various parties where teenagers are concentrated on, especially teenagers at high schools and colleges, because 70% of them at the institution level are at high risk (juveneli deliquence).

The provision of legal sanctions is seen as a real dilemma for WH, because WH does not have any authority in imposing any sanctions, such as revocation. Often times the offenders have done the violations repeatedly, they need to have necessary administrative sanctions in accordance to khalwat qanun Chapter VII Article 25, points a and b,. However, when coordinated with the local government as the institution that has full authority to it, consideration of sanctions does no longer refers to the violation of Islamic Sharia bylaws and khalwat / meusum, but rather the consideration of the city's economy.

Jinayah Qanun. WH role as the sharia police has massive weaknesses, ranging from raids systems to litigation and judicial decision-making, WH does not really have a clear formal legality in completing the implementation of Islamic law, that is why it is necessary to provide a more adequate legal protection to perserve Shari'a lawfrom the very moment the offenders get arrested, up to the prosecution in courts, the acceleration draft from qanun jinayat into Qanun Jinayat.

### **Advice**

Public participation throughout the villages of Banda Aceh is a must to establish Shari'a Gampong Movement Alert (GAMSIA). So that the role and function of the village as a dakwah control and prevention of deviant behavior / khalwat will be effective in all groups of society.

Village structure needs more development and the existing village structure is not able to resolve the issue in an increasingly complex social dynamics, and therefore the need of additional new kaur (Kaur Islamic Law), Shari'a handling problems for this is not clear and often is done by case by case and there is no specific format, so it often leads to new problems, such as human rights violations, vigilantism under the pretext customs, and so on. To maximize the role of the community, then in every village should also be characters who deal with Islamic law, this is the figure that represents the people and lead the Islamic Sharia Kaur.

Need to have cooperation with all schools and colleges, either through Osis / PEMA and Bimpen so that all elements of WH exist in each school to monitor, supervise the implementation of Islamic law in each school.

Need to have a social contract with various parties, such as Shopping Center, Cafeteria, Hotel, Lecturers, restaurant, business recreation, boarding houses and rented house owner, cafe, etc. warmang, which involves a commitment to support the

implementation of Islamic law in place each through certain systems which are effective to prevent deviant behavior or violation of khalwat.

Need to inform the non-muslim so that they will appreciate and respect the communities to implement Sharia law by adjusting themselves in their dresses, behaviors, food and so on in accordance with the shariah law as mandated in Law No. 11 tahun 2006 PA and Qanun Qanun-related.

Qanun jinayat which has been discussed by the House of Representatives and is the desire of all elements of Acehese society should be bravely passed as soon as possible, without fear of intervention from other countries, because to build a community we must conform to the local culture, because culture can not be exchanged with anything. By legalizing and approving WH legal law, WH and other related institutions will have a clear legal basis and strong in the settlement of Shari'a cases.

State Government needs to take firm steps that all internet cafes (cafe) and dimly lit stalls (Warmang) need to clearly understand shariah law. To provide such facilities which are prone to shariah law violation will breach the khalwat qanun No. 14 of 2003 as stated in Chapter VII provisions' Uqubat, chapter 24, 25, and 26 which will end up the licences being revoked.

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# WILLINGNESS TO PAY THE DOMESTICAL TOURISTS TO THE ECONOMIC VALUE OF SABANG TOURISM USING TRAVEL COST METHOD

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## Abstract

The purpose of study is to analyze the factors that affect tourist visits in Sabang and their willingness to pay for tourism attractions in Sabang. The population of this study is all tourists who visited Sabang for the past 3 years when the study began. The study was conducted on March-May 2014 by Using Non Probability Sampling by total sample of 30 domestic tourists. The types of data used for the research are primary and secondary. Primary data were collected through interviews using questionnaires and observations in the field. While secondary data used documentary techniques and literature study. To determine the factors that affect the number of tourists visiting Sabang then the writer used simple econometric techniques, namely Ordinary Least Square. Hotelling (1931) opens early ideas Travel Cost Method that calculates benefits travelers with travel cost approach, where travel costs are assumed to greatly affect the number of tourist visits and negatively correlated. The results showed that the travel costs and alternative travel cost negatively affect the domestic tourist visits. And travel costs are below the willingness of tourists to pay benefits in Sabang. Domestic tourists WTP value of IDR 22.204.17 where the mean WTP of IDR 5657.53 with an admission fee to Iboih of IDR 2.000 and free. So by setting the ticket price of Rp. 5.657.53 then Iboih can be managed in line with the concept of sustainable development that takes into account the environment.

**Keywords:** Sabang tourism, Domestic tourists, Willingness to Pay, Economic valuation, Travel Cost Method

## INTRODUCTION

### Background Research

#### *Attraction and Tourist Arrivals to Sabang*

Sabang is at the tip of Sumatra island is famous for its natural beauty. There are 2 districts in Sabang, namely Sukajaya and Sukakarya. Location of a natural park in the district Sukakarya wider than Sukajaya districts (Table 1.). In the District there Sukakarya Kilometer Zero Monument as the most western part of Indonesia and the most frequently visited by tourists. Clear sea with a variety of species and without hindrance for large ships to be docked to the edge of the island as well as the condition of unspoiled jungle tours are the main attraction.

**Table1. Location Nature Park in Sabang**

No	Districts Sukakarya	Area	Distance from city center (Km)	Districts Sukajaya	Area	Distance from city center (Km)
1	Hutan wisata Iboih Taman Laut	-		Pantai Pasir Putih	± 5 Ha	17 Km
2	Pantai Rubiah	± 2000 Ha	21 Km	Pantai Panas Keuuekai	± 0,1 Ha	21 Km
3	Pantai Gapang	± 8 Ha	19 Km	Pantai Tapak Gajah	± 1 Ha	2 Km
4	Pantai Teupin Layee	± 8 Ha	21 Km	Pantai Aroun	± 5 Ha	13 Km
5	Pantai Teupin Sirkui	± 1 Ha	21 Km	Pantai Sumur Tiga	± 4 Ha	4 Km
6	Pantai Lueng Angin	± 1 Ha	25 Km	Pantai Reuteuk	± 5 Ha	12 Km
7	Pantai Kasih	± 1 Ha	1 Km	Air Panas Jaboi	± 0,1 Ha	24 Km
8	Pantai Pria Laot	± 600 m <sup>2</sup>	8 Km	Pantai Balohan	± 0,1 Ha	13 Km
9	Danau Aneuk Laot	± 4 Ha	3 Km	Pantai Chum	± 600 m <sup>2</sup>	7 Km
10	Tugu "KM 0"	± 2 Ha	29 Km			
11	Gua Sarang	± 2 Ha	25 Km			
12	Swim Bath	± 800 m <sup>2</sup>	2 Km			
13	Pantai Paradiso	± 600 m <sup>2</sup>	2 Km			
14	Air Terjun	± 1000 m <sup>2</sup>	9 Km			

**Resource: Kantor Walikota Sabang 2012**

Sustainable development is closely related to the environment. Law No. 23 Year 1997 on Environmental Pengelolalaan mentioned environmentally sustainable development is a conscious and planned effort that integrates the environment, including the resources, to the development peroses to ensure capability, welfare, and quality of life of the present generation and future generations front.

The growth of Indonesia's tourism sector is currently at 5 percent. This figure is still above the world tourism growth is 3.8 percent. Constraints and challenges of tourism in Indonesia is infrastructure, connectivity and transport. Besides the quality of tourism products that have not been developed in accordance with the market demand. The results of the study mentioned UNWTO ASEAN tourism prospects even brighter future with projected growth reached 10.3 percent in 2030. It is also the World Travel and Tourism Council (WTTC) estimates that ease visa policies to increase tourist arrivals by 6-10 millions people into ASEAN in 2016 and there will be an increase in revenue of 7 to 10 millions U.S. dollars. The high growth of tourism in the ASEAN region due to various factors such as infrastructure repair and improvement of direct flight connectivity, including the expansion of the Low Cost Carrier (LCC), an increase in purchasing power in Asia, refinement and visa facilitation, as well as intra-ASEAN cooperation.

According to the Department of Culture and Tourism Aceh, the length of domestic tourists who stay in Sabang which decreases inversely with the number of domestic tourist visits in general, namely increased since 2008-2012 (Figure 1.1.).



The number of domestic tourist visits in Sabang in 2012 amounted to 212.165 people, while in 2011 amounted to 96.691 people, the number decreased in 2010 when compared with the number of tourist arrivals amounted to 121.647 people, and in 2009 only reached 88.083 people. But in 2008 reached 128.573 people. The largest number of domestic tourist visits with in the last 5 years was in 2012, while the lowest number of visits was in 2009.

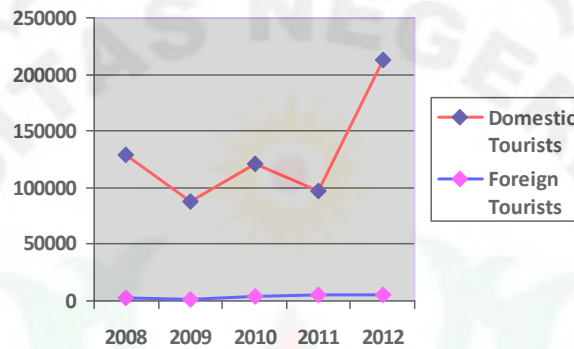


Figure1. Number of Visits Domestic Tourists and Foreign to Sabang Year 2008-2012 (People)

Resource: BPS 2013

The cause of the increased tourist traffic in general is influenced by rising incomes, planning the program traveled to a place in a certain time period per year, also the presence of a travel agent destination services to Sabang which offers vacation packages at affordable prices. With the services of travel agencies, the number of days in Sabang has been determined, the trip list also has been in the hands of the service user before arriving at the location.

The Advances in technology, social networking, and the presence of the backpacker community, encouraging travelers to be smart. They make searching before dropping recreational options to tourist sites. So that the length of stay in Sabang tourists can experience a reduction in the number of opposite tourist numbers increased in the last period. Technology has helped Sabang promote yourself with all the challenges and obstacles that exist.

An increasing number of tourist visits and the length of stay in Sabang be a positive influence on PAD. Thus the decrease in tourist visits to Sabang longer be exploited, one of which analyzed the contribution of the tourism sector with a decrease in the number of tourist visits in Sabang. It was noted that the average length of stay of tourists in a hotel in Aceh, from 3-4 days to 1-2 days range from 2012 to 2013. Average length of stay of domestic guests at hotels in Aceh 1,83 days per December 2012. Figure it to 1.76 per day in December 2013. Meanwhile the average length of stay of foreign tourists at hotels in Aceh 3,06 days as of December 2012. Figure is to 1, 63 days per December 2013.

But fell short of the length of the visit and tourists vacationing in Sabang is still less than the area in Bali and Java. Given these improvements will contribute to local revenue (PAD). Difficulty in measuring the economic value of non-market value of the benefit

resulting from the attraction is often overlooked in the development planning process. It is vital therefore do these calculations, so that the concept of sustainable development can work

### **Problem Formulation**

Based on the description of the background research, the issues to be addressed in this study are:

1. Was the travel costs and the alternative travel costs affect the number of visits domestic tourists to Sabang?
2. How much value Willingness to Pay domestic tourists to the benefits of Sabang attractions using Individual Travel Cost Method?

### **Purpose Research**

The specific aims of this study were:

1. Knowing the relationship between travel expenses and the cost of alternatives to the number of domestic tourists visiting Sabang.
2. Knowing the value of domestic tourists Willingness to Pay in Sabang using the Individual Travel Cost Method.
3. Discovering Sabang tourism development model based on the value of Willingness to Pay domestic travelers using the Individual Travel Cost Method.

### **Research Benefit**

The benefits of this research are as follows:

1. Contribute to the enrichment of the study of the valuation of non-market economy, sustainable development that is closely related to the management of natural resources and the environment well.
2. Discovering Sabang tourism development strategy based on the value of Willingness to Pay travelers to attractions using the Individual Travel Cost Method.

## **LITERATURE REVIEW**

### **Theoretical Grounding**

#### ***Demand and Consumer Surplus***

According to McEachern (2001) market demand for a resource is the sum of the entire demand for a variety of uses of these resources. The law of demand states that when the number of items requested in a certain period of time as opposed to the price change, if anything else is assumed to be fixed (Samuelson, 1998). As a result, the higher the price of goods, the smaller the amount requested. Conversely the smaller the price of goods, the higher the amount requested. Factors that affect demand also are factors that affect the number of tourist visits in Sabang. According to McEachern (2001), several factors other than demand prices are as follows:

1. Income

Usually the increase in income will lead to a rise in demand. This means that the demand curve has shifted to the right shows the quantity demanded is greater at each price level.

2. Prices of other goods relating

Substitution and complementary goods can be defined in terms of how changes in the price of commodity affects demand for related goods. If goods X and Y are substitutes then when the price of good Y fell while the price of good X fixed, consumers will buy more of X so that the demand curve will shift to the left. If goods X and Y are complements then apply the reverse, where a decrease in the price of good Y will increase the demand for goods X and Y goods price increase will reduce demand for goods X.

3. Tastes and preferences

Tastes are an on price determinant of demand, due to difficulties in measurement and the absence of a theory of changing tastes, we usually assume that the constant taste and look for other traits that affect behavior.

4. Conjecture about the relative price changes in the future

Conjecture about the relative prices in the future play an important role in determining the position of the demand curve. If all prices rise 10 percent per year and is expected to continue, the anticipated rate of inflation is no longer affect the position of the demand curve (if the price is measured in terms relative to the vertical axis).

5. Population

Often the increase in the number of people in an economy (with a per capita income constant) market demand shifts to the right. It applies to most goods.

To determine the Willingness to Pay tourist attraction tourist areas to benefit will be used proxy Sabang consumer surplus. According to Samuelson and Nordhaus (1990), the consumer surplus is the difference between the amount paid by the buyer for a product with a willingness to pay. Measurements can be obtained from surplus production and consumption of goods and services produced by natural resources and it is a measure of well-being. It is the underlying economics of natural resources is how natural resources can provide benefits or welfare to society as a whole.

Total consumer surplus (Figure 2.), which was in the field below the demand curve and above the price line. Consumer surplus arises because consumers receive over bonuses paid and is rooted in the law of diminishing marginal utility. Because of the emergence of consumer surplus, because consumers pay for each unit based on the value of the last unit. Consumer surplus reflects the public benefit derived from consuming natural resources is reduced by the amount paid for the goods consumed. More consumer surplus is intangible but nevertheless the concept is so important to be ignored because it can measure the willingness of people to pay for goods produced from natural resources (Fauzi, 2006).

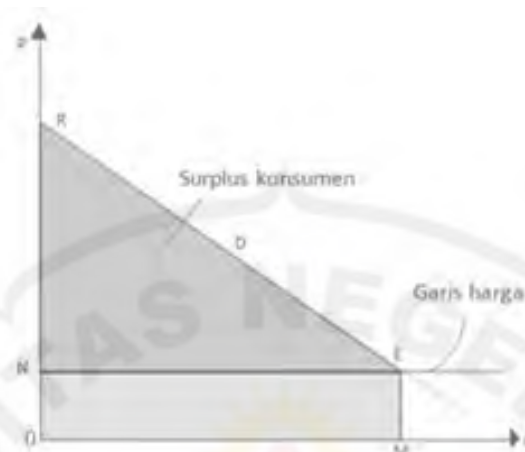


Figure 2. Consumer Surplus

Resource: Samuelson and Nordhous (1990)

description:

ONEM : Total utility or the consumer's ability to pay

OREM : The cost of goods for consumers

NRE : The total value of consumer surplus

The demand curve can be derived from two different sides, namely: 1) By maximizing the satisfaction or utility that will then generate demand curve Marshall, 2) With meminimalkan expenditures will result in uncompensated demand curve or the demand curve is also called Hicks. Individuals seek to maximize satisfaction (U) to the consumption of two goods, ie goods X and Y are constrained by fixed income (M).

$$M = P_x X + P_y Y \quad (1)$$

Thus satisfaction to be taken by the consumers is how to choose the goods X and Y that will result in maximum satisfaction. In the graphit can be seen from the slope (the slope) the slope ofthe budget line is tangent to the utility function so that the resulting optimal consumption for the X and Y which is a function of price and income.

Systematically : Max U (X, Y)

With constraints

$$M = P_x X + P_y Y \quad (2)$$

Equation (2) is a function of demand Marshall. While other alternative slows the demand curve is to minimize expenditure with the constraint utility must achieve a certain level of  $U^0$ .

Systematically : Min M = P<sub>x</sub> X + P<sub>y</sub> Y

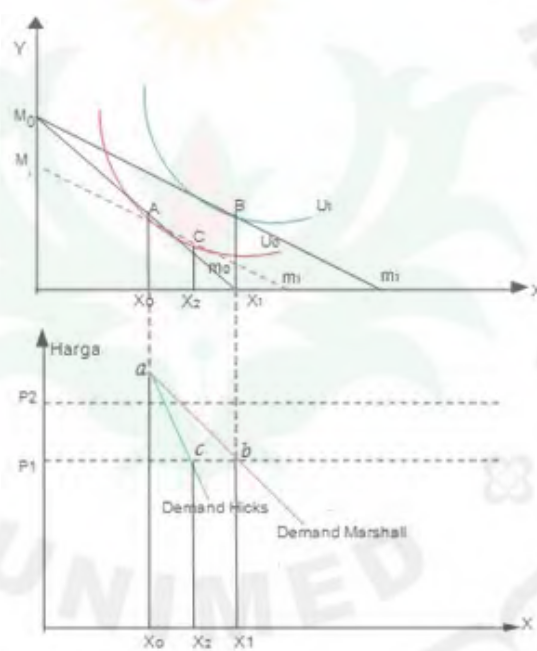
With constraints

$$U(X, Y) = U^0 \quad (3)$$

Optimal values of  $x$  and  $y$  is a function of prices and utility:

$$\begin{aligned} X^H &= x(P_x, P_y, U^0) \\ Y^H &= y(P_x, P_y, U^0) \end{aligned} \quad (4)$$

Marshall's demand curve in Figure 2.2. shows the area bounded by the demand curve  $P_0$  area,  $ab$ , and  $P_1$ , is the change in consumer surplus or consumer surplus. While the area is behind the curve Hicks, the  $P_0$ ,  $ab$ , and  $P_1$ , an area known as the Compensating Variation.



Source: Fauzi (2006)

**Figure 2. Derivation of demand curves Marshall and Hicks**

The urge to pay can also be measured in terms of increase in income causes a person to be in a position in different to exogenous changes. These exogenous changes can occur due to changes in prices, for example as a result of increasingly scarce resources, or because of changes in resource quality. Thus the WTP concept is closely related to the concept of Compensating Variation and Equivalent Variation in demand theory. So WTP can also be interpreted as the maximum number of someone willing to pay to avoid a decline towards something.

WTP associated with the measurement of CV and EV, the more precisely measured by demand Hicks compensated demand curve as the price of the area under the demand curve for the measurement of relevant Hicks compensation. While the area under the demand curve or the demand curve Marshall usual measure changes in surplus.

Haab and McConnell (2002) stated that the measurement of PAP acceptable (reasonable) must meet the following requirements : (a) PAP has no lower limitis negative, (b) The upper limitof PAP should not exceed income, (c) There is consistency between randomness (randomness) to scramble estimation and calculation. Mathematically  $0 < WTP < M$ .

Willingness to Pay is the individual's willingness to pay to an assessment of the condition of the environment or natural resources and natural services in order to improve the quality of the environment. WTP calculated how far the ability of any individual or society in the aggregate to pay or spend money in order to improve environmental conditions in order to conform with the required standards.

According to Bateman and Turner (1992), in asking WTP needs to be asked Willingness to Accept(WTA) on respondents, where WTA is the minimum respondent's willingness to accept environmental conditions. Foster (1985) states that the main factors affecting the tour are as follows:

1. Traveler Profile(Tourist Profile). Traveler profiles can be grouped into two categories, namely: (a) socio-economic characteristics of travelers (Socio-economic characteristic) that included age, education and income levels, (b) Characteristic behavior (behavioral characteristic) that includes motivation, attitudes and desires of tourists.
2. Knowledge to travel (travel awareness) that includes information about popular tourist destination as well as the availability of facilities and services.
3. Characteristics trip (trip features) which includes distance, time of stay at the destination, the cost and time of travel.
4. Resources and characteristics of the destination area (resources and characteristic of destination), which includes the types of attractions, accommodations, availability and quality of service facilities, environmental conditions, and so on.

Because of the high variation in the size of the WTP, usually required a large sample. Standard error of WTP is  $WTP_{se} = \frac{s}{\sqrt{n}}$  or sample standard deviation divided by the roots. Thus, the statistical error can be minimized by increasing the number of samples. Consideration of sample size is important for two reasons. First, the accuracy of the estimated value is crucial for policy analysis. An estimated with large error range is less credible. Second, statistical precision affects the ability to detect differences between the estimated values which will further complicate the process of validation.

In general techniques of economic valuation of resources that can not be marketed (non-market valuation) can be classified as two groups, namely: 1) a valuation technique that relies on the implicit price where WTP is revealed through the model developed (Travel Cost, Hedonic pricing, and the Random Utility Model), 2) a valuation technique that is based on a survey in which the desire to pay or WTP is obtained directly from the respondents, which directly expressed orally or in writing Contingent Valuation Method (CVM) and discrete Choice Method).

## Travel Cost Method (TCM)

Travel Cost Method (TCM) can be said to be the oldest method for measuring the economic value of indirect value. The method is derived from the ideas developed Hotelling (1931), and then formally introduced by Trice and Wood (1958) and Clawson and Knetsch (1996). This method is mostly used to analyze the demand for outdoor recreation in recreation such as fishing, hunting, hiking, and so forth.

In principle TCM examines the cost of each individual to go to places of recreation. For example, for fishing hobby at the beach, a consumer will sacrifice the cost in time and money to go to these places. By knowing the pattern of consumer expenditure, it can be assessed how much value (value) given to the consumers of natural resources and the environment. TCM can be used to measure the benefits and costs as a result of: (a) Changes in access costs such as admission to a place of recreation, (b) Addition of new recreational areas, (c) Changes in environmental quality recreation areas, (d) Closure of existing recreation areas.

The working principle of TCM is quite simple. If you want to know the value of natural resources attractive for recreation, such as beach located within a certain radius. The basic goal of TCM is to know the value of utility (use value) of this natural resource through a proxy approach. In other words, the cost incurred to consume service from natural resources are used as a proxy to determine the price of these resources.

The fundamental assumption used in the TCM approach is that the utility of every consumer of the activity, such as recreation, are inseparable (separable). That is, the demand function of recreational activities such as fishing is not affected (independent) by the request other relaxing activities, such as watching TV, shopping and others.

In general, there are two simple techniques that are used to determine the economic value based on TCM, namely: (a) a simple approach through zoning, (b) Approach Individual Travel Cost Method (ITCM) using data mostly from the survey.

TCM approach through zoning is a relatively simple approach and inexpensive because the necessary data are relatively more reliant on secondary data and some simple data from respondents at the time of the survey. In this technique, the recreational beach is divided into several zones of data required visits and number of visitors per year. From here then obtained data on the number of visits per 1000 population. By obtaining these data plus the data of distance, travel time, and cost per trip per unit distance (per km), will be obtained overall travel costs (Travel Cost) and the demand curve for visits to tourist attractions. While the method of the Individual Travel Cost Method (ITCM) in principle the same as the zoning system, but on a more analytical approach is based on primary data obtained through surveys and statistical techniques are relatively complex, and ITCM is a relatively accurate results than the method of zoning.

Haab and McConnell (2002) states that the valuation with TCM methods, there are two critical stages that need to be done: First, determine the behavior of the model itself, and secondly, determining the choice of location. The first concern regarding whether TCM is built to be determined first preference functions, hypothetically, then build a model of behavior (behavioral models), or whether directly build the behavioral model. The

second concern about whether we should do modeling for all or some places a sa model. Demand function must be built with the basic assumptions, the aim is for the assessment of natural resources through the TCM is not biased. Assumptions include: (a) the cost of travel and time costs are used as a proxy over the price of recreation, (b) travel time is neutral, meaning no utility or disutility yield, (c) The trip is a single trip (not multitrips).

### ***The Strengths and Weaknesses Travel Cost Method***

The advantages of the use of travel cost method are: (a) the travel cost method can be used by economists to estimate the economic value based on market prices, (b) The method is based on the actual behavior based on the value of willingness to pay, (c) it is relatively in expensive method is applied, (d) the survey approach gives visitors an opportunity, on a large sample size to participate, (e) results are relatively easy to interpret and explain.

This method, although considered as a practical approach, however, has several drawbacks, namely: 1) TCM is built on the assumption that each individual has only one purpose to visit tourist destination spot. So in this case, we do not easily examine multiple aspects of the visit (multipurpose visit), whereas in reality an individual will be visiting other places prior to the tourist attractions we mean. 2) TCM does not distinguish individuals coming from the vacationer (holiday makers) and those who come from the local area (resident). So if this is indeed the holiday makers coming to enjoy the natural beauty of our tour carefully, then surely travel expenses should be allocated to the residents around the holiday makers. 3) The problem of time measurement value (value of time). As we know from microeconomic theory, the time variable has its own intrinsic value is expressed in terms of the cost of the sacrifice (opportunity cost). Some experts claim that must be distinguished between the time that it resulted in a utility (picnic) and the time it becomes sacrificed (opportunity cost). When someone visited tourist attractions, he sacrificed the usual wage gains acquired from an outpouring of time to work and so on.

### **Previous Research**

Smith, Desvousges and Fisher (1986) conducted a comparative valuation of recreational benefits between the two valuation methods. On the Indirect Method (Travel Cost) used Generalized Travel Cost Model (Marshallian and Hicksian) and Simple Travel Cost Model. In the Direct Method (Contingent Valuation) used direct question technique, iterative bidding and payment cards. The results indicate similar estimates.

Purwanto Research (1998) using the travel cost method approach, suggesting that the factors that affect the number of tourist visitors are travel costs and per capita income. The regression equation suggests that the higher the per capita income, the demand for recreation will also be getting bigger, whereas if the higher cost of the trip will result in less demand. Analysis of the demand curve indicates that the prevailing price level ticket is IDR 7.00 the obtained revenue of Rp. 22.910.700. Proceeds will achieve optimum value on the ticket price of IDR 6.000 which is the average value of WTP with a revenue of IDR 206 963 800.



Dijiono (2002) examined the economic valuation method travel cost analysis shows that the willingness to pay of visitors Wan Abdul Tourist Park, Lampung province is Rp. 11.517 per visit and sacrificed value of Rp 7.298 per visit and the consumer surplus of Rp 4.219 per visit.

Sobari (2006) calculated the economic value of the Natural Park of the island of Wehusing TCM approach, namely individual and zoning. Referring to the existing conception that the calculation of an individualized approach is better than the zoning approach, the economic value of Rp. 30.902.587.657, 26.

Hidayat (2011) aims to determine the factors that affect the tourist traffic in Way Kambas National Park in Lampung Province. This study shows that the factors that influence the demand for tourist visits are travel expenses, the cost of time, income, level of education, and leisure time.

Furthermore, Herman (2012) examined the economic valuation of Bunaken National Park through the TCM approach shows the estimated economic value of nature (WTP) the Bunaken National Park tourists are calculated from IDR 140.405.171.010 with the value of consumer surplus IDR 6.433.440.930 or by IDR 232.271 per individual. As for the estimation of the economic value of the calculated nature of foreign tourists amounted to USD 13.054 million to the value of the consumer surplus of USD 232.000 or USD 8.36 per individual. This value also indicates the opportunity cost to society when the Bunaken National Park ecosystem damage and loss of tourist attractiveness.

In general, the greater the person's income, the greater the demand for leisure good and environmental services. The need for environmental services as a place traveled is influenced by several factors such as the cost of travel, distance, time, level of education, visitor perceptions, characteristics of substitution, facilities, individual income and other factors. The main difference of this study with previous studies lies in the period of the research and development of research variables, whereas the equation is the search methodology used.

## Hypothesis

The hypothesis in this study are:

1. Travel costs and alternative travel costs negatively affect the number of domestic tourists visiting Sabang.
2. Travel cost is below value Willingness to Pay for domestic travelers to benefit attractions in Sabang.

## METHODS

### Scope and Research Sites

The location of research is in Sabang because it has the potential of tourism and a tourist attraction visited by domestic tourists relative. The study was conducted in from January to March 2014.

## Data Collection Method and Sampling

The data used is primary data and secondary data. Primary data obtained through interviews with a questionnaire that has been prepared and observations in the field. Secondary data is data through documentary techniques and study of literature.

The population in this study are all domestic tourists who are visiting the tourist area of Sabang in the last 3 years. Samples were taken based on the Non Probability Sampling method, which means every member of the population does not have the opportunity or the same opportunities as the sample. Reasons for the selection of the method is due to the limited time and funds research. The total study sample was 30 domestic tourists.

## Operational Definition of Variables

Operationally, the definition of the variables in this study are presented in Table 2.

**Table 2. Operational Definition of Variables**

Variable	Symbol	Definition	Unit	Formula	Method
1. Number of visits	V	The number of domestic tourist visits in the last 3 years	Person	$Vis = f(X_1, X_2, \dots, X_n)$	Primary/survey
1. Travel costs	C	Total costs incurred in Sabang recreation	Rp	$Cis =$ Transportation costs+accommodation costs+meal expenses+rental costs +etc	primary/survey
3. Alternative travel cost /subtitution costs	S	Total alternative costs in Banda Aceh	Rp	$Sib =$ transportation costs+accommodation costs+meal expenses+rental costs +etc	primary/survey

## Analysis Model

The initial idea regarding the assessment of natural resource valuation using Travel Cost Method was developed by Hotelling (1931), and applied by Clawson and Knetsch (1966). In determining the demand function for visits to tourist spots, TCM individualized approach using econometric techniques are simple regression (OLS). A visit to the tourist places will be heavily influenced by all the travel costs (travel cost) and negatively correlated assumed, in order to obtain the demand curve has a negative slope. In simple terms the demand function is written as follows:

$$V_{ij} = f(C_{ij}, T_{ij}, Q_{ij}, S_{ij}, M_i) \quad (5)$$

here:

$V_{ij}$  : The number of individual visits to the site i j

$C_{ij}$  : Travel costs incurred by an individual to visit the location j

- $T_{ij}$  : The cost of time spent by individual  $i$  to visit site  $j$   
 $Q_{ij}$  : Respondents' perceptions of the quality of the environment in the location  $j$   
 $S_{ij}$  : Characteristics of substitution that may exist in other locations  
 $M_i$  : Income individual  $i$ .

to make it become more operational, the function request is made in a linear form as follows:

$$V = \alpha_0 + \alpha_1 C_0 + \alpha_2 S + \alpha_3 M + \alpha_4 T + \alpha_5 Q \quad (6)$$

Research Model of the domestic tourist visits were analyzed using ordinary least square method as follows:

$$V_{ns} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + e_i \quad (7)$$

here:

- $V_{ds}$  : Number of visit to Sabang  
 $\beta_0$  : Constanta  
 $X_1$  : Individual travel cost to Sabang  
 $X_2$  : Alternative travel cost to Banda Aceh  
 $\beta_1, \beta_2$  : Regression coefficient  
 $e_i$  : Error terms

After determining the demand function it can be seen the influence of travel costs and the cost of a trip alternative to the number of tourists visiting Sabang. Furthermore, the value of consumer surplus can be measured, which is a proxy of consumer surplus value of willingness to pay (WTP) to tourist attractions. Fauzi (2006) wrote the following formula:

$$WTP \approx CS = \frac{N^2}{2\beta_1} \quad (8)$$

Here,  $N^2$  is the number of individual visits  $i$  to Sabang is squared and  $\beta_1$  the coefficient of domestic tourists travel costs.

Statistical formula to determine the average value in this study for an average value of domestic tourists WTP namely:

$$MWTP = \frac{1}{n} \sum_{i=1}^n y_i \quad (9)$$

here :

- MWTP : the mean WTP values  
 $y_i$  : maximum WTP values of respondents to- $i$   
 $n$  : Number of visits

## THE RESEARCH RESULTS

### Characteristics of the Respondents

Characteristics of the respondents can be seen from Table 3. serving on gender, marital status, age, education level, occupation, purpose to Sabang, and region of origin. Of the total respondents, the number of travelers who married at 51 percent, they visited Sabang with family. Domestic tourists visiting the destination on vacation or recreation leave in groups accompanied by friends or family. In Sabang they liked Iboih and Rubiah most tourists do snorkeling, others relax and enjoy the atmosphere of unspoiled natural scenery. The average age at the visit is over 25-45 years. While most jobs are private employees. The area of origin is the largest domestic tourists from Medan, Sabang them to a new average of the first to visit twice, while the origin of the visitors who dominated after the field is of Banda Aceh. For travelers education level is Tier 1 (S1).

**Tabel 3. Characteristic Domestic Tourists**

No.	Charaacteristic Respondent	Classification	Total (Person)	Percent (%)
1.	Sex	Male	18	60,00
		Female	12	40,00
2.	Marital Status	Married	15	51,72
		Not married yet	14	48,28
4.	Education	SMA	7	23,33
		S1	21	70,00
		S2/S3	2	6,67
5.	Job	-	3	10,00
		Dosen	1	3,33
		Karyawan Bank	1	3,33
		Mahasiswa	3	10,00
		PNS	6	20,00
		Staf RS	1	3,33
		Staf swasta	10	33,33
		Staf USM	1	3,33
		Wiraswasta	4	13,33
		6.	Purpose	Work
Recreation	27			90,00
7.	Based Region	Aceh Besar	1	3,33
		Aceh Tengah	1	3,33
		Banda Aceh	12	40,00
		Medan	14	46,67
		Pekan Baru	1	3,33
		Sigli	1	3,33

Source: primary data 2014

Sabang typical culinary favored by tourists is kueh Sabang, octopus and various seafood satay. Seafood available in Sabang is still very fresh. Enjoy fine dining on the edge of the sea or a relaxing beach atmosphere certainly is a pleasure in itself is invaluable for tourists.

## The Results

Model of domestic tourists visiting Sabang is:

$$\text{Visit domestic tourists to Sabang} = 3,294 + 0,120 * \text{Travel cost to Sabang} - 4,839 * \text{Alternative cost}$$

**Table 4. Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin Watson
					R Square Change	F Change	df 1	df2	Sig. F Change	
1	0,725 <sup>a</sup>	0,526	0,487	1,531	0,526	13,319	2	24	0,000	1,994

\*Predictors: (Constant), alternatif travel cost (to Banda Aceh), travel cost to Sabang  
 Dependent Variable: visit time to Sabang

Regression coefficient ( $R^2$ ) of 0,526 indicates that the variables together travel expenses to Sabang and Banda Aceh cost alternative to affect the frequency of tourist visits to Sabang by 52,6 percent. While 48,4 percent have been affected by other factors not included in the study.

**Table 5. ANOVA<sup>a</sup>**

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	62,463	2	31,232	13,319	0,000 <sup>b</sup>
Residual	56,278	24	2,345		
Total	118,741	26			

\*Dependent Variable: visit time to Sabang

Predictors: (Constant), alternatif travel cost (to Banda Aceh), travel cost to Sabang

The results of processing the data in Table 5. ANOVA showed that the model frequency of visitors traveled to Sabang simultaneously influenced by the cost of travel to Sabang and Banda Aceh to the alternative charge. Calculated F value of 13,319 > F table and this is indicated by the significance of 0,000 which means that the two independent variables together affect the frequency of domestic travelers to Sabang.

**Table 6. Coefficient**

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error			
(Constant)	3,294	1,415		2,328	0,029
Travel cost	0,120	0,047	0,458	2,569	0,017
Alternative travel cost	-4,839	2,487	-,347	-1,946	0,063

In Table 6. Coefficient can be seen how the partial contribution of the independent variables on the dependent variable (number of frequencies to Sabang). Variable cost cost-free travel to Sabang has a positive coefficient of 0,120 with a level of 0,17 which means significant conclusively that significantly affect the frequency of visits to Sabang. While the cost of a travel alternative has a negative effect on the frequency of domestic tourist trips to Sabang with a significance level of 0,063 and the negative effect that can be seen from the coefficient of 4,839 meaning that if the cost of alternative traveled to Banda Aceh to decline, then the domestic tourists will increase the frequency of visits to Sabang.

Willingness to Pay values are calculated domestic travelers through ticket prices are assumed to be Rp. 2000, when according to the official ticket given officers and tourists whose public transport instead not pay admission to Iboih. They are actually willing to pay more to enjoy the benefits of Sabang attractions with admission ticket in the hopes of improving the quality benefits in Sabang attractions. The willingness to pay is Rp. 22.204,17. Now we know the value of WTP then the average value or mean WTP is Rp. 5.657,53.

With a ticket price of IDR 5.657,53 travelers who wish that tourism is managed in line with the concept of sustainable development that takes into account the environment, then they want the much improved facilities and services such as internet signal, toilet/clean public toilets, prayer room availability, availability of water, availability of lodging in the area Iboih and Rubiah, better waste management, and others.

## CONCLUSIONS AND SUGGESTIONS

The results showed that the travel costs and the cost of alternative travel negatively affect the domestic tourist visits. And travel cost are below the willingness of tourists to pay benefits in Sabang. Domestic tourists WTP value of IDR 22.204, 17 where the mean WTP of IDR. 5.657,53 with an admission fee to Iboih of IDR. 2.000 and free. So by setting the ticket price of IDR. 5.657,53 then Iboih can be managed in line with the concept of sustainable development that takes into account the environment.

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# INTERPERSONAL COMMUNICATION OF COMMERCIAL SEX WORKERS IN THE PROCESS OF TRANSACTION WITH CUSTOMER IN LHOKSEUMAWE

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## Abstract

The purpose of this study was examined about “Interpersonal Communication of commercial sex workers in the process of transaction with customer in Lhokseumawe”. Commercial sex workers in Lhokseumawe used interpersonal communication with their customers through face to face interpersonal communication and media communication so that the presence of these activities remains shrouded. The method was applied in this study was the qualitative approach that using descriptive type of analysis where the final result of the study described in words or with a sentence that show at the end of the study. Subjects were female commercial sex workers with age around 16-45 years old. The subjects were from district Banda Sakti and Muara Dua Lhokseumawe. The technique sampling used in this study was the purposive sampling technique which is based on the selection of sampling research on what aspect of what and who made a particular focus on the current situation and current continuously throughout the study. The result of study showed that each of subject doing a communication with customers by using interpersonal communication that revealed a good self-disclosure of their personal through interpersonal communication media, which was supported by verbal and nonverbal communication that give an equal reaction. The type of communication that used by commercial sex were through face to face and media communication. However it was found also some barriers that interfere while doing interpersonal communication during the transaction such as adjustment problem, error communication and misperception between the subject and the customer that used their services.

**Key words: Communication, Interpersonal communication, commercial sex workers, transactions and customer**

## INTRODUCTION

Lhokseumawe, North Aceh, is one of the provinces of Aceh, where Islamic religious community in general and almost the entire Muslim community who use the hijab in their life. Aceh province is also known as the provinces implement and apply Islamic law. Unfortunately, the city once called the Petro Dollar, as a gas producer, now has commercial sex workers. It is based on observations made in September to November 2012, which is done through persuasive approach, discussion or sharing with a few prostitutes (commercial sex workers). From the results of field observations in two sub-districts of Banda Sakti and Muara Dua, found that in some cafeteria KP 3 Lhokseumawe including cafes, cafes Ariski, Shakira Cafe, Cafe 55 and Cafe Sentosa (districts of Banda Sakti), Muara cafe, Cafe Lotus, Craving cafe, and cafe Singapore (Muara Dua) is a haven and meeting among commercial sex workers and customers.

Realita permasalahan yang terjadi adalah keberadaan PSK di Kota Lhokseumawe yang telah meningkat sebanyak 65 persen adalah PSK lokal, selebihnya dari luar daerah yang mencari pelanggandi Kota Lhokseumawe. Based on the data obtained from the National AIDS Commission (NAC) Lhokseumawe, of the five City / County in Aceh has been the 'barn' commercial sex workers are Aceh Tamiang, Lhokseumawe, Banda Aceh, West Aceh and Aceh Besar. Recapitulation percentage Hotspot issued during the data collection and key populations on 24-26 January 2012 that the percentage of commercial sex workers in Lhokseumawe as much as 18 percent. In addition, through the free sex relationship transmission of the virus has been donated to HIV and AIDS so as to achieve 65 percent overall. This is because there is still place of prostitution is done in secret and confidential by both the perpetrators and their customers. The practice of prostitution in Lhokseumawe generally done at home by 65 percent, then at boarding house by 10 percent, and 25 percent at the hotel.

Based on this phenomenon, Aceh which has been known to the law and rules of Islamic Shari'a unlikely in Lhokseumawe happens when prostitution covertly, and it is increasing every year. The results of the data collection in 2009 KPA Lhokseumawe total number of commercial sex workers were 51 people, commercial sex workers directly as many as 37 people and indirect commercial sex workers as many as 14 people, and increased in 2012 to direct commercial sex workers numbering 43 people, and sex workers indirect commercial as many as 21 people. Direct commercial sex workers are women whose main job is as a commercial Sek workers while indirect commercial sex workers are women who join this work but it is not a major job, but as a side job. In this case I would like to examine more deeply to find communication patterns used by commercial sex workers in the transaction with the customer. Which of course still use interpersonal communication in secret that the face to face communication and mediated communication so that the presence of these activities are still hidden.

Based on preliminary observations, in September to November 2012 at several cafe above mentioned authors see the unique ways in the process of transactions between sex workers komesial with customers. The transaction process begins with a mutual acquaintance, or through "Germo" , some from friends to friends who act as agents and even some are from customer to customer. Sit together at one table, enjoying dinner and sing along (karaoke). Commercial sex workers using a fairly open clothes and dress up 'menor' then there is no movement of either the body language of commercial sex workers and of customers who communicate nonverbally, and eventually they moved together to leave the cafe. And they also use media such as mobile communications (personal communication tool that facilitates communication systems), Facebook (social networking one of the most widely because of its very easy to interact personally), blackberry massanger (an existing application on Blackberry branded mobile phones, and with this application, the user is very easy to communicate, highly secure and confidential). And based on the above, the writer is interested in conducting research on "Interpersonal Communication Commercial Sex Workers In Transactions With Customers In Lhokseumawe".

## Research Problem

Based on the background of the problem, then the formulation of the problem in this study are:

1. How interpersonal communication used by commercial sex workers Lhokseumawe in the transaction.
2. The Barriers of interpersonal communication that occurs in the process of transactions between commercial sex workers with the customer.

## Research Objective

Based on the formulation of the problem, the objectives of this research are:

1. Know and describe the interpersonal communication that is used by commercial sex workers Lhokseumawe in the transaction process with the customers in the form of face-to-face interpersonal communication and mediated.
2. Know and describe the interpersonal communication barriers that occur in the process of transactions between commercial sex workers with customers.

## LITERATURE REVIEW

Mudjijono (2005, p.16) provide restrictions as female sex workers who primarily work daily to satisfy the sexual desires of men or anyone who is capable of giving out rewards that are normally in the form of money or other valuable items. Motif women into commercial sex workers vary, but can be concluded that there are two factors driving the internal and external driving forces (Hutabarat, et al., 2004, p.75). internal driving forces come from individuals, while the external driving factors come from outside the individual. External driving factors, among others, economic factors, low education levels, marriage at a young age, divorce, to friends who have first become commercial sex workers and Danya ease in getting money. Hurt, angry and disappointed in betrayed by the couple into internal factors that drive women into commercial sex work.

## Interpersonal Communication

Communication is the process of sharing meaning through verbal and non-verbal behavior (Mulyana, 2005) According DeVito (1989), interpersonal communication is the delivery of a message by one person and receiving messages by another person or a small group of people, with various effects and with the opportunity to give immediate feedback (Effendi, 2003, p. 30). Interpersonal communication is communication between people face to face, which allows each participant capture reactions of others directly, either verbally or nonverbally. According to Effendi, essentially interpersonal communication is communication between communicators with the communicant, communication of this type is considered the most effective in changing attitudes, opinions or behavior of a person, because it is a dialogical form of conversation. Reverse flow is direct, and communicator will get respond directly from communicant.

## Verbal and Nonverbal communication

Verbal communication is a process of delivering the idea through communicator to communicant by using the verbal language or in writing. Nonverbal communication is one of the most fundamental form of communication in business communications. In addition to using words, while doing communication is also used body movement that known as sign language or body language.

## Commercial sex workers

Commercial sex workers are workers in the service of social activity with the aim to get a salary or compensation of which has been using his services (Koentjoro, 2004: 26). In some countries the term implies that prostitution is considered negative. In Indonesia, the perpetrators given the designation with commercial sex workers. This means that the women are not immoral for doing a job that is contrary to the values of decency prevailing in the society. Because of this view, the sex workers get a bad label (stigma) as dirty and contemptible and undignified.

## THEORETICAL REVIEW

### Theory of Self Disclosure

Self-disclosure can be interpreted as providing information about yourself to others. The information provided may include a variety of things such as life experiences, feelings, emotions, opinions, ideals, and so forth. Self-disclosure should be based on the honesty and openness in providing information, or in other words what is conveyed to others let not a personal mask or lie so that only show the good side only. To answer the question of why someone needs to tell other people about themselves, then it must be seen as a cycle that involves three (3) things: self-disclosure, friendly relations and acceptance of self. Research shows that individuals who are able to express themselves appropriately proved better able to adapt (adaptive), better believe in yourself, more competent, extrovert, reliable, be able to be positive and trust toward others, more objective and open (David Johnson , 1981, in mentalhelp.net). Joseph Luft suggests other self-disclosure theory based on a model of human interaction, which is called the Johari Window, as follows:

**Table 1. Human Interaction Model**

	Known by oneself	Not known to self
Known by others	(1) OPEN	(2) BLIND
Not Known by others	(3) HIDDEN	(4) NOT KNOWN

**Resources : (Little john : 1939 : 161)**

If communication between two people is going well, there will be a push disclosure of information about themselves into each quadrant (1) OPEN. Quadrant (4) is difficult to know, but may be achieved through self-reflection and dreams.

In psychology stated that the purpose of communication is to examine the understanding of self and others, and that understanding can only happen with proper communication. According to humanistic psychology, interpersonal understanding occurs through:

- 1) Self-disclosure
- 2) Feedback
- 3) Sensitivity to know others.

While misunderstanding and dissatisfaction in relationships initiated by:

- 1) Dishonesty
- 2) The lack of similarity between the actions of a person with feelings
- 3) Poor feedback
- 4) Self-disclosure were detained.

## **METHODS**

This study focused on Lhokseumawe precisely in the district of Banda Sakti and Muara 2 (Cunda). The research approach used in the study is the qualitative approach in which the final results of this study are described in words or with a sentence that shows the end result of the study. Subjects were female sex workers aged 16-45 years residing in Lhokseumawe. Data retrieval technique using the technique of "purposive sampling" technique that is based on the choice of sampling research on aspects of what and who made a particular focus on the current situation and the current continuously throughout the study, purposive sampling is that depending on the purpose of the focus of a current (Nasution, 2006: 29). While the object of this study is the interpersonal communication of commercial sex workers in the process of transactions with customers in Lhokseumawe. Data Collection Techniques conducted through observation techniques, interviews and documentation. Data analysis techniques in this study using qualitative data analysis techniques from the very beginning until the completion of data collection.

## **RESULT AND DISCUSSION**

### **Interpersonal Communication forms of commercial sex workers in Transactions with Customers**

To be able to know how the process of interpersonal communication in the commercial Sek Workers engaged in transactions with customers in Lhokseumawe, indeed researcher must first know and understand the nature of women prostitute themselves. Researchers are trying to understand the process of introducing the concept of female sex workers themselves to customers. As has been noted previously that the research is about how they want others to know about them will be determined by how the individual in expressing himself. Sources of self disclosure form, can be identified through the background of each speaker. Further elaboration of the background of the life of each resource, researchers can understand interpersonal communication sources. Table 2 showed description of the background of each speaker briefly (not real name).

Put simply, each speaker doing a form of communication with customers is the interpersonal to the disclosure of their personal good use interpersonal communication media, and supported with verbal and nonverbal language which gives equal reaction. So that disclosure themselves raises openness between the five speakers with their customers, but this openness is only limited to the superficial things and are very reluctant to open secret involving their personal. But if it is to trust, then they are not reluctant to divulge their most personal in the end it can be concluded based on the results of the interview (June 15, 2013), Karina openly communicate with their customers without a sense of inferiority in him anymore. Though initially he never experienced the level keminderannya he could not control. Karina is able to create a mood of customers become comfortable with courtesy and elegance which he naturally had to communicate both verbally and nonverbally, and it is more attractive in starting every conversation with customers.

While the results of the interview (July 21, 2013), Flower communicate openly but still not too bold in giving information about him. Only to customers who have he believes, he will be more open and tell a more personal things in his life. In interpersonal communication with customers, flower picking also, the level of self-disclosure is weak or shallow, although there is openness among individuals, therapy does not occur interpersonal relationships. Then from the interview (August 5, 2013), Silvia communicate with customers as well as Karina. But Silvia is still controlled by his teenage life make it seem aggressive in communicating with customers. Silvia who was experiencing a disappointment or frustration about the inability of his family in the finance, making him want to throw all that resentment and usually will feel happy when telling a prospect that is already trusted. With this kind of disclosure self he got a chance to express his feelings. In the interview (August 12, 2013), Rani also communicate with their customers with a full range of open as well as he has. Sometimes Rani also easy to share and tell the feelings and the sense of the problem at hand to its customers, Rani hopes to be able to obtain an explanation and understanding of other people will face problems that will become more clear mind and can see the problem with a better seat. And of course with revealing personal information such as this will provide a stimulus to the customer's wants closer relationship with Rani.

While the results of the interview (15 September 2013), Memel who had experienced a difficult period before becoming prostitutes finally able to get up and be more confident in carrying out his profession. Even in communicating with customers, Memel more attractive master chat, so that customers feel comfortable and more inclined to use the services of Memel. Not only good interpersonal communication done Memel, but it also keeps the performance in order to remain a role model for its customers.

For Karina, Flowers, Silvia, Rani and Memel, they can find a suitable form of interpersonal communication in accordance with their character in a relationship with its customers. Researchers see the development of relationships with self-disclosure as the main medium. The process to achieve interpersonal intimacy referred to as social penetration. The social penetration occurs in two main dimensions of breadth and depth. The breadth dimension in which one can communicate with anyone either strangers or with close friends. While the depth dimension in which a person communicates with

someone close, who initiated the relationship and the development of shallow to very intimate relationship, or reveal things that are personal about him. In general, when dealing with strangers self-disclosure little deep and narrow range (the subject a bit). While the introduction of regular, self-disclosure deeper and wider range. While relationships with close friends marked the self-disclosure depth and range is the widest (subject more and more).

Disclosure themselves they do not even limited to the language of interpersonal communication that they pakai. Mereka also aware that their work is very dependent on the physical condition of interest include facial and body parts. Commercial sex workers who are physically attractive have a great opportunity to get customers, even though the physical addition there are several other criteria of customers who sought from commercial sex workers such as hospitality and enough knowledge so that when spoken to make the customer comfortable. Some ways to do so in order to appear attractive lure customers is to use good clothes and use "make-up". As with Karina, Flowers, Silvia, Rani and Memel, so obviously they have an age gap, which certainly can affect their performance in the presence of customers. Memel who has entered his age three heads are always trying to keep the body shape, skin, hair and even the order of "make-up" in his face. But as is the case with young Karina, "energetic" and naturally stunning, she's not afraid of her appearance. Enough with the look, neat, clean and fragrant. And it also does not invite the attention of the community on its identity.

Karina is still 22 years simply use the "make up" the natural and minimalist. While the 27-year-old flowers, but because of her small petite and very supportive of her appearance. Flowers do not need to spend so much money to care for the skin beauty and the beauty of her body. But Flower keep up with the "make up" a very supportive sensual work. In contrast with Silvia, age is still very young, very clearly become more value on his work. It's just acting like children and labile at issue every transaction with its customers. Silvia enough to maintain the appearance of costumes and accessories as well as the flagship perfume. While Rani is also classified as very young do not have difficulty in maintaining their appearance. "Make up" remains a major liability for him, but not excessive. He was just trying to keep his face so as not to breakouts. And Memel who are age 30 years had a strong challenge to continue to take care of his body in order to remain confident in the face of pelanggannya. Dengan so they can confidently communicate with customers at the time of the transaction.

They passed through the process of self-disclosure may include information on topics such as behavior, attitudes, feelings, desires, motivations and ideas of appropriate and self-contained in the person concerned. The results showed that Karina, Flowers, Silvia, Rani and Memel able to communicate well in dealing with customers. This is because they are able to put communication at the time and in the right place.

However, communication is a process that continues among individuals in interpersonal relationships. In order to remain well established and able to deliver needed comfort in each other must also keterbukaan. Begitu premises female sex workers, they should always be cautious in attitude and well-spoken to be about providing convenience

to its customers and also not disturb the people in the neighborhood, for the sake of their individual image and also the customers.

**Table 2. Informan Interpersonal Communication forms of commercial sex workers (CSW) in Transactions with Customer**

Name	Background	Periode of CSW	Spesification
Karina (22 <sup>nd</sup> years old)	Comes from a rich family, but her parents suddenly go bankrupt business, so she had problems in school and on the economic side. The difficulty of finding a job as still a student and want to continue to college, make her accept the invitation of a friend who has become the first commercial sex workers (CSWs), and it turns out easier to get money.	2 years	The form of communication is used interpersonal communication <i>Face to face</i> . (Interview conducted on June 15, 2013)
Bunga (27 <sup>th</sup> years old)	an Orphans, and having 4 sister to be support, be in school finance and the cost of their life. Because, her only has a high school diploma and worked as a maid cafe with a little salary, eventually chose to become prostitutes after meeting with one of the customers who pay dearly. CSW is a side profession, because she is now opening an online business shop.	4 years	The form of communication is used mediated interpersonal communication by using <i>mobile phones and the use of an intermediary agent</i> . (Interview conducted on July 21, 2013)
Silvia (17 <sup>th</sup> years old)	Because it comes from a simple family and parents unable to meet the lifestyle needs, and also has been plunged into the world of free sex, then take the road as prostitutes to earn money addressing the needs of today's lifestyle.	6 months	The form of communication used is mediated interpersonal communication is by using <i>Mobile phone and Blackberry Smartphones</i> . (Interview conducted on August 5, 2013)
Rani (21 <sup>st</sup> years old)	A student who comes from a broken home, not getting the love from the family and also often victims of violence from parents, finally getting a helping hand from one man to another man, who became like with each other, eventually become prostitutes to get satisfaction in the field of materials.	3 years	The form of communication used is interpersonal communication <i>Face to face</i> . (Interview conducted on August 12, 2013)
Memel (30 <sup>th</sup> years old)	Despair because after becoming mistress of a contractor, then left by the men, and she feel shame with her family, finally fled to the city of Lhokseumawe and finally seeking an outlet to become prostitutes, In order to survive in Lhokseumawe.	5 years	The form of communication is used mediated interpersonal communication using the <i>mobile phone</i> (Interview conducted on 15 September 2013)

**Resource: Interview with the Subjects at Lhokseumawe**

### **Barriers to Interpersonal Communication Commercial Sex Workers in Transactions with Clients**

Based on the interviews, several sources such as Karina, Silvia and Memel realize that responds to and actively involved in the interaction with the customer is openly



critical thing to do. While Flowers and Rani interact in interpersonal communication is a difficult thing to do well. That means each speaker's behavior is influenced by the given symbols by others. Through the signaling form of symbols, then each speaker can express feelings, thoughts, intentions and vice versa by reading the symbols displayed by others. From interviews with sources researchers concluded that interpersonal communication barriers experienced by Karina was when he was having a hard time or have a problem that makes the condition emotionally unstable or depressed, he was unable to control "badmood" he experienced, so it this makes it a lack of focus in communicating with customers. And besides depression, Karina also often experience problems in communicating with customers when he was unwell, but there are customers who want membookingnya. In this case Karina tried to keep the customer is willing to use his services, but at first delayed until he is healthy. There is little difficulty experienced when communicating with customers, which is sometimes difficult to understand the condition of Karina. While communication barriers experienced by her own personal interest is from a little bit difficult to open up a closed and well acquainted with the customers at the time, so that the process transaction Flowers often have failed transaction when he faced his customers directly. Therefore, flowers are always trying to ask for help from his agent intermediaries namely "F" to assist in the process of transactions with customers who want to use his services. Flowers also claimed, nature was greatly influenced by the closing of fear when her sisters would know the real identity. Slightly different from the Silvia, 16-year-old girl was admitted, he suffered only a barrier if he did not get permission from their parents to leave the house. This often makes customers upset. Due to Silvia often replace phone numbers, the misunderstanding often happen with the customer, besides she does not want her parents were suspicious of his profession. However, Silvia experienced difficulty when meeting with customers who are far above her age. In terms of verbal or nonverbal language, Silvia often do not understand the intention of the customers. Then the barriers experienced by Rani based recognition is when there are customers who want membookingnya suddenly, while he was at college on campus. The obstacle is when he does not get permission from the professor to go home early. Though Rani has used the excuse of illness. However, because they have to use the same reason, so that the lecturer did not give him permission again. And the risk is Rani lost the opportunity to earn money. Rani is also classified as a private person as well. He was only friends with one or two friends in college, this is because Rani did not want to move geriknya wafted by college friends. Therefore Rani was trying so no one else suspected. Even to customers Rani was not wearing his real name. It has also become a bottleneck when there are customers wanting to use his services again. or the customers wanting to bring Rani with new customers. Because Rani does not open in communicating directly, Rani using communication media social networking "Facebook" account instead of the real self. There was little resistance when Rani communicates with prospective customers, namely in terms of written language that is sometimes difficult to understand by Rani Rani or no written language that is not understandable or any perception by the customer. While Memel experiencing communication barriers Karina same premises, only if she had physically weak, Memel epilepsy often experience difficulty concentrating so listen to

what was said by the customers, so that customers may be uncomfortable effect. Then when Memel suffered emotional distress due to problems at the salon so, these emotions get carried away when it communicates with its customers, and it really makes Memel could not control her mood which affects the aura of her face. So that this condition makes Memel lose customers.

## Discussion

### *The forms of Commercial Sex Workers Communication with customer*

From the research conducted, it can be seen how communication of commercial sex workers with the customer in the process of transaction, how the stages of self-disclosure made by commercial sex workers, the factors that influence self-disclosure of commercial sex workers Lhokseumawe, and interpersonal communication barriers of commercial sex workers during in the process of transaction. Depth and disclosure of a person depends on the situation and people are invited to interact. If the people who interact with the fun and make feel safe and able to evoke the spirit of the possibilities for depressed individuals to further open up is great. In contrast to some certain people who can just shut down because they feel less confident (DeVito, 1992).

According Korichi, Pelle-de-Queral, Gazano, and Aubert (2008) psychological make-up has two functions, namely the function of seduction and camouflage. The function of seduction means individuals use makeup to enhance personal appearance. Generally, individuals who use makeup to function seduction feels that he attracted and use makeup to make it more interesting. Function means that the individual uses camouflage make-up to cover themselves physically. Generally, individuals who use makeup to camouflage himself does not feel attractive that need to use makeup to make interesting. Self Disclosure in theory although it is recognized that self-disclosure is very important for the development of the individual, but some people are still reluctant to do so. Basically reluctance or difficulty in expressing themselves many individuals based on the risk factors that will be received in the future, as well as the lack of a sense of security and confidence in yourself. The risk in question may be leaking information that has been provided by women prostitutes to customers when such information is considered very personally by the giver that information in this study is a prostitute, or it could be information that is conveyed precisely offend another person so as to interfere with interpersonal relationships previously already well established. In addition to the self-disclosure or improper conditions it will be a boomerang for the giver of information.

The dynamics of the communication process that occurs in sources after they decide to become prostitutes can be seen from the experience of their natural life. The nervous in communicating seen observe during the communication with the customer. The difference is their communication with subscriber only in gesture. The gestures, eye contact, speech and certain signals they use. Based on the research results of several speakers at the customer's identity can be expressed through the disclosure itself. Prostitutes who have a true understanding of the self-concept, it is easier to open up even though only forced by the demands of professional work.

Karina proved to still be like to communicate and interact like other women, even though he had experienced of low confidence because she is a prostitute. Besides its activity with other activities make it more excited to move on and look more confident. So Karina accustomed to first start a conversation, invite acquainted, exchange of contact person even to persuade potential customers to use his services. Likewise, the Silvia is still 17 this year and only 6 months to become a prostitute in Lhokseumawe. Cheerfulness and nature make it more attractive in communicating with prospective customers. Because life can be motivated to follow the lifestyle trends of today's teenagers, making the Silvia is able to communicate well and are friendly with prospective customers, although Silvia including prostitutes who do not use such rates of other prostitutes. For invited Silvia to eat, buy all the goods she needs, it will be enough for her. This condition also applies to Bunga , Rani and Memel.

Bunga become more open since start the business "online shop" , that required her to has a good interpersonal approach to selling her services and make customers feel comfortable, even though, she selected the customers that "booking" her to go out of town. Rani try to interact with people around her by not limiting her social space. Only few friends are in her privacy list to get customers. In general, Rani can talk and discuss a lot of things reasonably well with the old customers and new ones he met.

Memel also always active in communicating with their friends or customer behalf of professionalism as a worker in a beauty salon, it help her interacting with customers who want to use her services.

In the process of interpersonal relationships are different stages in self-disclosure. According to John Powell (in Beebe, 2008), the disclosure of information that we do on our self developed based on the following stages:

Level 1: Peak communication

Based pemahan researchers, at this stage is the perfect stage in interpersonal communication open, where there is mutual trust between the communicator and communicant in sharing the message and ready to accept the risks of openness that exists. Powell also refers to this stage as "gut level" which is regarded as the final stage of self-disclosure, and this stage is rarely achieved. Only with a very close friend of course we will reveal some of our personal information. Powell also stated that there is a possibility that we do not reach this stage of closeness with spouse, family, or our children. This stage is rare because it requires trust and involves risks when we are too open.

Level 2: Personal feelings.

At this stage, based on the understanding of the researcher is a communicator and communicant began to establish mutual trust in expressing or conveying messages that are privacy. Speakers such as Karina, Silvia and Memel discuss topics and things that are more personal. Once they build rapport with customers, then they tell you about their fears, secrets, and their attitude. Gradually increasing, and they are the speakers in this study to take risks when they notify this information to the customer, and in this stage is necessary to have confidence to tell these personal feelings.

Level 3: Attitudes and personal ideas.

At this stage, according to our understanding, is the stage where the communicator began to try to discuss personal matters of but still take the safe road. Once a resource name and other basic information, usually speakers start to talk about the customer's personal information, such as our attitude about work or other topics that are safe. At this stage, the information disclosed is not too open and not too threatening, but the speaker started to say about things that speakers like or do not like or opinions speakers on topics that are not controversial.

Level 4: Facts and biographical information.

At this stage, according to researchers is the stage of understanding between the communicator and communicant began to establish global interactions. After using cliché phrases and provide a response to build interaction, usually informant goes on to reveal information about themselves that are not threatening, such as your name, residence, or age.

Level 5: Cliché communication.

At this stage, according to the researchers understanding is the first time we establish verbal contact with another person by saying something to tell the person that we accept its presence. As with Karina, Bunga, Silvia, Rani and Memel were always saying "Hello" or "How are you?" Is a sign to start a relationship, although brief and fundamental to its customers.

#### ***Barriers of Interpersonal Communication of commercial sex workers in the process transaction with the customer***

Based on the background expressed by the entire subject, we can understand how they make the process of communication. Consequently, happened to Bunga and Rani due to they have difficulty to revealed openly about their personal identity honestly, so it impact while doing interaction with the customer. Nothing like that happened to Karina, Silvia and Memel. Instead, they rely more open to customers about their identity as a prostitute. The life of prostitutes who are generally more closed, therefore, through interpersonal communication based on self-disclosure deliver them successfully conduct transactions with customers. In fact, things occurs in Bunga and Rani is difficult to reveal the real identity honestly. This disclosure must aim to existence itself. Though it is important to interact with customers, which not only conveyed information alone. Taylor (2009) stated several obstacles that occur when expressing themselves, include:

##### **a. Abandonment**

When initiating a relationship, sex workers may share a little information with customers. When the prostitutes did self disclosure reciprocated by expressing themselves by customers, then the relationship is growing. But sometimes there are customers who do not care or ignore the self-disclosure that prostitutes do as stating that he was not in the mood or even less healthy customer did not want to understand how the condition of prostitutes. And this happens to Karina.

b. Rejection

Commercial sex workers disclose personal information that may lead to social rejection. For example, Memel probably would not say to his customers that he suffered from epilepsy, because he was worried if he revealed this information then he will experience rejection from customers.

c. Loss of control

There is a possibility that information about the self of commercial sex workers disclose to its customers that used to hurt or control the behavior of commercial sex workers, and this happens to Silvia and Bunga.

d. Betrayal

When commercial sex workers disclose personal information to its customers, such as Rani prostitutes often assume, or even explicitly requested, so that the information is kept confidential. However, there are times when the customer is betrayed and prostitutes disclosing personal information to others.

In addition, the barriers that often occur in the form of internal barriers, ie barriers that come from within the individual related to the physical and psychological condition. For example, if someone who is depressed (depression) will not be able to communicate well. As experienced by Karina and Memel. Then the external barriers, example barriers that come from outside the individual related to the physical environment and the socio-cultural environment. Example, differences in socio-cultural background can lead to misunderstandings. As experienced by Rani, Silvia and Bunga. Karina, Silvia and Memel choose to open their own private boundaries through various ways in the interpersonal communication with the customer expectations that can penetrate the boundaries of private information and or within the boundaries of their collective sedsuai can appreciate and respond to that expected by Karina, Silvia and Memel. On the other hand, Rani, Bunga and more affected by the constraints that occur in communicating with customers. This is because the respective interests, motivations and prejudices so opted for openness is bounded by its customers in the process of interpersonal communication. That is the theory of Self Interest Disclosure and strongly consider Rani to tell everything about themselves to customers, will produce a positive effect in the relationship with its customers, or even a negative effect on relationships as well as their identity.

## CONCLUSIONS

From the results of research and discussion, the authors can take the following conclusion that most women commercial sex workers make the process of interpersonal communication with customers, they establish their private information as commercial sex workers in an open interaction model, while partly they choose their private information sets as workers commercial sex on hidden interaction model so that information as a commercial sex worker and not be kept in the open by its customers. However, all the efforts made by commercial sex workers is part of the struggle to be accepted in the self and the environment in which they live, so they should always be able to interact with other women who are not sex workers.

Commercial sex workers form of communication is a form of communication with customers face to face and mediated communication. Through the signaling of a symbol in their nonverbal language, the commercial sex workers can express feelings, thoughts, intentions by reading the symbols on nonverbal language displayed by the customer. In face to face communication, commercial sex workers have prepared themselves before meeting with customers, both wearing make-up on her face, the use of perfumes that smell attractive men, wear clothing that is fashionable but not too open so as not to invite the attention of the people around. In addition, the communication face to face sex workers focused their good communication in order to understand the conversation that covered by the customer, so the customer becomes comfortable. After getting feed back from customers subsequent commercial sex workers also provide their contact person personally to continue their interpersonal communication with customers. While the use of media communication such as using a cell phone, Blackberry or Smartphone and also social networks, the previous commercial sex workers has been introduced by the agent or former customers as well as from friend to friend with a contact person promoting the commercial sex workers or BB Pin or social networking account. The preparation at the time of going to meet with customers similar to those performed by commercial sex workers who communicate face to face.

Barriers that occur in interpersonal communication with customers of commercial sex workers who use face to face communication is the awkwardness at the beginning of communication because it is the beginning of the meeting. The existence of awkward body language that greatly affect the success or failure in the transaction. In the use of costume, perfume or make-up has not adjusted to the tastes of customers, so this is also a factor supporting success or failure of the transaction. While interpersonal communication barriers that commercial sex workers are using the media, due to the closed nature of commercial sex workers and more attractive when using the media, so that when meet in person instead inversely communication patterns, and this often creates discomfort in communicating with the customers of commercial sex workers.

### **Recommended Suggestion**

Commercial sex workers should start thinking about their future, the effect of their profession could cause and create the deceases. So that their lives better in the future. It also need the integrated cooperation from all the aspects, that contribute to help prostitutes return back to the right way that please Allah. Therefore, need the support from all parties in order to be free from the commercial sex works in Lhokseumawe city. Especially for government have to think about how to empowering them, help them and make their live better by giving the chance and the opportunity to be work at the right place. Government also has to pay attention and provide guidance and opportunities for them to improve themselves and the opportunities in the economic aspect, so its to avoid behaviors of selling themselves as prostitutes. If this kind of behavior is not preventing since now, we will see our next generation will get the impact of this. Parents also need to control the child and make sure we build up a good communication with our children. I believe every good thing is starting from home as well as the bad things.



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# IDENTIFICATION OF BIOLOGY TEACHERS MISCONCEPTION AT SECOND GRADE OF SENIOR HIGH SCHOOL CLASS XI SCIENCE IN CONCEPT OF HUMAN REPRODUCTIVE SYSTEM

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## Abstract

The Research entitled "Identification Of Biology Teachers' Misconception At Second Grade Of Senior High School Class XI Science In Concept Of Human Reproductive System" aims to identify the existence or nonexistence of the misconception, to know about the misconcepted sub concept and misconception main factors of biology teachers. It used descriptive research method. The instrument of this research was *certainty of respons index* (CRI) test. The results showed that the teachers have misconception on 4 subconcepts, such as game tes formation (2.98%); ovulation (7.50%); menstruation (22.50%); fertilization, gestation, child birth, and lactation (14.58%). Based on those sub concepts, the highest percentage of misconceptions that occurred to teachers was in the group of menstruation sub concept. The main factors of the misconceptions existence towards teachers come from their own thoughts.

**Kata kunci:** Teachers' Misconception, *Certainty of Respons Index* (CRI), Human Reproductive System.

## INTRODUCTION

Until this time, rebuilding in education still continues to be striven. This effort has the aim in realization of education quality of a nation to be better in the future. Education quality will produce a qualified generation. Qualified generation will be created when there is a good interaction between students and teachers in a learning process. On the contrary, a learning process which is only dominated by the teacher will create a situation that is less attractive to the students. These conditions are not going to make students become active, the student will only receive the material presented by the teacher. Moreover, if the materials presented have the abstract concepts so that will make it difficult for students in understanding the concept. By these conditions, it is likely students will experience the difference understanding that is not in line with the scientific concepts and will have no impact on student learning outcomes.

According to (Tekkaya *et al*, 2001; Ekici *et al*, 2007; Kose, 2008), "Understanding the different concepts from scientific concepts may cause the misconceptions". In addition, misconceptions also regarded as an error in understanding a concept. It usually indicated when explaining a concept by using its own language (Kustiyah, 2007).

The teacher is one of the factors that have contributed in causing of students' misconceptions to a certain material. If the teacher do something wrong, or a misconception in understanding and giving an explanation of learning concept, then students will also receive a misconception. This is consistent with the statement Yip

(1998) in Cibik (2008) which states that, “one of the reason for the occurrence of misconceptions on students is the teachers who have misconceptions on the subject”. From the following statements, it is known that misconception could happen to teachers who teach certain subjects. Misconceptions that arise continually are able to disrupt the formation of a scientific conception in students and the teacher's own self.

In this research, researchers interested in the topic of the human reproductive system, which is one of the concepts in the field of biological sciences. Human reproductive system is a scientific sex education which is closely related to daily life. Therefore, it needs a good understanding of concept. In accordance with the results of a short interview conducted by researchers before doing a research towards several biology teachers at the second grade of SMAN Banda Aceh XI Science class, some of the teachers expressed their incomprehension regarding of specific sub concept, therefore it makes difficult for them to teach it to students. By the teachers' incomprehension, it is very likely to cause misconceptions for teachers themselves.

One way that can be used to identify problems misconception is to use the method of certainty of response index (CRI). CRI method to explore the understanding of science, the level of confidence associated with the understanding and identify misconceptions that occur (Hasan et al (1999) in Hakim, Liliarsari, & Kadorahman, 2012) stated that the CRI obtained using the teacher answer the multiple choice questions. The CRI determines the level of certainty in each answer the teacher based on a scale of 0-5. This scale starts from guessing answers to the teacher believes the answer to any given question.

Based on these ideas, a further action needs to be done to find an image about them is conceptions that occurred to the biology teachers towards the concept of the human reproductive system.

## RESEARCH METHODOLOGY

This research was a descriptive research as it aims to investigate teacher respondents based on the concepts understanding (Nasution, 2012). The research sample selected by *clusterrandom sampling*, as many as 8 biology teachers at second grade class XI Science from four different senior high school. Each school consists of 2 teachers. The research instrument is a CRI test as many as 60 questions. The study design consisted of three phases, the preparation, execution, and analysis phase.

### Data collection

Construction a research instrument in the form of CRI test. It was multiple choice questions equipped with CRI values. Specifies the number of biology teachers of class XI Science who has taught the concept of the human reproductive system at their school. Then, doing CRI test and then calculate the CRI values obtained from the teachers' answers.

## Data analysis

CRI test results obtained are classified into three categories, understand the concept (UC), misconceptions (M), and not understand the concept (NUC), and then calculated the percentage of teachers' answers for each these categories. Obtaining the average number of CRI correct answers is done by summing the overall CRI score for each teacher' question divided by the number of teacher who answered correctly. To obtain the average number of CRI wrong answers is done by summing the overall CRI score for each question teacher divided by the number of teacher who answered incorrectly. Then adjusted average yield obtained with CRI Table 1 below:

**Table 1. Regulations to Distinguish Between Understand The Concept, Misconceptions, Not Understand The Concept to Respondents Individually.**

Answer criteria	Low CRI (<2,5)	High CRI (>2,5)
True	Not understand the concept (Guessing)	Mastering the concept well
False	Not understand the concept (Guessing)	Misconceptions

Source : (Hasan *et al*, 1999)

Furthermore, to determine the misconcepted subconcept by biology teachers can be identified through the compatibility between teachers' answer and reason for each question, which has been adapted to the literature in the form of a biology textbook for the course, such as Biology Volume 3 books written by Campbell *et al* (2004), Anatomy and Physiology (Scanlon, 2006), Reproductive System at a Glance Second Edition (Heffner & Schust, 2008), Medical Physiology (Ganong, 2008), Human Physiology: From Cells to Systems (Sherwood, 2011), and several supporting books relating to the human reproductive system.

## RESULTS AND DISCUSSION

The results of CRI tests indicate that biology teachers are identified suffering misconceptions on the concept of the human reproductive system. Percentage of teachers' answer from those three response categories showed in Table 2.

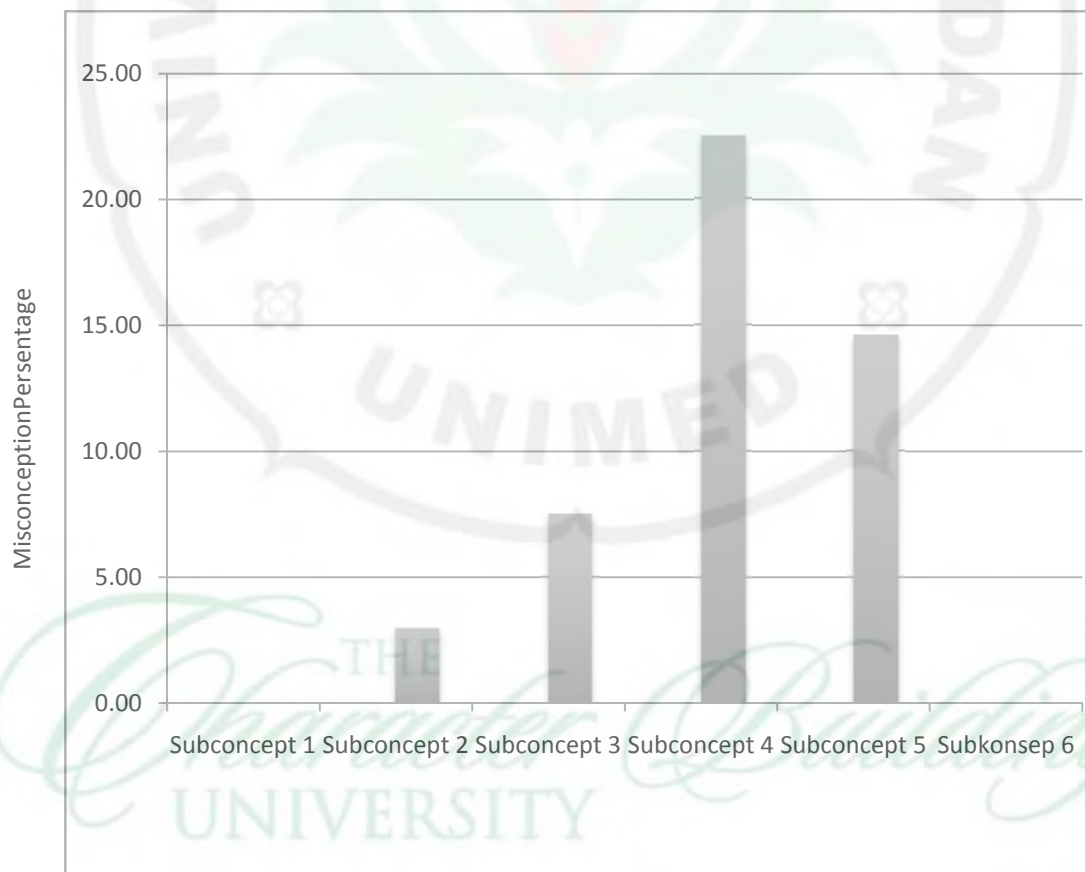
**Table 2. Percentage of Misconceptions, Understand The Concept, Not Understand The Concept on Biology Teachers.**

SubConcept Groups	Percentage		
	Understand The Concept (UC)	Misconceptions (M)	Not Understand The Concept (NUC)
Structure and function of human reproduction system	90,38	-	9,62
Gamete formation	82,74	2,98	14,28
Ovulation	55	7,50	37,50
Menstruation	37,50	22,50	40
Fertilization, gestation, child birth, and lactation	66,67	14,58	18,75
Deformity of reproduction organs	65,62	-	34,38

Based on Table 2 above, misconceptions experienced by teachers occurred in the entire sub concepts group of human reproductive system. The highest percentage of misconceptions happened in sub groups of menstruation, 22,50%. Meanwhile, the highest percentage also existed in the same subconcept for Not Understand The Concept (NUC) category, 40,00%. The result shows that biology teachers still lack in understanding the material of menstruation subconcept.

Based on data from the CRI test results, a comparison of the percentage of biology teachers' misconceptions, there are six sub concepts on the human reproductive system concept showed in Figure 1.

From Figure 1, it is known that there is a difference of the percentage of misconceptions at subconcept that is misconcepted by biology teacher. Misconceptions occurred in four sub concept of human reproductive system. The comparison of misconceptions percentage experienced by teachers can be showed from the description of each following sub concepts.



**Figure 1. Comparison of Percentage of Biology Teacher at Each Sub Concept of Human Reproductive System**

In sub concept 1 is the structure and function of the human reproductive organs, the teacher did not have misconceptions. In the second sub concept, the formation of gametes; the teachers are identified having misconceptions in the oogenesis process and the

influenced factors. For example, the teacher believes that the continuation of the meiosis II process would go on if affected by progesterone hormone. This statement is a misconception because, according to Campbell et al (2004) and Ganong (2008), the continuation of the meiosis II process would take place if there is a penetration of the ovum by the sperm (fertilization).

This is in accordance with the opinion of Sherwood (2011) which states that the entry of sperm into the secondary oocyte is required to trigger the second meiotic fission. The secondary oocyte which is unfertilized is never finish this final fission. During this fission, half of chromosomes together with little amount of cytoplasm was issued as the second polar body. Half of the other set (23 chromosomes unpaired) keep stay and is called as a mature ovum.

In the third sub concept, ovulation; the misconceptions experienced by teachers are occurred in the role of hormones that stimulate ovulation. For instance, the teacher believes that ovulation is stimulated by the FSH hormone. The answer given by the respondents had misconceptions because the function of FSH hormone is to stimulate the development of egg follicular and this growing follicle cells secrete the estrogen (Campbell et al, 2004; Scanlon, 2006). Thus, the hormone that stimulates ovulation is Luteinizing Hormone (LH). By the highest of LH concentrations may increase pressure of de Graafintrafolikel that resulted ovarian surface could not detain the pressure so the ovulation happened (Despopoulos&Silbergnagl, 2000; Ganong, 2008; Manuaba et al, 2007).

Examples of other misconceptions found in the hormone relation with the process of ovulation. The teachers stated that the estrogen relationship with the process of ovulation is stimulating the hypofisis to produce FSH so that the follicle get ruptured. In the actual concept, the relationship of estrogen to the ovulation process is stimulating the pituitary to secrete luteinizing hormone (LH) with high concentrations and suddenly causing ovulation (Despopoulos&Silbergnagl, 2000; Manuaba et al, 2007).

The fourth sub concept is about menstruation, teachers experienced the misconceptions on the menstruation sub concept. For example, the teacher gave a statement that menopause occurs because the ovaries do not produce eggs due to the hormone progesterone is decreased. In fact, the actual concept, menopause occurs as a result of the cessation of ovulation because of follicles are less responsive towards FSH and LH (Ganong, 2008). The fifth sub concept is about fertilization, gestation, childbirth and lactation. The examples of misconception that experienced by teachers are the use of urine for a pregnancy test because the urine of pregnant young women contains LuteinizingHormone (LH). While the actual concept is the presence of the Human Chorionic Gonadotrophin (HCG) hormone in the urine of pregnant women. The existence of HCG in the urine on early pregnancy is the basic of various laboratory tests for pregnancy. This hormone can be detected 14 days after conception (Baety, 2011; Bloom & Fawcett, 2002; Ganong, 2008).

In addition, teachers also had misconceptions on contraceptive methods. Students argued that contraceptive methods which do not allow for another pregnancy is the condom. Supposedly the right answer is tubectomy. In accordance to Siswosuharjo &

Chakrawati opinion (2010), contraception method which is permanent for women who sure do not want to have children is tubectomy. A voluntary surgical procedure to stop fertilization (fertility) a female person by binding and cutting the channel of fallopian tubes so that ovum are not able to meet sperm cells.

The sixth sub concept is about disorders of the reproductive organs, the teacher did not have misconceptions.

The main factor of causing the teachers' misconceptions in this study, is derived from the teacher's own thought. It means, these ideas can be obtained from the interpretation that appeared while reading a text book. The meaning of a teacher understood concept may have a mismatch between the opinions of the experts, so that will create a misconceptions on that concept. This is very worrying, because if a teacher has a misunderstanding of a concept, it is possible for the students to get the misconceptions of the teacher. Relating to Woolfolk and Nicolich statements (1984) in Hewindati and Suryanto (2004), which states that there is a close relationship between the quality of explanations and knowledge of teachers to student learning achievement. The lack of teachers' knowledge will lead to unclear presentation of the lessons that can lead to misconceptions.

In addition, the factors of misconceptions on teachers in this study also sourced from the textbook. Teachers tend to use some kind of senior high school textbooks level as the information sources to the concepts which are being taught to the students. Odom (1993) in Kustiyah (2007) states that, text books are used as the only source of information for teachers will encourage the misconceptions on the teachers.

Misconceptions derived from the text book is very harmful, because besides the teacher misunderstood towards the concept, then the students will also experience the same misconceptions. In accordance with the Adisendjaja and Romlahstatement (2007), if teachers use the only source book contained errors and misconceptions, it is not surprising to say that the form of the students' misconceptions may be multiplied by the textbook, because textbooks are the primary resources for teachers.

Teachers should use several books which has more detailed of concepts presentation and clearer than the senior high school textbooks level, such as books for the course. It is intended for teachers mastering and understanding the concepts better, so that teachers can more easily determine which senior high school textbooks that will be used as a teaching materials at school.

## CONCLUSION

The result of survey showed that the experienced teachers are identified had misconceptions. The misconceptions experienced by biology teacher occurred in four sub concepts, the formation of gametes; ovulation; menstruation; fertilization, gestation, birth, and lactation. The highest percentage of misconception sub concept found in the sub concept of menstruation. A major misconception factor comes from the ideas of the teacher's own thought and textbooks.

It is expected that misconceptions research on different concepts can be continued so that the quality of education will be better in the future.

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## SMAN 1 STUDENT'S PERCEPTION IN PREPAREDNESS TO COPE WITH TSUNAMI DISASTER

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### Abstract

The purpose of study is to analyze the factors that affect tourist visits in Sabang and their willingness Knowledge will ultimately form a perception, while the output of the owned perception is preparedness. The purpose of this study was to determine the perceptions of SMAN I students in their preparedness facing tsunami disaster. This research was using descriptive-qualitative quantitative methodology to measure SMAN 1 students' perception in their preparedness for tsunami. The samples of this research were 88 students of SMAN 1. The results showed that the majority of student / student answered the question correctly in accordance with the theory. Those accurate perceptions were probably based on experiences, reading materials, and mass media. Perception will affect someone preparedness in dealing with the disaster.

**Keywords : perception, preparedness, tsunami**

### INTRODUCTION

Aceh tsunami disaster that occurred in 2004 was the biggest disaster in terms of the number of victims. The tsunami on 26 December 2004 was also hit several other countries such as Thailand, Malaysia, Sri Lanka, India, Maldives and Bangladesh, even to Africa country such as Somalia, the number of victims were hundreds of thousands lives. Aceh was the region that worst affected by the tsunami and it is accompanied with the highest number of victims. The massive number of victims due to the impact of the tsunami in Aceh and due to the lack of public knowledge about the tsunami, particularly in places that have never learned from the experiences of their ancestors, how the tsunami happened although some people on those places already heard about "ie Beuna". Unlikely in the islands Simeulu, they learn from the experience of the tsunami that happened in 1907 where they called it "smong", so the tsunami that occurred in 2004 and also hit the islands but the number of casualties Simeulu just under 10 people. The number of victims due to the impact of the tsunami also caused by the government in their disaster management paradigm because it merely reactive (progress when disaster occurred) but forget the pre-disaster activities (before the disaster) as mitigation and preparedness. When an earthquake happened almost 9 magnitudes, the government did not realize that there would be a tsunami struck the Acehnese. Government had no preparedness especially for people who never socialized on disasters. Unpreparedness society and government aid, exacerbate the surviving victims, so victims that could still be helped also become casualties.

Along with the release of Act 24 of 2007 concerning disaster prevention, disaster management paradigm change to the comprehensive manner that includes pre, during and post disaster. Preparedness is an effort that must be considered in the pre-disaster activities to reduce the risk of disaster, if the disaster ever happens again. To improve community preparedness, one attempt to do is to raise public awareness about disasters and establish disaster preparedness teams. From now on, a widely socialization of disaster has to be done as well as forming a team of disaster preparedness in the community either by the government or by non-governmental organizations (NGOs), especially at the school level, so it needs to be seen how good the perceptions of the students with the understanding that has been received on disaster preparedness. One of the schools which had been established as a disaster preparedness school is SMAN I Banda Aceh, where the school is located in tsunami-prone areas so it is necessary to do research on the perception of student / student of SMAN 1 Banda Aceh on tsunami preparedness, to see the extent to which perceptions that the students held in the tsunami disaster preparedness.

## METHODOLOGY

This type of research is descriptive-qualitative-quantitative methodology. The population is the student / SMAN 1 Banda Aceh. Samples were obtained by 88 students / student using random sampling techniques. Sample criteria used are students of grade 10, 11 and 12 who are willing to be the subjects of research. Research variables, namely:

1. The independent variables: Students / SMAN 1 Banda Aceh.
2. Dependent Variable: Perception of tsunami preparedness.

Tools and materials used in this study are a questionnaire and a pen. The flow of research is done by asking the willingness of students and then the distribution of questionnaires. The data obtained were processed and presented in tables and bar charts.

## RESEARCH AND RESULTS

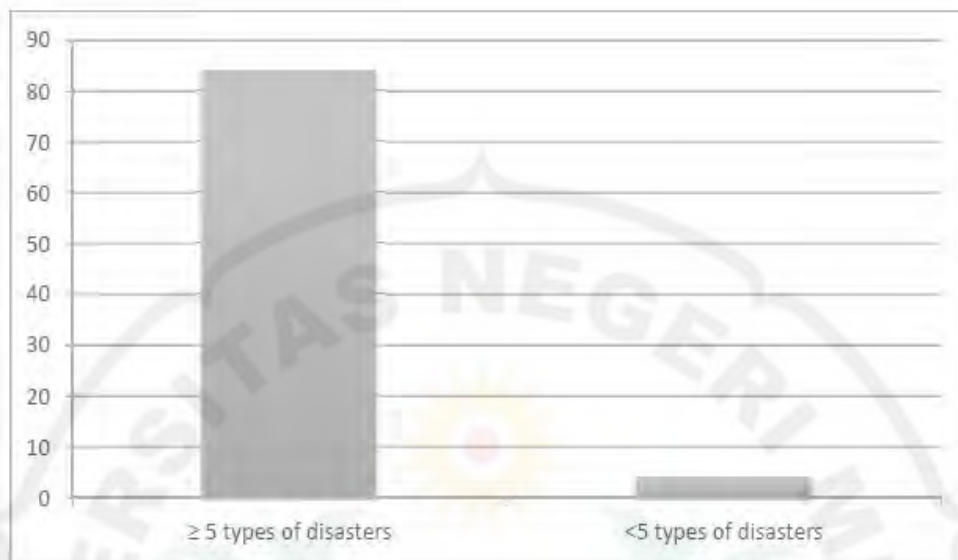
Based on the research result in table 1, it showed 29 students of grade 10 (32.77%) which consisted of 7 male students (7.91%) and 22 female students (24.86%), 27 students of grade 11 (30.15%) which consisted of 14 male students (15.82%) and 13 female students (14.69%), and 32 students of grade 12 (36.16%) which also consisted of 12 male students (13.56%) and 20 female students (22.6%).

**Table 1. The Distribution of SMAN 1 Banda Aceh**

No	Characteristics	Male	%	Female	%	Total	%
1	Grade 10	7	7.91	22	24.86	29	32.77
2	Grade 11	14	15.82	13	14.69	27	30.51
3	Grade 12	12	13.56	20	22.6	32	36.16
		33	37.29	55	62.15	88	100

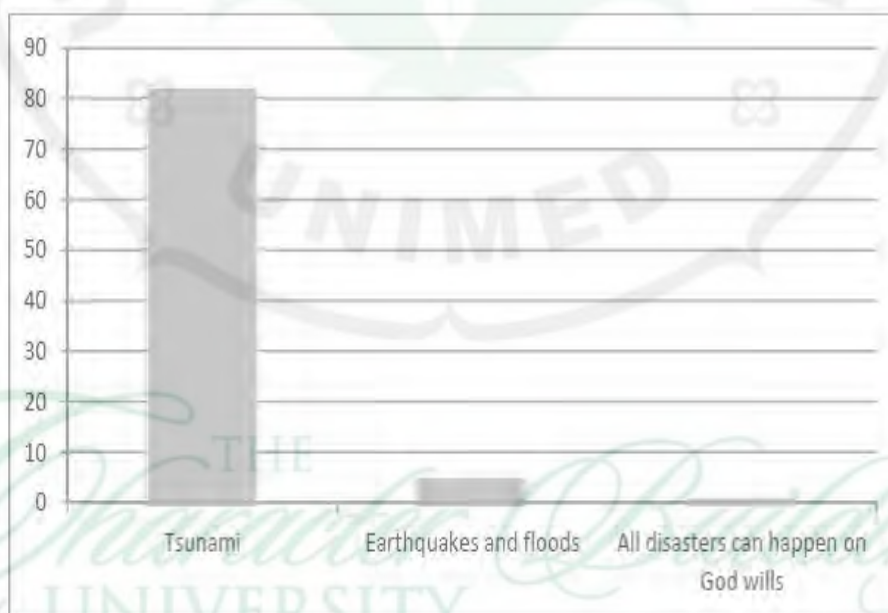
**Source : Primary Data of 2014**

The results of the research were obtained from the 13 questions asked in the research questionnaire, are as follows:



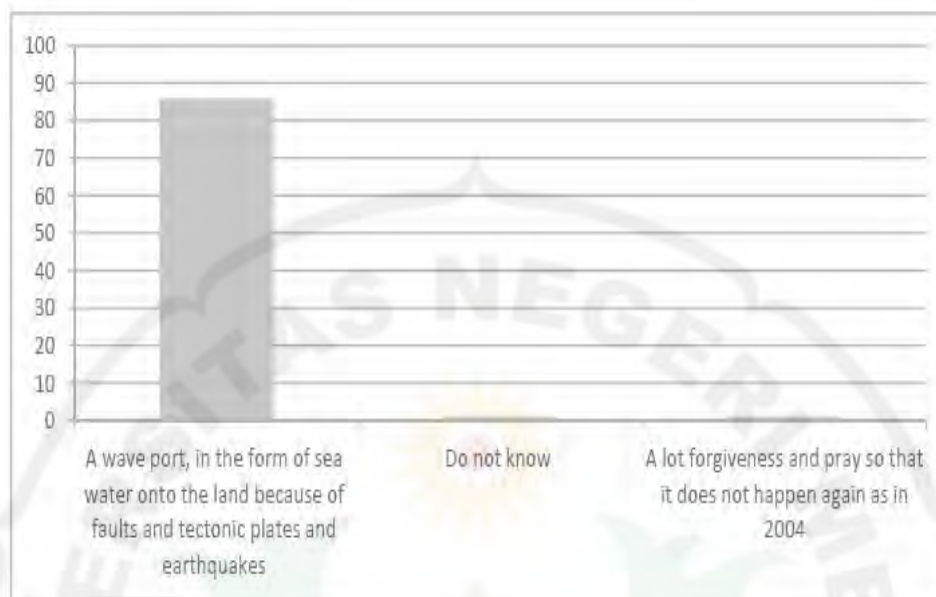
**Graphic 1. Types of disasters that are known**

The results were showed 84 Respondents answered 5 types of disasters, such as earthquakes, floods, tsunamis, landslides, volcanoes. The remaining 4 respondents answered <5 types of disasters.



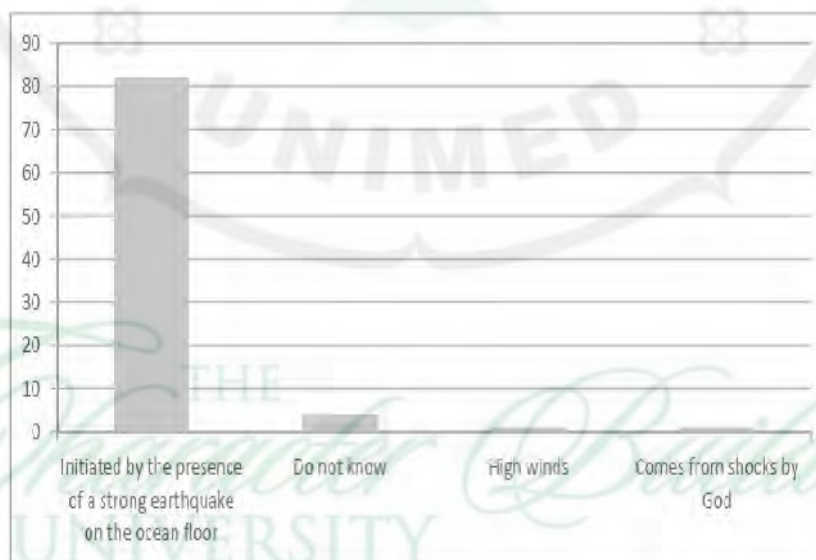
**Graphic 2. Disasters that could potentially occur in schools**

The result showed 82 respondents answered tsunami, and 5 respondents also answered in addition to tsunami, others disasters such as earthquakes and floods, and one respondent answered all disasters can happen on God wills.



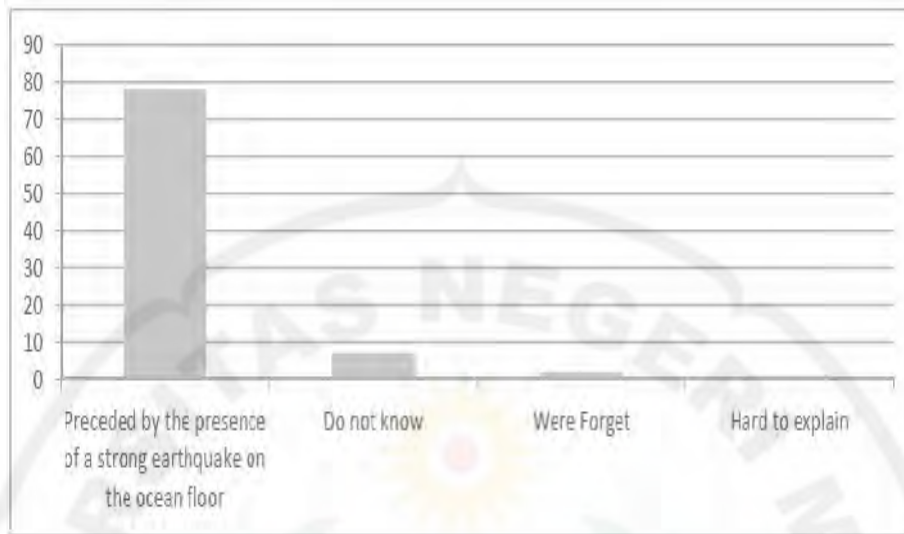
**Graphic 3. What do you know about the tsunami**

The results were described that 86 respondents answered that a tsunami is a wave port, in the form of sea water onto the land because of faults and tectonic plates and earthquakes cause casualties and property losses, one respondent answered do not know and 1 respondent answered a lot forgiveness and pray so that it does not happen again as in 2004.



**Graphic 4. Factors that caused the tsunami**

The result showed 82 respondents answered that the tsunami initiated by the presence of a strong earthquake on the ocean floor, 4 respondents answered that they do not know, one respondent answered that it happen due to high winds and 1 respondent answered that it comes from shocks by God that led to a slab of broken earth plate or eruption on the sea floor.



**Graphic 5. How the tsunami happen**

In the obtained results, as much as 78 respondents answered that the tsunami preceded by the presence of a strong earthquake on the ocean floor, 7 respondents answered that they do not know, 2 respondents answered that they were forget and one respondent answered that it hard to explain.



**Graphic 6. What would you do if an earthquake with great intensity happen**

The results were showed that 83 respondents answered escaping, finding a safe place, an openfield and a higher place, if it was not possible they hid under a strong table. 3 respondents answered praying, if the school could contact the parents, one respondent answered saving the closest kin, and do not panic, one respondent answered "ngucap,"<sup>1</sup> reports it to the elderly, run, and if he /she still at school, he/she pretended not to panic and stay cool, but slowly went out of the room.

<sup>1</sup>)Ngucap is the way Acehese refers to pray to God especially in dangerous or shocking situation)



**Graphic 7. What do you do if you learned that a tsunami is occurring**

The results showed that 76 respondents answered that they fled to higher ground, away from the sea or to the *escape building*, 6 respondents answered that they will seek the truth of the information, remain calm and try to avoid risky areas, 5 respondents answered that they will pray *zikr*<sup>2</sup> in asking for God's help for saving them, one respondent answered panic.



**Graphic 8. What should be done to minimize the tsunami victim**

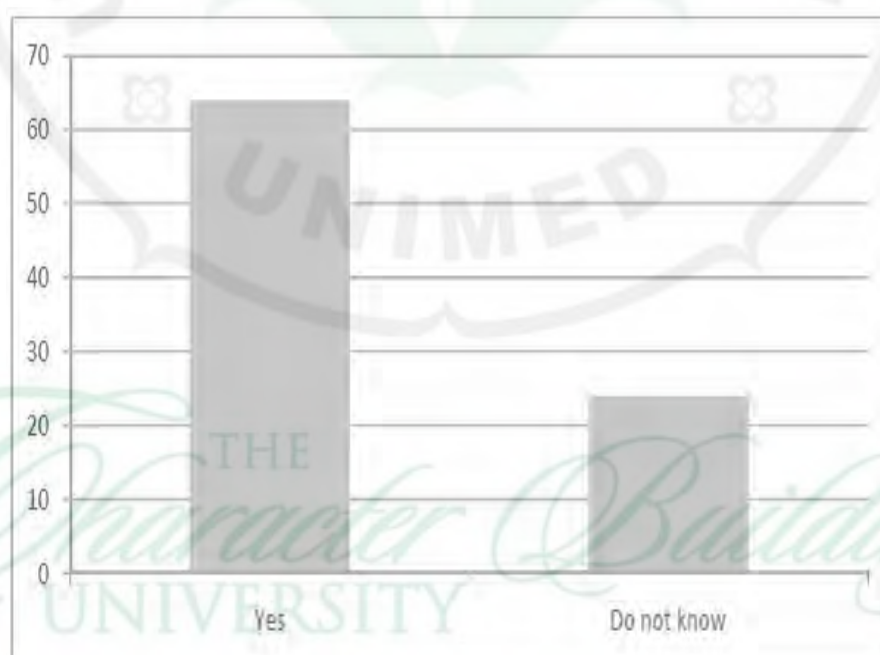
The results found that 78 respondents replied that we have to evacuate as quickly as possible, increase the socialization of the disaster, walking paths and evacuation building and increase the number of early warning system. 6 respondents answered that they do not know, one respondent answered that disaster is a lesson from God, one respondent answered that we should not panic, one respondent answered that it is volunteers concern, one respondent answered that we should alert to the situation.

<sup>2)</sup> *Zikr* is moslem praying way by reciting God's names



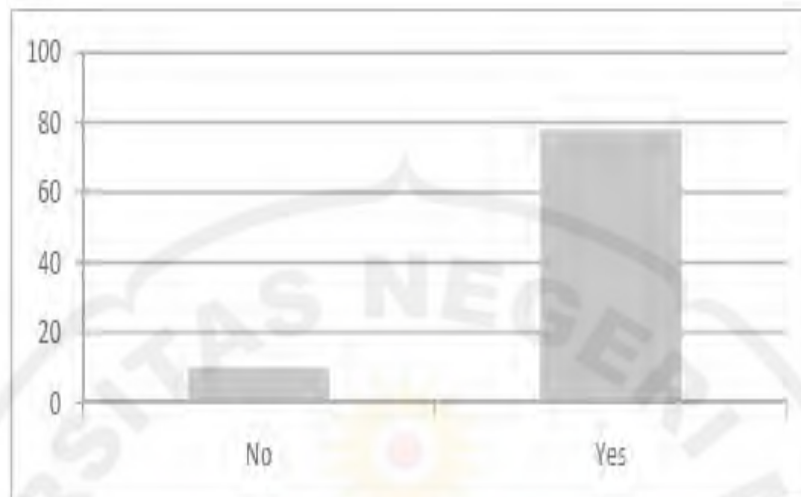
**Graphic 9. Is there a subject of disaster in your school curriculum**

The results showed that 81 respondents answered no, 5 respondents answered yes and 2 respondents answered that they do not know.



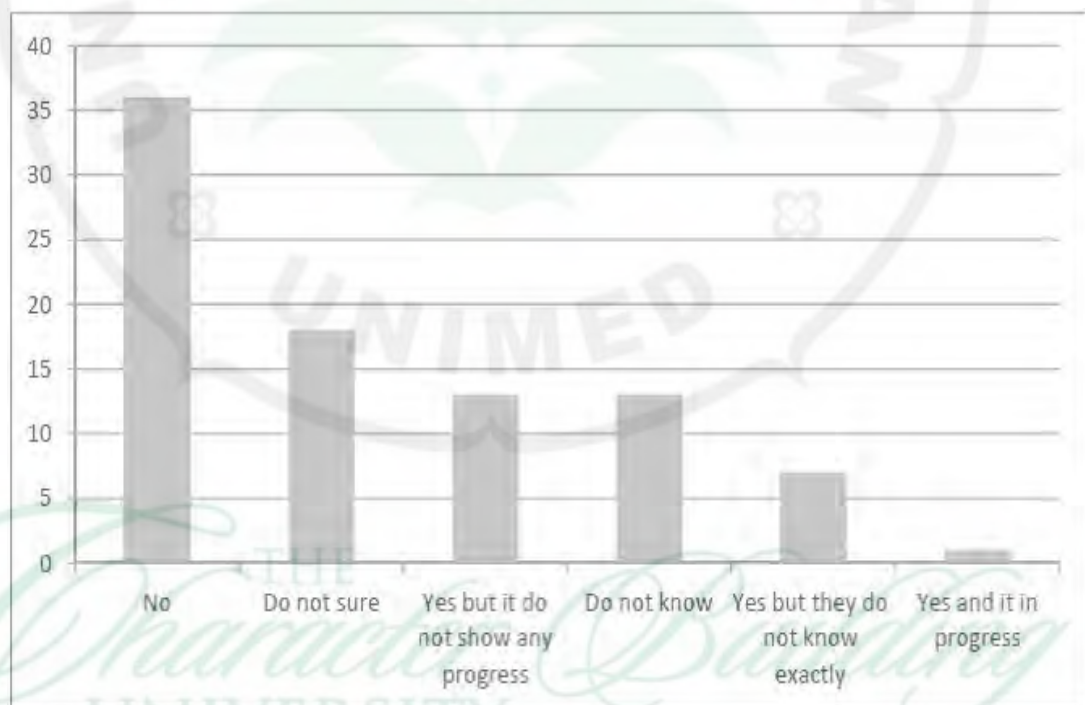
**Graphic 10. Was books and readings on disaster available in your school library**

The results showed that 64 respondents answered no and 24 respondents answered that they do not know.



**Graphic 11. Whether your school has the banners of the tsunami evacuation instructions**

The results showed that 78 respondents answered yes and 10 respondents answered no.



**Graphic 12. Does your school has a task force team of disaster**

The result showed that total of 36 respondents answered no, 18 respondents answered that they do not sure, 13 respondents answered that they do not know, 13 respondents answered yes but it do not show any progress, 7 respondents answered yes but they do not know exactly about it, one respondent answered yes and it in progress.





**Graphic 13. Whether you've ever done tsunami evacuation simulation in school**

The results showed that 43 respondents answered yes, 39 people answered they do not know, 6 respondents answered no.

Based on the data analysis of the diagram above, it can be explained that most of the students of SMAN 1 Banda Aceh have been answering the questions, related to tsunami-related definitions, causes and processes properly or in accordance with existing theory that the term tsunami comes from the Japanese word "Tsu "means harbor and" nami "means wave of the sea, hence the term" Tsunami ", was originally the ocean waves hitting the harbor. Tsunamis can occur for several reasons, mainly caused by the earthquake to the seabed at a depth of less than 60 km and the scale over 6 on the Richter Scale (90% of the tsunami). Tsunami can also be caused by volcanic eruptions on the seabed (approximately 9%), avalanche in seabed (about 1%), and the falling of a meteor into the sea but the latter factor is rare (Hamzah Latif, et al, 2000). The perception that has been properly obtained possibly comes from the experiences, reading materials, as well as mass media. Perception is a process when individuals organize and interpret their sensory impressions in order to give meaning to their environment. Individual behaviors are often based on their perception of reality rather than reality itself (id.wikipedia.org).

Gibson, et al (1989) in the book organizational behavior and management structure; provide a definition of perception is a cognitive process that is used by individuals to interpret and understand the world around it (the object). Factors that influence the perception are basically divided into two, namely internal factors and external factors. Internal factors are the factors contained within the individual, which include physiological factors, needs, interests, concerns, experiences and memories and moods. External factor is a characteristic of the environment and the objects involved. These elements can change one's viewpoint to the surrounding world and affects how a person feels it or accept it.

According to Law of Indonesian Constitution number 24 of 2007, preparedness is a series of activities undertaken through effective and efficient measures by organizing it to anticipate the disasters, while disaster preparedness is a condition of society which both individuals and groups having the ability physically and psychologically to face the disaster. Preparedness is an integrated part of disaster management. Preparedness in disaster management effort is made to ensure the appropriate disaster events so the victim and the impact of disasters can be minimized. Most of the students of SMAN 1 Banda Aceh have been answering questions related to preparedness and what should be done in facing the tsunami disaster, their answers were correct by looking for a safe place, higher ground, fled to *the escape building*, away from the risky area, do not panic and pray. Concerning to the students who are not informed about the existence of disaster signs and disaster task force teams, it is allegedly due to lack of socialization and failure of disaster task force team that has been formed.

## CONCLUSIONS AND SUGGESTIONS

The students of SMAN 1 Banda Aceh do not have the same perception and have many variations answers, but the answers can be inferred that the SMAN 1 students' understanding is very adequate although there is still a small part of students whose answers were not in accordance with the required

Disaster education should be incorporated into the curriculum so that students have the same perception about the disaster.

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# THE INVESTIGATION OF DISASTER KNOWLEDGE OF TEACHERS AND STUDENTS ON STATE JUNIOR HIGH SCHOOL (SMPN) 1 KAJHU, ACEH BESAR, ACEH PROVINCE

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## Abstract

The aim of this study was to investigate the disaster knowledge of teachers and students on State Junior High School SMPN1 Kajhu, District of Aceh Besar, Aceh Province, Indonesia. The samples of study were 19 teachers and 30 students. The data were collected by questionnaire that amounted to 15 and analyzed using descriptive statistics. It has been found that there was any different knowledge of disaster between teachers and students, whereas the mean knowledge of students was found to be higher than teachers. Due to the findings, therefore it has been suggested that teachers and students are strongly needed to have the best knowledge about the disaster, due the school was much closer to the disaster.

**Keywords: Disaster knowledge, Teachers and Students**

## INTRODUCTION

Schools, as a formal education institution, should disseminate adequate knowledge on disaster. The presences of schools in disaster are require collaboration among all concerned parties to provide the disaster knowledge to minimize the risk. SMPN 1 Kajhu, Aceh Besar, is one of schools located in disaster risk area, which has been relocated to the same place as it placed before the earthquake and tsunami hit. A safe school is a community of learners that are committed to a safe and health culture, aware of the risks, and has a well-established plan before, during, and after the disaster (PERKA BNPB No. 04, 2012). Therefore, this study was aimed to investigate the disaster knowledge of teachers and students.

This study was the initial survey to find out the adequate knowledge of teachers and students in understanding disaster. The student knowledge is essential and must be prioritized because the location of the school that is closed to the sea is a high risk factor. This study was conducted by investigating the knowledge and experiences of the respondent. Teachers as an educator and students as a learner who expected to improve the behavior toward disaster (Honesti, 2012). According to Astuti (2010), the indicators of assessing the students were related to the understanding of disaster through the dynamics thinking and acting in ORID (Objective, Reflective, Interpretative, and Decision).

## METHODOLOGY

The methodology of this study used questionnaire that given to teachers and students. The population of teachers in SMPN 1 Kajhu were 32, whereas the population of ninth grade students in SMPN 1 Kajhu was 50. It should use the solving formula to determine the minimum sample for the student respondents that can be seen below:

$$n = \frac{N}{(N \times d^2) + 1}$$

Where:

- n = number of sample;  
N = number of population;  
d<sup>2</sup> = determined precision equal to 10%, and  
1 = Constant number

Therefore by using the formula, it could be determined that students who were respondent in this study was 33 students.

The questionnaire design followed the Likert scale. According to Riduwan (2003), Likert scale is the standard assessment of variables that giving a code for each items for measure the statement. It could be a positive or negative statement as shown in Table 1.

**Table 1. Criteria score in Likert scale**

score range	Rating category
4 < x 5	Very Important
3 < x 4	Important
2 < x 3	Quite Important
1 < x 2	Unimportant
1	Very Unimportant

**Source: Riduwan (2003)**

After entire data has been collected, it recapitulated by using Microsoft excel. Analysis used in this study consist of : a recapitulation of respondent's response (teachers and students), then analyzed the frequency to determine the average of response of each respondents.

## RESULT AND DISCUSSION

The questionnaire was given to teachers and students at the same time. However, the respondent who were present in the school on that day was 19 teachers, and 30 students. Therefore, the samples for this study were 19 teachers and 30 students.

The questionnaire was consists of 15 questions which was intended to investigate the disaster knowledge of teachers and students. The questions was include: (1) The presence of disaster knowledge in school; (2) Provide the workshop or training related to

disaster; (3) The sustainability of disaster knowledge dissemination; (4) The availability of information about the high risk disaster area; (5) Provide the direction before, during, and after disaster; (6) The information about early warning system and evacuation route; (7) Established the schools based on disaster preparedness; (8) Controlling emotion during the disaster; (9) Creating the behavior and culture related to disaster; (10) The knowledge related to the highest risk of community (older, women, kids, and disable peoples) toward disaster; (11) Knowledge of how to rescue against disaster; (12) Schools as facilities which could be created the preparedness toward disaster; (13) The participation of school in disseminating the disaster knowledge to the community; (14) Controlled by the related parties in disseminating the disaster knowledge; (15) Establish the resilience to the community in knowledge application.

The percentage of respondents' response which considered 'very important' for each question is shown in Figure 1 and Figure 2.

Based on the respondents' responses, it can be seen that there were differences between teachers' and students' disaster knowledge, whereas the mean value of students' disaster knowledge was higher than teachers' as shown in Figure 3.

## CONCLUSION AND SUGGESTION

It was inversely with the initial presumption which told that the teachers' knowledge is higher than students. On the investigation of Suhengki (2014) shows that the average value of the students who were well-prepared for disaster are 73,43% and the teachers who were well-prepared for disaster are 82,76%. It can be concluded that the disaster knowledge of the students less than the teachers. As we know, teachers, are the role model for students, were expected to have the disaster knowledge more than the students. So the students could receive the adequate knowledge of disaster from them.

Factor that caused the students knowledge is higher than teachers is the availability of internet access. They can get much information about disaster from worldwide. In other hand, most of the teachers have no skill to operating the internet. They only received the information from the government and related parties which is very limited.

To achieve the good preparedness for all members in the school in order to reduce the risk, the teachers' disaster knowledge must be improved until they exceed the level of students'. Then, the students' disaster knowledge also must be improved due to the location of the school that is closed to the sea is a high risk factor. So that, when the earthquake occurs, they can be addressing the behavior toward the disaster knowledge.

A good preparedness will be created if both of the teachers and the students have adequate knowledge of disaster and can apply the knowledge together. It is also expected to be a figure to the communities.

The students in SMPN 1 Kajhu have more disaster knowledge than the teachers.

## RECOMMENDATION

This study is expected to be a reference for further investigation in order to increase the knowledge between teachers and students. It also could provide a reference to all concerned parties in improving the knowledge of disaster.

## ACKNOWLEDGEMENTS

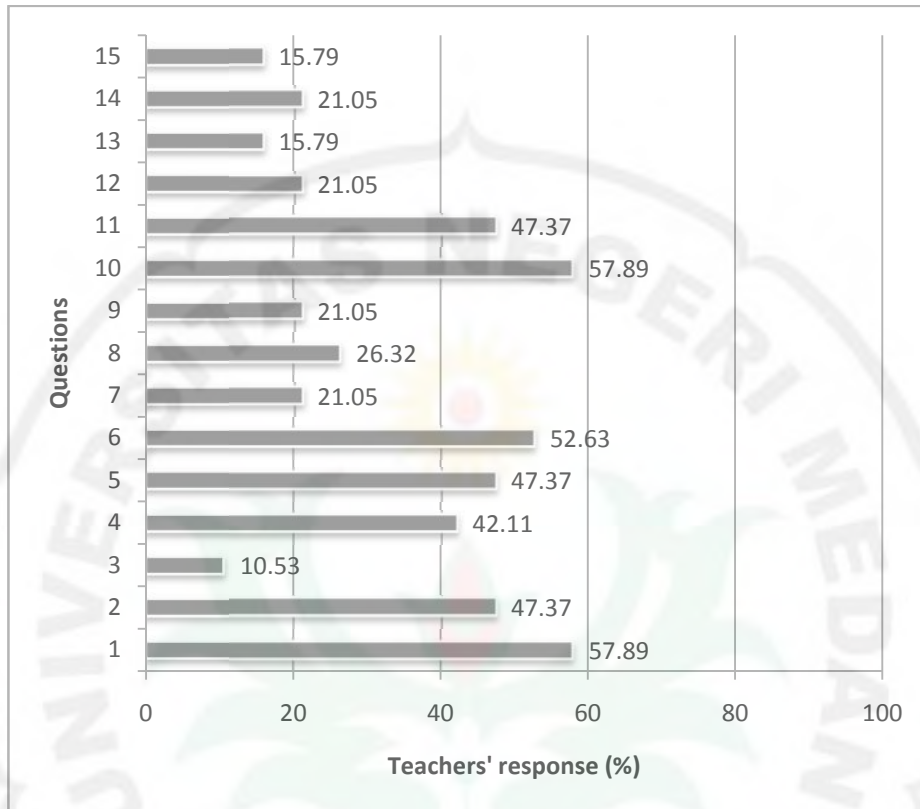
The gratitude is sent to all of teachers and students in SMPN 1 Kajhu who were participated as respondents in this study.

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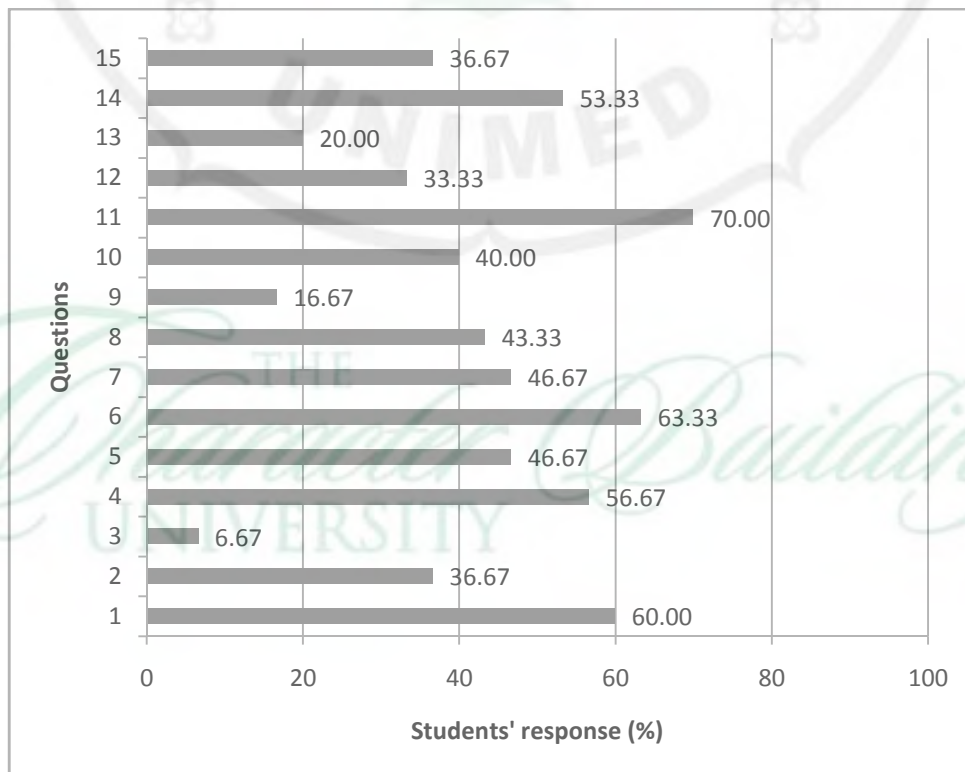
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**GRAPHIC**



**Graphic 1. The percentage of Teacher respondent's response for each question**



**Figure 2. The percentage of Student respondent's response for each question**

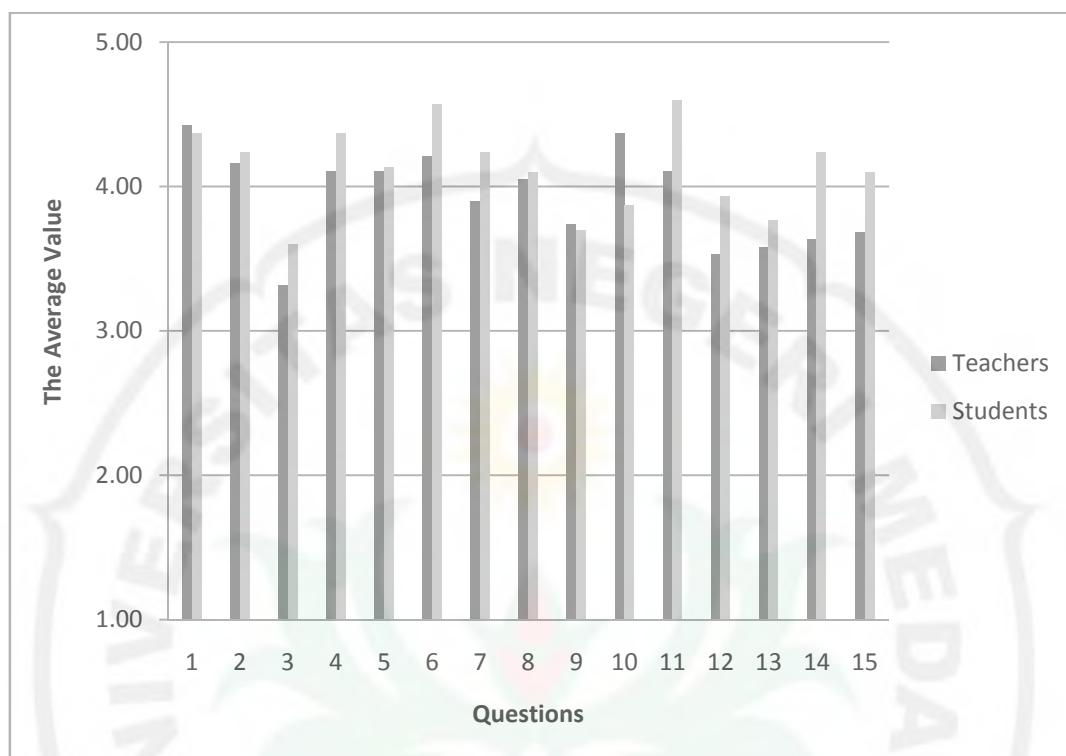


Figure 3. Average Value between respondents

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## THE EFFECT OF GUIDANCE GROUPS AND *SELF EFFICACY* TO STUDENTS' KNOWLEDGE AND ACTION OF SMPN 8 BANDA ACEH IN FACING THE EARTHQUAKE

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### Abstract

The purpose of this study was to determine the effect of guidance groups and self efficacy to students' knowledge and action of SMPN 8 BandaAceh in facing the earthquake. This study used aquasi-experimental research method approach. Student preparedness data was collected using a questionnaire. The study population was all students of Junior High School 8 (SMP N 8) Banda Aceh, Indonesia. Samples were selected using purposive of classVII-5, as many as 10 students were given guidance group. Data were analyzed using regression analysis. The results showed that the students knowledge and action of SMPN 8 BandaAceh in facing the earthquake can be increased through group counseling and self-efficacy by 1,041 % . This means that 98.96 % contributed by other factors .

**Keywords:** group counseling, self efficacy, knowledge, actionand earthquakes

### INTRODUCTION

Earthquake can occur anywhere and any time, no exception when learning process at the school. When a disaster occurs while learning process not only impact to physical damage but also can impact to students' psychology. One of disaster impact such as most of people were deaths and injury to children or students under the age of 15 years. The number of deaths of children are very high its cause stress and shock (Septiadi, 2012).

The geography of Banda Aceh often hit by earthquakes, so the school community need to be equipped with an understanding of good disaster management. Particularly for Junior High Schools students who tend to be closer with their friends (Partini, 2007). The most effective method that should be given is the method that enable students in sharing with a peer group. So to improve the knowledge and action of Junior High Schools students to anticipate and react quickly and appropriately to the needs of disaster management strategies of cognitive, affective management, as well as training in psychomotor (Ayriza, 2009). In particular (Watts, 2007) suggested that group counseling can improve students' knowledge and action in facing disasters so as to reduce the risk of earthquakes. This agreed as Lestari's opinion (2012) that the opportunity to convey ideas, feelings, and problems faced by students.

School community needs to address disaster preparedness by building, bringing the death toll and damage when a disaster occurs can be minimized. Similarly, the psychological impact can be prevented if the school community have a disaster preparedness early (Rinaldi, 2009). Provides knowledge to the whole school community needs to be given to enable them to prepare themselves and be more vigilant in facing of

disaster. The disaster knowledge will help teachers and students to seek prevention of shock sustained (Septiadi, 2012).

Preliminary studies conducted in Junior High Schools Banda Aceh in September 2013 showed that the students' attitudes in facing disaster are not appropriately. In accordance with the stage of development that is still unstable, emotional (Santrok, 2007) they tend to panic when disaster occurred, such as earthquakes. They were not confident with their ability control the earthquake.

Knowledge of disasters especially earthquakes Junior High Schools has been introduced in Banda Aceh on geography lesson. But it's not teach deeply, so that the application in disaster control was very limited. As a result students' knowledge in facing disaster and action still low. Further this condition enhanced efficacy with themselves against disaster was low.

The research on the effects of group counseling to the students' in knowledge junior high and students' action in facing disasters rarely done in the school, where the school situation in Banda Aceh was earthquake troubled. Learning of geography was effective to improve students' knowledge and action in facing disaster. Because of students' awareness of disaster in Banda Aceh. It is necessary to find an attempt to solve it. Such as finding an effective method to conduct for junior high school students. Therefore group guidance suitable applied in junior high school age so that, the research conducted on students' knowledge the effects of group counseling on the knowledge and action in Junior High School of Banda Aceh. The results of this study are expected to be able to find a class and an increased knowledge of student actions to disasters.

## STUDY BIBLIOGRAPHY

### Definition of Guidance Group

Group counseling is an activity undertaken by a group of people to take advantage of group dynamics. That is, all participants interacting in group activities, free expression, responding, giving advice, and so forth; talk about what it all worthwhile for the students' own self and to the other participants (Prayitno, 1995)

Guidance Group is a group activity in which group leaders provide information and guide the discussion so that group members become more socially or to help the group members to achieve common goals (Wibowo, 2005).

From the definition of group guidance above, it can be concluded that group counseling is an activity undertaken by a group of people by utilizing the dynamics of the group that is the expression of mutual interaction, provide feedback, suggestions, and so on, where the leader of the group provide useful information in order can help individuals achieve a common goal .

### Defenition of Preparedness

According to the Indonesian Institute of Sciences (LIPI) the United Nations Educational, Scientific and Cultural Organization (UNESCO)/ International Strategy Disaster Reduction/ ISDR, (2006) defines the preparedness of the government, a

community group or individual as "measures that enable government, organizations, societies, communities and individuals to be able to respond to a disaster situation quickly and appropriately. Preparedness measures are included in the preparation of disaster management plans, maintenance resources and personnel training". Preparedness activities focused on the development of plans to respond to disasters quickly and effectively.

Additionally, preparedness is a series of activities undertaken by the organization to anticipate disasters and through appropriate measures effectively and efficiently. Important in the face of disaster preparedness and become part of the strategy of mainstreaming disaster risk reduction or disaster risk reduction (Law No. 24 Year 2007 on Disaster Management). Based on definitions of preparedness in the above sense, it can be concluded that preparedness is an essential element in disaster management to disaster risk reduction can do in the face of a disaster effectively and appropriately before the disaster occurred.

### **Factors that influence preparedness**

#### ***Knowledge Students in Earthquake Disaster***

Knowledge is a very important factor for the preparedness of a school community. Frequent disasters can be used as an experience or a very valuable lesson about the importance of disaster were required knowledge possessed by each individual particularly in disaster -prone areas. Knowledge disasters that affect attitudes and concerns to be prepared in anticipation of disaster (LIPI UNESCO/ISDR, 2006).

#### ***Student attitudes in Earthquake Disaster***

Knowledge can influence the attitudes and concerns of individuals to be ready and alert in anticipation of disaster people living in disaster-prone areas. Attitude formation can be obtained from the learning process, and the personal experiences of others, as well as socialization. The attitude in the face of disaster is the embodiment of knowledge that is implemented through an action and skill to save themselves during a disaster (LIPI UNESCO/ ISDR, 2006 ).

### **METHODS**

This research method is designed using *quasi-experimental* research methods. Form of experimental that used the comparison of two groups they are and experimental group (*intact-group comparison*). In this design there are two groups used for research, in SMP 8 Banda Aceh. Class VII-5 as the experimental group (who were given counseling group) and Class VII-7 as a control group (who did not give counseling group)

### **Test Validity**

Test validity in this study using the product moment correlation formula as follows.

$$r_{xy} = \frac{n(\sum XY) - (\sum X)(\sum Y)}{\sqrt{[n(\sum X^2) - (\sum X)^2][n(\sum Y^2) - (\sum Y)^2]}} \quad (1)$$

### Test Reliability

In the reliability test was used to test the internal consistency using Cronbach alpha formula as follows.

$$r_{11} = \left[ \frac{k}{k-1} \right] \left[ 1 - \frac{\sum t_b^2}{V_t^2} \right] \quad (2)$$

In addition, this study used a simple regression analysis. This method used to determine the effect of variables if there are more than 2 variables to the equation:

$$Y = \alpha + b_1x_1 + b_2x_2 + \dots + b_nx_n \quad (3)$$

## RESULTS DISCUSSION

### Students in Disaster Preparedness Earthquake

Research conducted in junior high school 8 Banda Aceh assessed based on: knowledge, and action. Based on the percentage of knowledge and action then the percentage can be seen in Table 1:

**Table 1. The Results of Percentage Factors Affecting Preparedness**

School	Junior High School 8	
	The number of responden	The number of responden
	Frequency	Frequency
Knowledge	37215,83%	28014,12%
Action	35114,94%	29514,88%

Source: Primary Data, 2013

### Knowledge Students in Earthquake Disaster

The results of the percentage of students knowledge in experimental group is 15.83% experimental class and control group is 14.12%. In the process of group guidance given in the experimental group that students are able to mention the understanding of earthquakes, types, sources, and faults. The students could explain the reason why earthquakes occurred. Students are able to describe the process of the earthquake. Students are able to explain how to deal with the situation at the beginning, while, and after the earthquake. Students are able to retell the experience of the earthquake events experienced by themselves or experienced by others. Students are able to mention a safe place to take shelter. The students are able to mention the contents of the bag disaster preparedness.

Students are able to tell how to deal with earthquake risks. Students are able to practice handling at the time before, while, and after an earthquake.

Students more over, the students also stated already known about knowledge of earthquake and the students know what the earthquake means, and I can learn the experiences of the universe. Students are able to mention the contents of a backpack that filled with food, drinks, box P3K, change of clothes, flashlight (lighting equipment) and carry securities. Students able to mention earthquakes classification are divided into volcanic earthquakes, tectonic and debris.

Students gained knowledge and able to know about the earthquake. However, the control group, in choosing the answers most of students choose the wrong answer to the classification of earthquakes, the contents of the backpack, bags and pans are used to protect the head from debris during the earthquake, and the earthquake seismograph is recording device.

This is supported by LIPI UNESCO/ISDR, (2006) stated that knowledge is a very important factor for the preparedness of a school community. Frequent disasters can be used as an experience or a very valuable lesson about the importance of disaster were required knowledge possessed by each individual particularly in disaster-prone areas. Knowledge disasters that affect attitudes and concerns to be prepared in anticipation of disaster.

### **Student action in the face of Earthquake Disaster**

Based on the research results obtained by the percentage of students of experimental group is 14.94%, and the control group students is 14.88%. In the experimental group, students are choosing answers and strongly agree and agree. If an earthquake of students ran down under the table, run to an open space, Finding objects in order to protect themselves, for example a bag placed over the head. Stay away from large trees, power poles, away from the window glass. Suggest friends to run to the safe place. I'm afraid can not find my close friends. If I hear an earthquake will happen I would be prepared to take such P3K equipment, food, drinks and a change of clothes and took the family out of the house.

Besides, students will have knowledge about the action taken, the students also apply the knowledge gained in the group guidance when conducting simulated earthquake. However, the control group students are more varied in choosing the answer strongly disagree, disagree, agree, and strongly agree. So not all students have the same opinion with the statement, and the students never do earthquake simulations .

This is consistent with the statement of LIPI UNESCO/ ISDR, ( 2006) stated that the attitudes and actions of human beings is the perception, knowledge and skills they have. School community aims to build the capacity of the whole school community to cope quickly and appropriately. Thus, the entire school community be a target, not just students

## CONCLUSIONS AND SUGGESTION

### Conclusion

Based on the research and discussion that has been described, it can be concluded that the students who had received group counseling, not only gaining insight or knowledge, but students also simulate how an earthquake before it happens, when it happens, and after the earthquake occurred. In group counseling can also improve students' *self efficacy*. It is evident that the percentage of the acquisition of knowledge and action. From the results obtained statistical test that no effect of group counseling and self efficacy of students' knowledge and action in the face of the devastating earthquake of 1.041%. While the students who did not receive counseling groups, lack insight or knowledge about the earthquake, but it also never do the simulation. So that students only get knowledge about earthquakes is very limited. Statistical test result obtained no effect of group counseling and *self efficacy* to the knowledge and actions of students in the face of the devastating earthquake of 0.683%

### Suggestion

Based on the conclusions that have been described, the researchers advise the school in order to improve the self-efficacy of the students' knowledge and action in the face of earthquake as follows :

- 1) The school may conduct group counseling and self-efficacy on students' knowledge and action in the face of the earthquake, in extracurricular activities. Since time is limited if only carried out on a geography lesson.
- 2) It is expected that the Principal for the proposed training on disaster education material made regular basis to agencies or departments of education and school community to reduce the impact or loss of life if an earthquake occurs while the student is in school.
- 3) The group counseling services not only in SMP 8 Banda Aceh but in other schools also need to do these activities, thus providing knowledge to others.

### ACKNOWLEDGEMENTS

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# THE USE OF EVACUATION ROUTE MAPS ON LEARNING DISASTER PREPAREDNESS ON STUDENTS CLASS V ON STATE PRIMARY SCHOOL 19 BANDA ACEH, INDONESIA

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## Abstract

The aim of this study was to determine whether the use of evacuation route maps can help students State Elementary School (SDN) 19 Banda Aceh in understanding learning disaster preparedness. This study is a quasi-experiment. The population was all students of SDN 19 Banda Aceh. Sampling for students by purposive sampling, taken a class that is a class V student as many as 17 people. Data were collected by means of questionnaires provide disaster preparedness in students. Based on the results of the study it can be concluded that the use of evacuation route maps can help fifth grade students of SDN 19 Banda Aceh was 89.7% in the understanding of learning disaster preparedness.

**Keywords:** evacuation route maps and disaster preparedness

## INTRODUCTION

Disasters can result in loss of life, property and effects. This is due to the lack of knowledge of the community to prepare for natural disasters that often comes suddenly. This condition requires an understanding and knowledge of disaster risk reduction. Law No. 24 of 2007 on disaster risk reduction explained, so the impact of disasters can be minimized. Disaster risk reduction is one of preparedness.

The paradigm shift that first disaster prevention emphasis on post-disaster phase (emergency response) and now prevention priority on pre-disaster phase (preparedness) which aims to reduce disaster risk, so it is done before the disaster preparedness. This indicates the importance of science as a disaster preparedness efforts. Preparedness requires a lot of human resources trained and required public participation. Students is one part of a community that can be prepared, nurtured and taught to be a resource Prepared for disasters (Asiandi et al., 2010). Prepared resources in disaster-affected areas of the disaster. The area affected by the disaster one of which is the village Rukoh Subdistrict Syiah Kuala. In the village there is a State Primary School (SDN) 19 Banda Aceh.

Location of SDN 19 Banda Aceh which is close to the sea  $\pm$  3.6 kilo meters and never hit by the earthquake and tsunami in 2004 but has been rebuilt. The building has undergone earthquake on 11 April 2012 magnitude 8.5 to 8.8 magnitude, but there is no damage to both structure and function. In spatial Elementary School (SD) is located in front of the Mosque Rukoh, the village street does not have the capacity as an evacuation

route, especially for four-wheeled vehicles (ambulances, fire trucks, and other transportation). The main street of the village Rukoh an evacuation route for students of SDN 19 Banda Aceh to safety, namely Blang Bintang.

This suggests that it is necessary evacuation route maps for elementary students as disaster preparedness efforts. This study aims to determine whether a use evacuation route maps can help students of SDN 19 Banda Aceh in understanding learning disaster preparedness.

## METHODOLOGY

The research design of this study is the research used a quasi-experiment. This research was carried out on one classroom to provide treatment to the learning process by using the disaster preparedness evacuation route maps, can be seen in Figure1.



**Figure1. Evacuation routemap**

Procedures for:

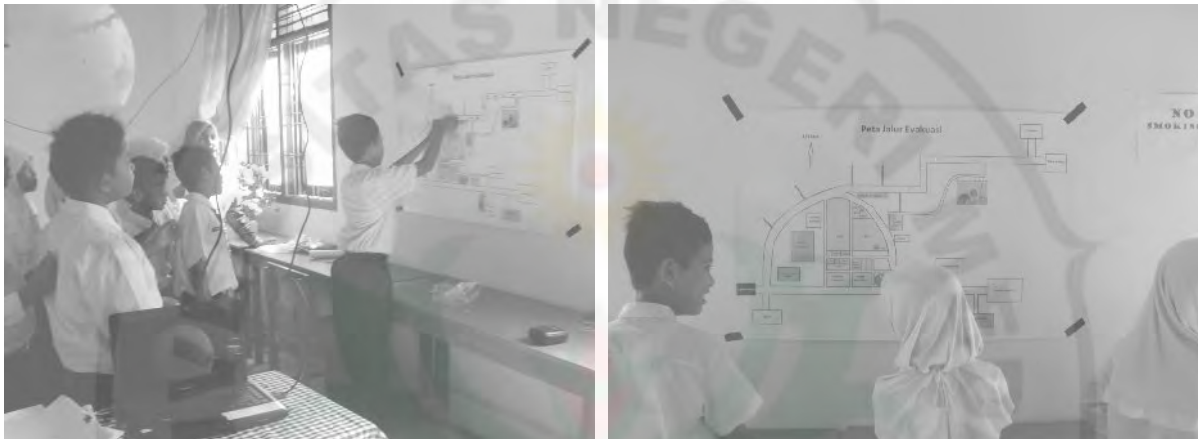
1. Students are given the knowledge about disaster preparedness.
2. Furthermore, students are distributed into 4 groups totaling 4 or 5 students.
3. The teacher explains to the students about the evacuation route maps.
4. Teachers and students agreed evacuation route to be traversed in the event of a disaster
5. Each group will be distributed in the form of pieces of paper arrows.
6. Students stick to paper form to the arrow on the evacuation route maps that are in front of the class.
7. Last of teachers and students to discuss the re-evacuation route to safety.

The population in this study were all students of SDN19 Banda Aceh. Sampling for students by purposive sampling. Samples taken one class that is a class V as many as 17

students. Data were collected by means of questionnaires provide disaster preparedness in students.

## RESULT AND DISCUSSION

Learning disaster preparedness with the use of evacuation route map shield on 22 April 2013, can be seen in Figure 2.



**Figure 2. Activities students of SDN 19 Banda Aceh**

After the learning process, students were given a questionnaire about disaster preparedness. The questionnaire to determine the level of understanding of disaster preparedness learning with evacuation route maps on fifth grade students at SDN 19 Banda Aceh, can be seen from the success of the students as much as 85%.

Elementary students' learning outcomes in learning disaster preparedness and evacuation maps usage is 10.3% answered in correctly (disagree), and 89.7% answered correctly (agree), then the students' understanding of disaster preparedness is good because it is already achieving results.

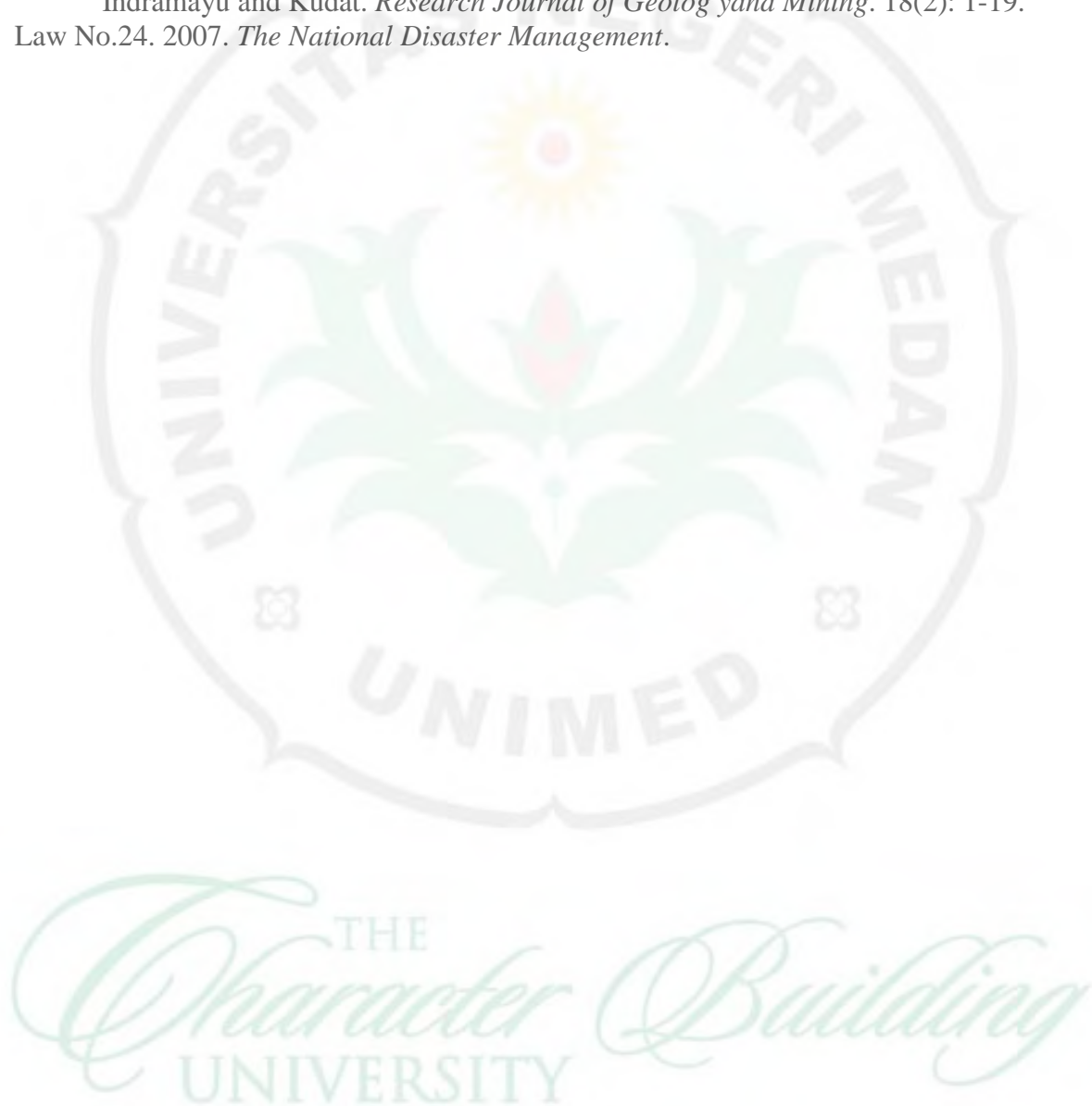
Nirmalawati, (2011) states that through education, especially in elementary school students in understanding the concepts of disaster preparedness so as to change the attitude and behavior of students in the face of disaster. Pemahami potential disaster with a natural disaster that may happen, there is much prevention, proactive and preparedness before disaster strikes (Ruswandi, et al., 2008). This signals then need to increase preparedness in an effort to prepare themselves for disaster. This shows the importance of preparedness for elementary students in an effort to prepare the community to respond to disasters that occur unexpectedly.

## CONCLUSION

Based on the results of the study it can be concluded that the use of evacuation route maps can help fifth grade students of SDN 19 Banda Aceh was 89.7% in the understanding of learning disaster preparedness.

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# THE STUDY OF PREPAREDNESS TO EARTHQUAKE DISASTERS IN PUBLIC HEALTH FACULTY SERAMBIMEKKAH UNIVERSITY BANDA ACEH

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## Abstract

The education about earthquakes disasters to the students in Public Health Faculty Serambi Mekkah University (FKM-USM) is very necessary, because with the education the students will be prepare anything regarding the hazards come to them and they will be able to find out the ways to save themselves when the earthquake occurs, other than they also have got the curriculum due to disasters management, so they have the way to save themselves through the preparedness process to avoid the disasters. The problems arising in the FKM-USM the buildings was not resistant against earthquakes, in fact, during the 2004 earthquake there are had some cracks on the side of the building, it will make the process of teaching and learning would be disrupted if an earthquake happen again. Beside that in FKM-USM does not have any signs to save themselves in the event of a disaster, such as a limited doors, evacuation directions are not clear, P3K equipment, etc. This research provides a number of questions to the students related to the earthquake, and the response from students was very diverse, but in essence the answer leads to things that are positive. The sampling technique using purposive sampling, ie sampling technique with particular consideration. This technique can be interpreted as a sampling process to determine in advance the number of samples to be taken, then the sample selection is done on the basis of specific objectives, and the results students are expected to know the actions that will be performed at the time of the earthquake threat and in order to reduce risk disaster.

**Keywords:** Education, Earthquake, Preparedness, FKM-USM

## INTRODUCTION

Disaster is an event that threaten and disrupt the lives and livelihoods caused by both natural factors and / or factors non-natural and human factors that lead to the emergence of human casualties, environmental damage, loss of property, and the psychological impact.

Preparedness is a series of activities undertaken by the organization to anticipate disasters and through appropriate measures and efficient.

The disaster in Aceh on 26 December 2004 was a huge disaster that make a lot of loss and damage in any sector. The earthquake is the one type of the disaster, and the earthquake are most dominant occurred in Aceh. These research was conducted in FKM-USM on February 17, 2014 due to FKM-USM already implementing a curriculum that was based on to the Disaster Management.

## The Purpose of Research

The students, lecturers and staff of academic at FKM-USM is expected able to determine the steps to be taken when the earthquake occurs, if we have and learn the disasters knowledge, then we will be able to avoid the large of number of human casualties and property or will reduce the disaster risk reduction.

## The Benefit of Research

### 1. For Team Members

As the one of the reference in writing the papers, so that will help to improve in writing any papers, especially in earthquake knowledge and will provide added value for team members regarding the knowledge of the earthquake.

### 2. For Community

The community able to know several problems about the earthquake and we hope after they read these papers, they will provide the ability in protecting the environment because the natural resources are among the factors that affect the welfare of beings living.

### 3. For Students

The students will have the added value about the earthquake that which often occurs in Aceh, starting from the understanding, cause, impact and the way to mitigation, so that after the students read these papers they will always able to protecting the environment.

## METHODOLOGY

This research was using analisis deskriptif, technic sampling was using the purposive sampling, and the population are the students in FKM-USM in conducting observation and interviewing.

Here are the list of numbers the questions that we asking to the students in FKM-USM

1. How do you respond to the frequent earthquakes in Aceh ?
2. How do you react to an earthquake or if you are in the academic room ?
3. How do you think if an earthquake occurs while you're on the third floor ?
4. how do you think as a student to response the earthquake while you are studying in the class room ?
5. Have you ever heard about disaster mitigation ?
6. How do you prepare yourself if an earthquake occurs ?
7. Is the FKM-USM building is equipped with such systems in earthquake rescue ?
8. What Do you think that FKM-USM building when an earthquake is feasible and resistant to earthquakes ?
9. Is it necessary to provide rescue system in FKM ?
10. Is evacuation route available or have many door ?
11. Aceh is a disaster area, what should be done by the Aceh government in addressing this matter in order to reduce disaster risk ?

12. How do you think the existing early warning system in Aceh, do you know the purposes ?
13. What do you think when hearing about the disaster ?
14. What are the kinds of disaster you know ?
15. Is there any knowledge obtained from FKM-USM related disasters ?

Here are the list of numbers the questions that we asking to the lecturers and staff of academic in FKM-USM

1. How do you respond to the frequent earthquakes in Aceh ?
2. How do you react to an earthquake or if you are in the academic room ?
3. what if there was an earthquake and the earthquake when you're on the third floor, what would you willdo ?
4. Is the FKM-USM building is equipped with such systems in earthquake rescue ?
5. Have you ever been trained in ways to deal with the earthquake evacuation ?

## RESULT AND DISCUSSION

After we conduct the observations and interviews in FKM-USM, it was founded many varied answers from the respondents related to earthquake preparedness. The answer from the respondents essentially has a positive thing but at the time of the incident as lost all of control (panic, screams hysterically, running) to save themselves to the safe places.

The answer from them are like below :

1. The earthquake in Aceh will makeafraid and unsafe, because Aceh still in vulnerability area.
2. Out from academic room and go to open places, wait until safe and come back to work again
3. The government should make the simulation before disaster occur, make evacuation road in order to the people understand where should go to safe themselves.
4. The building in FKM-USM is not equipped with the rescue system
5. Go up to the roof, and wait until safe, then try go to the safe places

The earthquake is a vibration or shock that occurs as a result of activity within the earth, the ground we walk on, generally in the form of magma activity and shifting plates of the earth. The earth we walk on like a "soccer ball", which consists of several plates of skin. It's just a slab of earth (plate tectonics) always caused by the activity of magma moving beneath it.

Indonesia is the country that is located at the confluence of three major plates of the earth: the Eurasian plate, the Indo-Australian plate and the Pacific plate. This is the land which has the potential for large earthquakes and volcanoes in the world. But on the other hand, this country is very fertile, full of biodiversity, and was rich in mineral resources. All that can not be separated from Indonesia's position in the heart of the earth three plates meeting.

## CONCLUSIONS AND SUGGESTIONS

1. FKM-USM inadequate building in earthquake disaster mitigation process, because the building does not have the tools and signposts along the evacuation route.
2. Lack of the training and simulation or SOP when an earthquake occurs.
3. FKM-USM is located close to the sea.
4. Training and simulation routinely
5. The Building should be in accordance with the standard operating procedures for disaster earthquake resistant.

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# IMPLEMENTATION OF PROBLEM BASED LEARNING MODEL IN CONCEPT LEARNING MUSHROOM AS A RESULT OF STUDENT LEARNING IMPROVEMENT EFFORTS GUIDELINES FOR TEACHERS

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## Abstract

Problem based learning is a training strategy, students work together in groups, and take responsibility for solving problems in a professional manner. Instructional materials such as textbooks become the main reference of students in study of mushrooms, especially the material is considered less effective in responding to the information needs of students, make students look for other resources related issues mushrooms that is often difficult to be accounted for. This study aims (1) to determine the implementation of problem based learning model on the concept of mushrooms as an effort to improve student learning outcomes for the guidance of teachers, (2) to determine the effectiveness of biological products teaching materials mushrooms as a student reading. This research was conducted in SMA Banda Aceh with descriptive statistical data analysis techniques using a questionnaire survey of students regarding information mushrooms. These results indicate that (1) the development of problem based learning, (2) teaching materials of biological products based on fungal problems Mushrooms as a special supplement for students and teachers

**Keywords: Problem Based Learning, Instructional Materials and Concepts Mushrooms**

## INTRODUCTION

Learning model can dedefinisikan as a conceptual framework that depicts the procedure of organizing systematic learning experience to achieve a certain goal belajar, and serves as a guide for instructional designers and teachers in planning and implementing learning activities (Siberman, 2005). Problem based Learning provides active learning, independent, and self-contained, so as to produce students who are capable of independent self study continuing for life. In a model of learning problem-based learning class more lively atmosphere dengan discussion, debate, controversy clan, greater student curiosity, problem based learning is a teaching method that is motivating students to achieve academic success.

(Savery, 2006) describes the learning step in problem based learning model took my basic concept, pendifinisian problems, self learning, and knowledge exchange as follows: First, the teacher gives the basic concept of the learning procedure to be performed. In this activity the teacher gives, instructions, references, or links and skills required in learning. It aims to make students more quickly into the atmosphere of learning and getting map is accurate about the direction and purpose of learning. Second, is the definition of the problem. In this step the teacher delivered a scenario or problem and brainstorm students doing various activities. All members of the group to express their

opinions, ideas, and responses to possible scenarios that arise independently a wide range of alternative opinions. Third, is a self regulated learning. In this activity students are guided to find different sources to clarify the issues that are being investigated. Sources referred to in the form of written articles stored in the library, web page, or even an expert in the relevant field. Investigation phase has two main objectives, first so that learners seek information and develop an understanding of the relevant issues that have been discussed in class, and second with the information collected is presented in class. Purpose is the exchange of knowledge. After getting the source material for the purpose of deepening the self learning step, students were asked to discuss in their groups to clarify their achievements and formulate the solution of the problem group. This knowledge exchange can be done by having students gather appropriate and give each group presentations and responses.

Mahendra, et al (2008) Assessment describes learning in problem based learning model is done with authentic assessment. This assessment can be done by the teacher portfolio is a systematic collection of student works are analyzed to see learning progress in a certain period of time in terms of the achievement of learning objectives. Assessment is done by means of self-assessment and peerassessment. Self-assessment is an assessment conducted by the learners themselves to his efforts and his work with reference to the objectives to be achieved (standard) by the learners themselves in learning. Peer assessment is an assessment conducted in which learners discussed to provide an assessment of the efforts and results of the completion of the tasks that have been done alone or by a group of friends in

Chin (2008) emphasizes that learning is said to be effective when it begins with a concrete experience. Questions, experiences, formulation and drafting of the problems they create for themselves is the basis for learning.

Boud and Felletti (1997) describes the Advantages of PBL is the students are encouraged to explore the knowledge he already has then develop independent learning skill to fill the void. It is a lifelong learning because the skills can be transferred to other learning topics, both inside and outside of school.

Problem based learning that focuses on the problems that can evoke the experience of learning the students will have greater autonomy in learning, Lesperance. MM (2008)

Into the biology subjects including natural science. However, biology has a special characteristic of other science. Characteristics such as the existence of particular objects, problems and methods that have clear scientific structure

(Rusman, 2011) The purpose of biological science in general is to profess students understand the concepts of biology and its association with their daily lives, skills about the nature around for, and n various biology concepts to solve yang found in their daily lives. (Sardiman, 2009).

Students in the learning process less encouraged to develop kemampuan think. Classroom learning process directed to the child's ability to memorize information. Brain children forced to recall and hoard various information required to understand the information without recall to connect with their daily lives. As a result, when students graduate from school, they are smart but they are poor theoretical applications. In other

words, our educational process is not directed intelligent man, has the ability to solve the problems of life and is not directed to the human form of creative and innovative.

According to (Ibrahim, 2005) describes the approach that is considered appropriate biological science is problem-based learning approach, because the problem-based learning, learning in design in the form of learning that begins with the structure of the real problems associated with the concept of the concept biology that will be taught.

Learning begins after students are faced with a real problem structure, in this way the students know why they are learning, practical lab work or through discussion with peers themes, can be used to solve the problems it faces Johnson (2002). Problem based learning intended to improve learning outcomes and motivation, because through problem based learning students learn how to use an interactive process to assess what they know, identify what they want to know, gather information information and collaboratively evaluate the hypothesis based on the data they have collected (Jaskarti, 2007).

Subjects are all forms of material used to assist teachers in the classroom teaching and learning activitie. Instructional materials has a very important position in learning, namely the representation of the class in front of the teacher's explanation. Description teachers, description description should be submitted by teachers, and teachers presented information should be collected in the teaching materials. Thus teachers will also be able to reduce its activities to explain the lesson, have plenty of time to guide students in learning or student (Arends, 2008).

Teaching materials are wujud educational services to learners unit. Individual service may occur denagn teaching materials. Learners are dealing with material that is documented. Learners deal with information that is consistent. Participants were quick to learn, will be able to optimize their ability to learn the material he taught over and over again. Thus optimization of learning services to the learners may occur with instructional materials.

Teaching material is a material substance or subject matter systematically arranged, used by teachers and students in the learning process (Pannen in Belawi, 2003).

Instructional materials is the knowledge, skills, and attitudes that should diarkan by teachers must be learned by the students to achieve basic competency standards, there are several types of subject matter and the type of the type that is a fact, concept, principle or procedure and attitude nilai. Materi learning including the fact that the object name as the name of historical events, symbols, place names, people's names.

According to (Belawati, 2003) teaching materials can be grouped into three categories, namely the type of instructional print, non-print, and display teaching materials. Materials are printed invite a number of materials used in the paper, which can serve for learning purposes or submission of information (kemp and Dayton, in belawi, 2003). From the standpoint of educational technology, instructional materials in various forms as part of instructional media, therefore the design issues need to be done very carefully to ensure that most of the learning objectives can be achieved. In this study only discusses the concept of Mushrooms. Research activities to be conducted is about "Implementation of problem-based learning instructional model on the concept of mushrooms as an effort to improve student learning outcomes for a teacher's guide".

## **Problem Formulation**

To be able to provide guidance that can be used as a reference in the research, made the formulation of the problem as follows: "How is implementation model of learning problem-based learning on the concept of mushrooms as an effort to improve student learning outcomes for a teacher's guide?"

## **Research Objectives**

To determine the implementation of problem-based learning model on the concept of mushrooms as an effort to improve student learning outcomes to guide teachers.

## **Benefits of Research**

The results of this study are expected to provide benefits to educators in particular teachers of biology and readers

1. Provides information about students' prior knowledge on the material mushrooms (fungi), which is used to formulate appropriate teaching strategies so as to strive to increase the learning model and student motivation.
2. Helping to understand more about the development of teaching materials such as books and resources about environmental issues based

## **METHODOLOGY**

### **Model Development**

This research and development is an (Research and Development) model of learning, particularly in the form of product development of teaching materials on the concept of fungal biology-based approaches to the problem, which is the development of models of teaching materials in other forms, which complements its existing teaching materials.

Development models used in this research is a procedural model. Procedural model is a model that is descriptive, which outlines the steps that must be followed to produce the product. Procedural model used is based on R & D cycle Borg and Gall (in Setyosari, 2010), with the explanation that description has been modified and premises research objectives and actual conditions, as described in brief in the development of the model in the table below

### **Product trials**

1. Designs trials carried out in two stages, namely the expert testing and focus group testing. This is done in order to obtain complete data to see the response of students and improve the products developed
2. Subjects trials consisted of 42 randomly selected high school students from two schools in Bacolod City and a team of experts in the content and design of products that have qualified expertise S2 and S3
3. Type of data, test the product on purpose to collect data that can be used as a basis for acceptance of students to instructional materials as reading material for the concept

fungi obtained from the questionnaire via the test the students' understanding of the concept of small groups and the suitability of the content of teaching materials obtained from subject experts. The analysis used is deskriptif analysis.

### **Technical Data Collection and Research Instruments**

Techniques of data collection by questionnaire. There are three types of instruments structured questionnaire to capture information and data required in the development of teaching materials on the biological concept of mushrooms that suits your needs and specific information for students to study the concept of fungi, namely a questionnaire, questionnaire Questionnaire B and C

### **Research Procedures**

This research activity is divided into three phases, namely (1) the planning stage; (2) the implementation phase, and (3) data analysis stage

### **Analysis of data**

Analysis of the data in this study is descriptive, ie describing a problem, symptom, or state, and open test hypotheses. The data obtained in this study is qualitative data obtained from a questionnaire completed by the response of students and experts.

## **RESULT AND DISCUSSION**

Obtain the data of this study came from three sources of data on needs analysis, and field tests by students. The results of the three phases are as follows:

- a. The results of the needs analysis The data captured by the analysis of the needs analysis questionnaire distributed to the students needs. Needs analysis involving 65 students about the data needs of students can be concluded in which (a) to understand the concept of mushrooms using only fully student textbook learning. It shows that the lack of students in the learning resources; (B) Students expressed the need for additional teaching materials concept mushrooms that is integrated with other disciplines to address the needs of students in the era of globalization. Students need instructional materials still less answer the problems of mold, so that students are stuck fault information to solve the problem mushrooms. Based on the needs analysis necessary to develop teaching materials that aims to produce teaching materials in addition to the material mold that can assist students in answering the problems, appropriate information and organizing information into a solution for fungus problems, and to train and develop the idea of a critical attitude students in learning. To achieve these objectives the teaching materials developed using problem-based learning. The design of instructional materials can be inferred creativity, critical and participant analytics capabilities of students is very low so as to come up with ideas or new ideas in solving the problems that they face particular problems mushroom concept, from these results we developed teaching materials on the concept of problem-based biological mushrooms. This problem-based teaching materials to train

students to foster their ability to bring creative, critical and able to analyze the problems faced by students.

b. Development of teaching materials

At this stage the activities carried out are done testing on students. At this stage in doing 3 step test that is, small groups of 6 students, the group is 12 people, and a large group of 24 people. In this test assesses the students on display teaching materials, learning activities, affective awareness, resources gain Of the three field trials that saw an increase in the presentation of student assessment results for each of each indicator, thus the product of the development of teaching materials is very effective and feasible for digunakan as a source of reading material in the study for the concept in high school.

## CONCLUSION

Based on the discussion of the above results it can be seen that the product problem based teaching materials on the concept of mushrooms is based on a needs analysis. After going through the stages of assessment and testing, and revisions can be concluded that the final product of problem-based biology teaching materials, considered to be very effective as reading material for the concept mushrooms

## IMPLICATION

The impact of this research get very positive both to students, educators, and researchers for this study describes the substance of fungal problems in students and help facilitate communication between students and educators of the concept and delivery so that the original concept of the purpose of the concept can be achieved well. Research and product of this study, the textbooks which can also act as a guide concept mushrooms students and teachers. The product is very effective as an answer to the question that had fungus problems often form the question in the hearts of students who often end up falling to the wrong decision.

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## AN EDUCATION OF DISASTER RISK MANAGEMENT AT BUNG HATTA UNIVERSITY

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### Abstract

This paper deals with disaster risk management at Bung Hatta University. Disaster risk management refers to the identification, assessment, and prioritization of risk in terms of combination of threat (hazard) and vulnerability. As known, the threat of danger (risk) is a phenomenon by both natural factors and or non-natural factors together with human factors that cause human sacrifice, environmental damage, loss of property, and the psychological impact in a community. Furthermore, the vulnerability refers to the state within a community that makes them susceptible to the harmful effects of threats including physical vulnerability, social, psychological, and environmental. In order to understand the disaster risk, the community should be required by a range of knowledge and education towards preparedness in accepting, handling, and resolving the disaster. Therefore, Bung Hatta University as one of the higher education institutions collaborates with the Indonesian National Board for Disaster Management offers an education on disaster risk management at postgraduate program. The study program provides the competence of graduates to be ones who can evaluate and plan of action for disaster risk preparedness, emergency response, and disaster recovery with planned strategies.

**Keywords: Disaster Risk Management, Emergency Response, Preparedness And Recovery**

### INTRODUCTION

Indonesia, the region that consists of islands lies from Sabang (Aceh) to Merauke (Papua) with the natural and cultural wealth of magnificent. However, it has high enough potential for disaster. In recent decade, almost every year in the Indonesian regions face numerous of disasters such as earthquakes, tsunamis, floods, volcanoes, floods, hurricanes, tornados, landslides, and droughts that cause loss of life and property. Most of the victims died because of lack of know how to save themselves, lack of knowledge on natural signs (ecological environment) indicating the existence of a natural disaster.

In the western part of Indonesia, particularly in West Sumatra that prone areas for disasters. Some major disaster has occurred; earthquakes in 2007 and 2009, the tsunami in 2010, floods, landslides, hurricanes, and fires almost every moment, even the eruption of Mount Merapi threatens everytime. Dense population along the west coast of West Sumatra made a very vulnerable and susceptible to disaster. Moreover, related to the experts predict such situation will take place on megathrust earthquake followed by a tsunami Mentawai. If this occurs, the impact would be expected to shake the region along the west coast of Sumatra (Anon, 2012a).

Some basic consensus has existed regionally, nationally, and internationally. For example, Yokohama Strategy and Plan of Action for a Safer World 1994, the Economic and Social Council resolution 63, 1999 of the UN (International Decade for Natural

Disaster Reduction/IDNDR), Hyogo Framework of Action in 2005, Framework Beijing Action Plan in 2006, Indonesian act number 24 of 2007 on Disaster Management which is followed by its derivatives, including the National Action Plan for Disaster Risk Reduction 2010-2012 (Anon., 2010).

Accordingly, learning is very valuable at the time of the earthquake happened on April 11, 2012 at the coast of West Aceh. Ocean earthquake occurs, people were panic because of fear of the coming tsunami, they stayed away from the coast by driving a motor vehicle causing a huge traffic jam at each intersection (Anon., 2012a). Furthermore, the readiness of officer in view and manage early warning systems in the gate house need to be improved. By having an early warning system, it will function properly and effectively so that the occurrence of earthquakes that happened on 11 April 2012 will not be repeated again (Anon., 2012a). Under these conditions, we need to prepare human resource capacity and other communities in reducing disaster risk in a holistic manner.

In order to fulfill the needs and a more holistic approach to disaster management, Bung Hatta University in collaboration with the National Disaster Management Agency has opened a concentration of Disaster Risk Management under the Civil Engineering Program that has been accredited. On the following, it will be discussed briefly some aspects that relate to this concentration.

## **EDUCATION FOR DISASTER RISK MANAGEMENT**

According to Benson and Twigg (2007), less attention and efforts to wards mainstreaming disaster risk posed by disasters mainly caused by the increasing vulnerability of economic assets and social well-being and livelihood of communities to natural hazards that cause substantial losses. Becoming more aware, disaster is a serious threat to sustainable development in poverty reduction and the achievement of several goals of the Millennium. In this regard, it is required a number of devices to intensify and increase knowledge about disaster and risks and how to deal within the event of a disaster on society, especially in vulnerable areas. One way to overcome the problems is providing an education on disaster risk management. Therefore, Bung Hatta University in collaboration with the National Disaster Management Agency offers postgraduate education (Anon., 2012b).

## **PROPOSE AND COMPETENCE**

The purpose of this program is to provide expertise on disaster for the workers/staff working on aid agencies and national or international, government officials and other professionals that are interested in the interdisciplinary background in disaster management to understand the complex contexts, actions, and workings before, during, and after disaster (Anon, 2012b).

The main competencies of graduates from this program is (i) to assess, analyze, implement, and evaluate disaster risk reduction; (ii) to make a plan of an action preparedness, emergency response, and disaster recovery. Supporting competence deal with (i) identify the risks, hazards, and vulnerability to disaster risk management; (ii) determine the legal aspects related to the disaster; (iii) analysis and evaluate the

environmental aspects of disaster risk reduction; (iv) determine the methods and tools of analysis of disaster risk evaluation; (v) understand the concept and implementation of participatory community development for disaster risk reduction ; (vi) plan for the management of infrastructure (roads, bridges, energy, telecommunications) and housing; (vii) emergency action plan and apply in a state of disaster; (viii) planning and evaluation the water supply systems and sanitation in emergency situations; (ix) plan and apply the process of recover/rehabilitation and reconstruction; (x) apply the GIS for disaster risk management; (xi) determine the research method and applying it to a report in the form of scientific work as a thesis.

## STRUCTURE PROGRAM

As stated by Anon (2012), the structure program consists of three main components: (i) lectures/seminars, (ii) field studies, and (iii) a final project/thesis. Lecturers who get involved in teaching the materials and having seminars are the experts or scientist from college, professional, bureaucracy from various disciplines. While finishing the study, each of the student will be conducted with an independent research under the guidance of a supervisor/lecturer/ relevant experts, and it will be presented in a scientific report or a thesis.

## CURRICULUM

The curriculum is based on main and support competencies described in several courses with credits score. The number of credits is 40 credits distributed in four semesters. These can be completed in three semesters. The distribution of the courses and credits can be seen in Table 1.

**Table 1: Subject and credit (Anon., 2012b)**

Semester	Number	SUBJECT	CREDIT
I	1	Basic of Management	3
	2	Geospatial in Disaster Management	3
	3	Legal Aspect	3
	4	Infrastructure and Housing Management	3
		<b>Total</b>	<b>12</b>
II	1	Research Methodology)	3
	2	Community Based Disaster Management	3
	3	Risk Management	3
	4	Emergency and Early Recovery Management	3
		<b>Total</b>	<b>12</b>
III	1	Environmental Aspects on Disaster Risk Reduction	3
	2	Recovery Management/Rehabilitation and Reconstruction	3
	3	Water Supply and Sanitation in Emergencies	2
	4	Elective subject: - Resource Management (2 credits) - Material Procurement Management (2 credits) - Financial Management (2 credits)	2
		<b>Total</b>	<b>10</b>
IV	1	Thesis	6
		<b>Total</b>	<b>6</b>
	<b>Total</b>		<b>40</b>

## SUPPORT FACILITIES AND ACTIVITIES

Prior to concentration risk management is opened, Bung Hatta University has been providing studies center for Disaster Studies and Environmental Studies. Both of these studies center have been actively engaged in research and community services. The activities focus on research and planning earthquake friendly buildings, urban development and regional control, the use of local materials and waste material, retrofitting, and the planning of post-earthquake Singkarak (2007), a rapid assessment of damage to houses in regency of Agam, Tanah Datar, and Solok, and making the temporary (transition) houses in Agam and Tanah Datar regency. In 2009, after the earthquake in West Sumatra happened, Bung Hatta University in collaboration with University of Andalas and provincial governments have done a quick assessment of damage to public houses and public buildings in the city of Padang. There has also been done the manufacture of sample (temporary shelters) for Padang city and Pariaman (cooperation with PMI), Survey of housing damage in Padang (cooperation with Mercy Corp). In 2010, there has also been done a training for facilitators community of earthquake on September 30, 2009 (collaboration with BPBD, BNPB, and PU). Furthermore, the Center for Environmental Studies is active as a task force of climate change adaptation in West Sumatra.

## CONCLUSION

As a closing statement, Disaster Risk Management Education is needed to facilitate and improve the capacity of human resources (public and disaster management). Bung Hatta University is the second University to open the disaster education in Sumatra after Syah Kuala University in Banda Aceh. The program is held in cooperation with the National Disaster Management Agency. We really appreciate for the cooperation and express our sincer gratitude to the leaders of BNPB who provide the opportunity and give assistance to implement the programs at Bung Hatta University. Finally, for all of people and the community of disaster managers who have not had a chance yet to follow this program, we will invite to join us and study at Posgraduate Program at Bung Hatta University.

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# THE KNOWLEDGE ABOUT PREPAREDNESS OF EARTHQUAKE DISASTER OF IBNU SINA ACADEMY STUDENTS SABANG CITY, ACEH PROVINCE

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## Abstract

Sabang city is a part of Sumatera Island in Indonesia and closed to highly disasters. This study was aimed to know the knowledge of Ibnu Sina students about earthquake disaster preparedness. The methodology used was descriptive and cross sectional approach, with total 27 samples of respondents from a population of 74 students. Data were collected using questionnaire. The results showed that 66.67% of students have good knowledge. However, the knowledge was still needed to be improved through training, seminars, and integrated the earthquake disaster preparedness into the curriculum.

**Keywords:** Knowledge, Preparedness, and Earthquake Disaster

## INTRODUCTION

Indonesian territory located at the confluence of three world's plates is prone to earthquakes, almost all regions of Indonesia have experienced it ranging from small scale to large scale, except in part of the Borneo island. Damage caused by the earthquake that occurred also varied ranging from minor damage with slight victims up to huge damage with a large number of victims as well.

Earthquakes that caused by tectonic activity due to sudden plates shifting have a greater destructive force especially if the epicenter of the earthquake occurred on the land, albeit on a small scale can result in damage that would be very dangerous. In addition tectonic earthquake, there is also a volcanic earthquakes which caused by increased volcanic activity, earthquakes usually are not too big. There was also an earthquake due to a meteor or asteroid collision to earth but rarely occurs (id.wikipedia.org).

According to the theory of tectonic plates, the Earth's surface was split into several large tectonic plates surface. Tectonic plate is the hard segments of the earth 's crust that float on the liquid and burning astenospher so they can move freely and interact with each other. Border area of tectonic plates was the places that have an active tectonic conditions, which can cause earthquakes, volcanoes, and formation of the plateau. The theory of tectonic plates is a combination of the previous theory such as the theory of continental drift and sea floor spreading. (Fauzan suryani putri, et al, 2011)

An earthquake is a condition in which the earth vibrating or shaking that caused by the collision between the plates or other reasons, for example due to a volcanic eruption. Earthquakes can occur due to the sudden release of inner energy that creates seismic waves, typically a series of several vibrations from several earthquake focuses. When viewed from the large amount of energy or vibration that was released, generally the

largest earthquakes will be preceded by small earthquakes, called the initial earthquake (foreshock), followed by a major earthquake (mainshock), and then followed again by the small scale vibrations. (Fauzan suryani putri, et al, 2011)

Earthquake as earth tremor movement in an area depends on the epicenter, the strength or magnitude, duration, occurring on the land or sea, which overall can causes panic of the human race. Mitigation built by the government and public, such as the construction of earthquake-resistant buildings, public preparedness to face earthquake and others is an important factor.

Development of profound knowledge of the disaster should be done optimally and covers all relevant aspects, not just the government, PMI, BPBD, but not less important is the role of education to incorporate disaster science to the curriculum, so that rising up a great concern for the nation's children, know and understand the threats around them, the risks that may occur, as well as to build capacity to facing disaster.

Ibnu Sina Academy of Nursing in Sabang city is a Nursing Diploma programme in the Sabang city, founded in 2004. After the earthquake and tsunami in Aceh, the academy received support of new two-floor campus building from the Norwegian Red Cross with building conditions feasible for disaster emergency, for example wide stairs with many evacuation routes, large lecture hall, with wide door, and others, and have incorporated Disaster nursing sciences into the curriculum since 2008.

The Academy has vision and mission as a novice professional education based on the ability of the academic profession that produces graduates as skilled nursing media obtained through various forms of experiential learning laboratory practice, field clinic practice held in health care real structure. The educational programme lasts for 3 years and was divided into 6 semesters. Implementation of teaching and learning activities were using *Sistem Kredit Semester* (SKS) with a total study load of 116 SKS with details of 50 SKS theory, 46 SKS practice and 20 SKS clinical, including courses in disaster nursing subject who already taught at level II even semester and III odd semester in the local curriculum. (Ibnu Sina Academy of Nursing, 2012).

The purpose of this study is to describe the earthquake disaster preparedness knowledge of the students of Ibnu Sina Academy of Nursing Sabang City in 2014.

This study's method is descriptive and using cross-sectional approach in order to reveal the students's knowledge about earthquake preparedness at Ibn Sina Academy of Nursing Sabang city.

The population in this study is the first and second year students of Ibnu Sina Academy of Nursing Sabang city of 74 respondents, given the very short time of this study researchers determined samples using Slovin formula, in order to get the total sample of 27 respondents with sampling technique of random sampling.

Here is an example of a module on Disaster Nursing courses:



### A. The primary key is

Recognizing what is called an earthquake. Ensure that the structure and layout of your home can be protected from harm caused by earthquakes (landslides, liquefaction, etc.). Evaluate and re-renovating your building structure to avoid the danger of earthquakes.

### B. Know the environment of your working place

Note the location of doors, elevators and emergency stairs, in the event of an earthquake, you already know the safest place to take shelter.

Learning to do P3K

Learn to use a fire extinguisher

Write down important phone numbers to be contacted in the event of an earthquake.



### C. Routine Preparation on where you work and live

The furniture (wardrobes, cabinets, etc.) shall be attached to the wall (nailed, tied, etc.) to avoid falling, collapsing, shifting in the event of an earthquake.

Store flammable materials in a place that is not easily broken to avoid fires.

Always turn off the water, gas and electricity when not being used.

### D. The cause of the most harm of earthquakes is due to falling material

Set heavy objects as far as possible be at the bottom

Check the stability of hanging objects that can fall during an earthquake (eg lights etc)



### E. Tool that should be exist in every place

P3K box

Flashlight / battery

Radio

Supplement foods and water



### A. If you are inside a building

Protect your head and body from the rubble with hiding under the table etc.

Find the safest place from rubbles and shaking

Running out if you still can do it



### B. If you are outside a building or an open area

Avoid buildings around you like mansions, electrical poles, trees, etc.

Pay attention to where you stand, avoid if soil fracture occurred

### C. If you're driving

Out from your car and get away from the car to avoid shift or fire. Perform point B.



### D. If you live or are on the beach

Stay away from the coast to avoid the danger of tsunami. .

### E. If you live in a mountainous area

In the event of an earthquake avoid the possible avalanche areas.







### A. If you are inside a building

Go out of the building in an orderly manner  
Do not use the escalator or elevator, use the stairs.  
Check if there are injured people, do P3K.  
Phone or ask for help in the event of severe injuries to you or people around you.

### B. Check your surroundings

Check if there is a fire.  
Check the event of a gas leak.  
Check the event of short-circuits.  
Check the flow and water pipes.  
Check if there are things that can harm you (turn off electricity, do not start a fire, etc.)



### C. Do not enter a building that has been affected by the earthquake

because there is still the possibility of rubbles.

### D. Do not walk in the area around the quake

the possibility of the danger of aftershocks are still there.



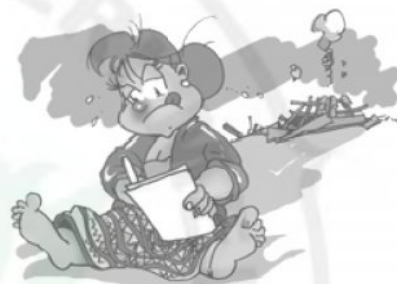


**E. listening to the information.**

Listen to the information about the earthquake from the radio (in case of aftershocks).

Do not be easily provoked by issues from unobvious source.

**F. Complete a questionnaire given by the relevant agencies to determine how much damage occurred**



**G. Do not panic and do not forget to always pray to almighty God for the sake of the security and safety of all of us.**



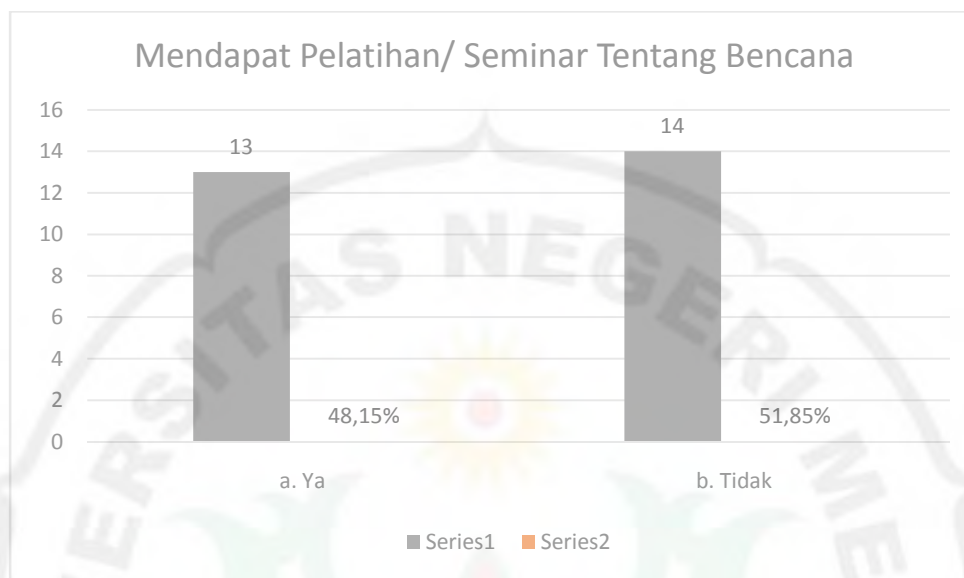
**DATA PRESENTATION**

**Identity-Related Frequency Distribution**

*Do you ever get disaster related subjects*

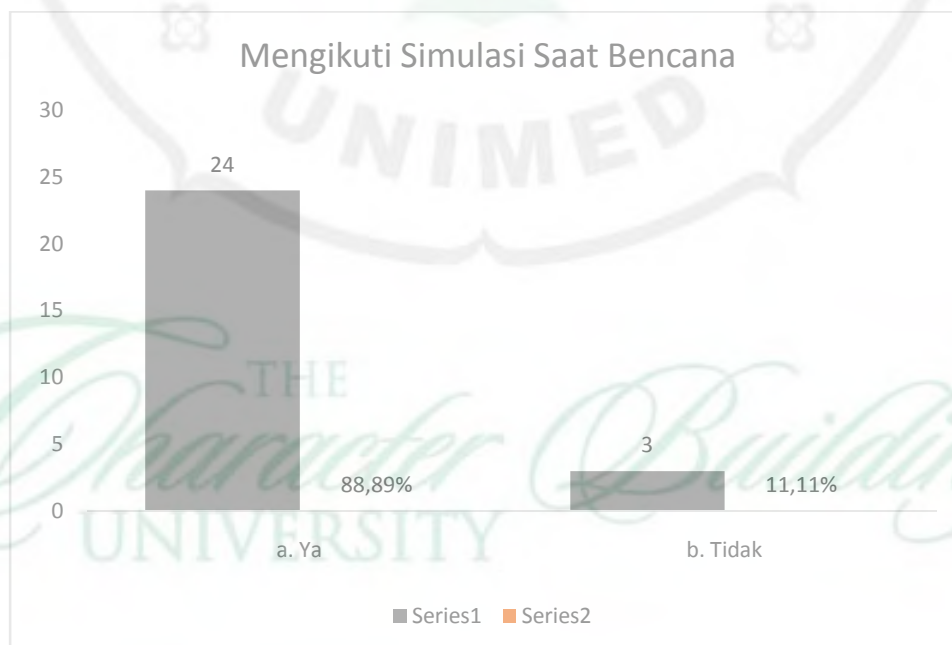
Based on the results of the questionnaires that have been done by the researcher it can be seen in the diagram above that the respondents who had received disaster subject gave the answer "YES" as many as 17 respondents 62.96%.

*Did you ever get a seminar / training on disaster*



Based on the results of the questionnaires that have been done by the researcher it can be seen in the diagram above that the respondents who had received seminars / trainings on disaster gave the answer “YES” by 13 respondents 48,15 %.

*Have you followed the rescue simulation of disaster*



Based on the results of the questionnaires that have been done by the researcher it can be seen in the diagram above that the respondents who had attended the disaster simulation gave the answer "YES" as many as 24 respondents 88,89 %.

*Training / seminars that have been followed*



Based on the results of the questionnaires that have been done by the researcher it can be seen in the diagram above that the training that attended by respondents was disaster nursing training which was 21 respondents 77.78% and disaster management seminars: a health perspective as much as 6 respondents 18,52 %.

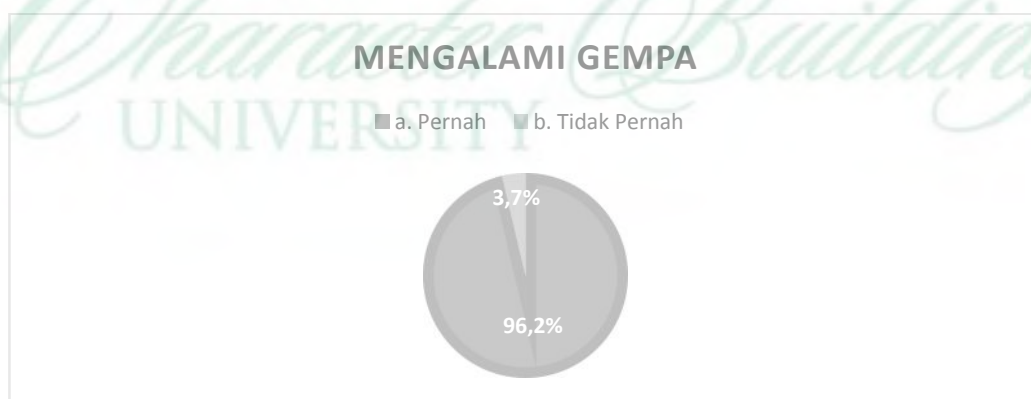
*Earthquake Disaster Knowledge-Related Frequency Distribution*

NO	CATEGORY	F	%
1	Good	18	66,67
2	Lack	9	33,33
TOTAL		27	100

Based on the above table it can be seen that the knowledge of students about earthquake preparedness in Ibnu Sina Academy of Nursing in Sabang city is was in good category of 66,67 %.

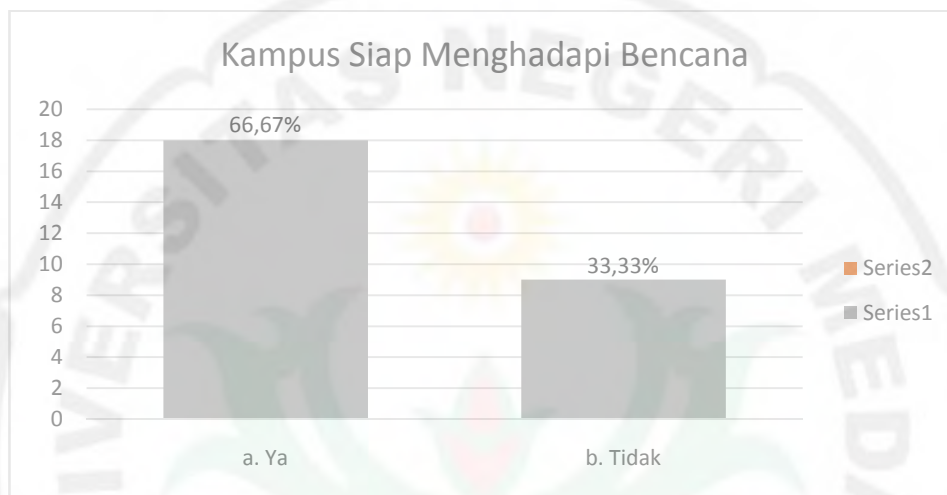
**The frequency distribution of the earthquake experience**

*Experienced earthquakes*



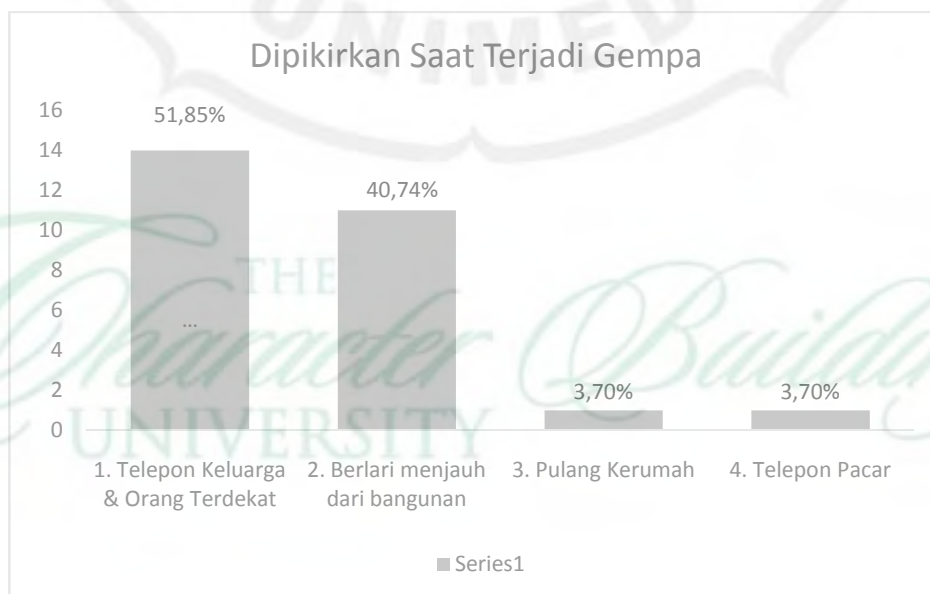
Based on the results of the questionnaire it can be seen that respondents who had experienced an earthquake gave the answer “Ever” as much as 26 respondents which was 96.2%.

***Does the campus have been prepared for possible disasters***



Based on the results of the questionnaire it can be seen in the diagram above that the respondents according to Ibnu Sina Academy of Nursing in Sabang city already prepared for disasters, answering "yes" as much as 24 respondents which was 66.67%.

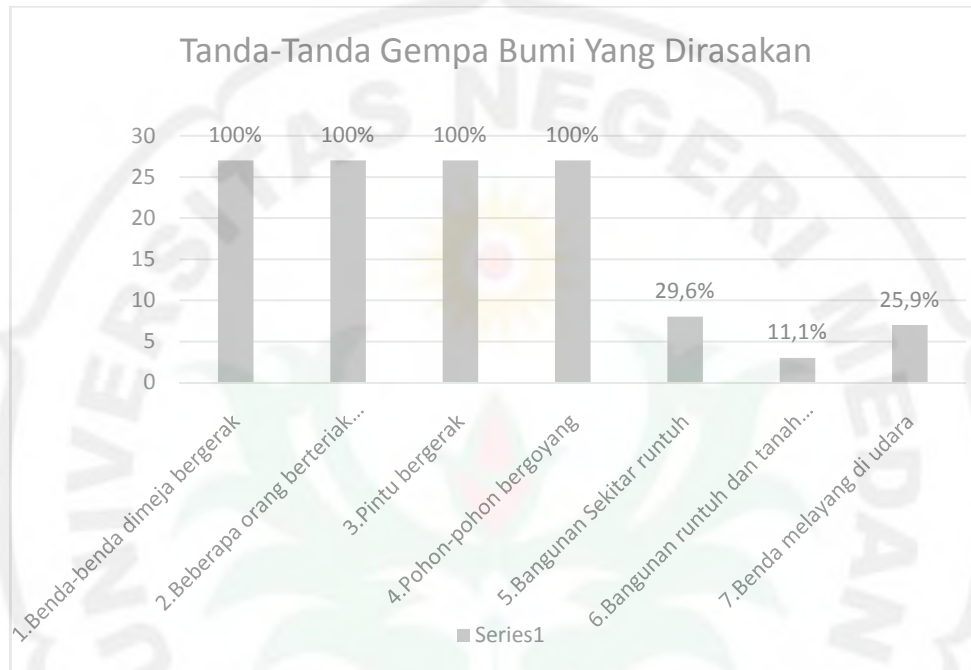
***What do you think first if the earthquake occurred***



Based on the results of the questionnaire it can be seen in the diagram above that the respondents’ thought when an earthquake occurred was call the closest family which

was 51.85%, ran away from buildings was 40.74%, go home as much as 3.70% and call girl/boyfriend was 3.70%.

***Earthquake signs that ever felt by respondents***



Based on the results of the questionnaire it can be seen in the diagram above that quake signs that ever felt by respondents were objects on the table moved, some people shouted, the door moved and swaying trees all have felt by 2 respondents which was 100%.

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## THE PREPAREDNESS OF SMAN 5 BANDA ACEH IN FACING EARTHQUAKE DISASTER

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### Abstract

Risk disaster reduction of earthquake could be taken in each aspects, one of them are educational applying system. This research was taken at SMAN 5 Banda Aceh where located in earthquake trouble area. The purposed is to noticed how far the preparedness made by teachers and students in facing an earthquake disaster. The methods that are used to collect the data are observing, deploying questionnaire and interviewing the subjects. There are 10 teachers and 15 students involving this study as a sample. The question that we provide is related to emergency disaster knowledge, organization, evaluation, socialization and providing early warning systems, basic needs, infrastructure preparation and evacuation route. The result of data collection prove that 73,3% students know about disaster knowledge, 26,7% do not know and 59,98% teachers know, and 23,35% do not know. Organization, socialization, evaluation, providing early warning system gave a 23,3% students know, 31,6% do not know, 24,45% teachers know, 51,12% do not know. Providing and preparedness of basically needs is 53,4% students do not know and 2,2% teachers know. For evacuation route 20% students know and 33,3% teachers knows. There are so many things that we have prepared to improve students and teachers knowledge related to emergency disaster knowledge.

**Keywords : The Preparedness, preparedness component, Organizing, Socialization, evacuation.**

### INTRODUCTION

Disasters can happen anywhere, anytime, and any place, even though the threat may be different, the school is no exception. Therefore, it is needed a good preparedness in the face of existing threats. Preparedness is a series of activities carried out in anticipation of disaster risk through the organization as well as through appropriate steps effectively and efficiently (UU No. 24 Year 2007).

In improving preparedness for disaster risk reduction in future generations, it is good if started from the school, because at school a lot going knowledge transfer. One of the sciences that can be taught in schools is disaster science that is very useful in daily life. From our observations, learning about disaster science in schools is not maximal yet; this is because the knowledge of disaster is only taught in social studies majors in geography subjects. For better preparedness, disaster knowledge can also be taught in science majors, so knowledge of the disaster can be known by all students at the high school level or equivalent.

Look at the conditions in Banda Aceh, the earthquake was a disaster that often happens, so it is necessary the appropriate steps in order to reduce the risks that may be caused. One of the way that can be taken to reduce the risk is by improving the

preparedness at all levels of society, one of them is school. A school that researchers made this area of research is SMAN 5 Darussalam. To measure the preparedness of SMAN 5 Darussalam, researchers used 4 components preparedness activities of 7 components of the activities mentioned in UU No. 24 Year 2007. Researchers took 4 components such activities because considering the time, money and energy that researchers have is very limited.

## METHODOLOGY

The study that researchers did is located at SMAN 5 Darussalam with timescales 6 days, starting from the date of 12-17 February 2014. Determination of sampling is using random sampling. If a population is more than 100, it can be taken between 10% - 20% or 25-30% or more. However, if the population is less than 100 so the sample is taken entirely as a sample, Arikunto (2003:149). Considering the very large sample, the researchers took less than 10% of the total population. The samples in this study were students and teachers who each amount to 10 people who serve as the respondent, considering the time, money, and energy researchers have extremely limited.

Techniques of data collection used observation, questionnaires, and interviews to determine the preparedness of student sand teachers in facing the earthquake and tsunami, while the data analysis techniques used the formula percentage of respondents.

## RESULT AND DISCUSSION

Approaches the researchers did included in the qualitative approach, it means a researcher worked with the information, descriptions and explanations of data. Technical analysis which is used is a non-statistical technique or by principle. The approach used in this study is descriptive qualitative approach. Comparing one thing with another in order to solve or answer the problems that exist in the current situation.

The method used is by way of distributing a questionnaire that will be answered by the respondent or filled by respondents. A type of research used is a case study, namely the preparedness of schools in earthquake disaster management. Preparedness that researchers want to find out in this study consistsof 4 components activities, hoped that it can represent the preparedness overview in SMAN 5 Banda Aceh.

Based on the results of the research respondents collected, researchers can describe as follows:

### 1. The knowledge of preparedness of emergency disaster response

#### a. Student

**Table 1. The knowledge of preparedness of emergency disaster response**

Question Number	Respondents Answer Choices					
	Know	%	Do not really know	%	Do not know	%
1	11	73,3	4	26,7	-	-

Source: Data of Research (2014)



Based on Table 1. above, it can be said that 11 respondents (73.3%) answered know about the knowledge of disaster, 4 respondents (26.7%) do not really know of the disaster knowledge, thus the majority (73.3%) of students in SMAN 5 have knowledge of emergency preparedness earthquake response.

## b. Teachers

**Table2. The preparedness knowledge of emergency disaster response**

No.	Respondent answer choices					
	Know	%	Do not really know	%	Do not know	%
1	15	100	-	-	-	-
2	13	86,6	2	13,4	-	-20
3	11	73,3	1	6,7	3	40
4	1	6,7	8	53,3	6	66,7
5	5	33,3	-	-	10	
average		59,98		14,68		25,34

**Source: Data of research (2014)**

Based on Table 2. above, the average of respondents who answered yes (59.98%), respondents who answered do not really know (14.68%), and respondents who answered do not know (25.35%), thus it can be said that most (59.98%) teachers at SMAN 5 has knowledge of emergency preparedness earthquake response.

From the results of teacher and student respondents, it is known that the knowledge of the disaster emergency response has been good. This knowledge is due in school SMAN 5 Banda Aceh there are the books of knowledge about the earthquake and also felt themselves, how the earthquake was.

## 2. Organising, counseling, training, and mounting early warning tools

### a. Student

**Tabel 3. Organising, counseling, training, and mounting early warning tools**

No Question	Answer Choices					
	yes	%	Do not really know	%	Do not know	%
2	8	53,3	5	33,3	2	13,3
3	3	20	7	46,6	5	33,3
4	-	-	10	66,7	5	33,3
5	3	20	5	33,3	7	46,6
Average		23,3		44,9		31,6

**Source: Data of Research (2014)**

Based on Table 3. above, the average respondent who answered yes (23.3%), do not really know (44.9%), and do not know (31.6%). Thus it can be said that the students in SMAN 5 Banda Aceh is still lack in the organizing, counseling, training, and mounting early warning tool in earthquake the preparedness.

## b. Teacher

**Tabel 4. the organizing, counseling, training, and mounting early warning tool**

Question Number	Answer choices					
	yes	%	Do not really know	%	Do not know	%
6	5	33,3	-	-	10	66,7
7	5	33,3	3	20	7	46,7
8	8	53,3	5	33,3	2	13,4
9	2	13,4	3	20	10	66,6
10	2	13,4	4	26,7	9	60
11	-	-	7	46,7	8	53,3
Average		24,45		24,45		51,12

**Source: Data of research (2014)**

Based on Table 4. above, the average respondent who answered yes (24.45%), do not really know(24.45%), and do not know (51.12%), thus respondents in SMA 5 Banda Aceh is still lack organizing, counseling, training, and mounting early warning tool in earthquake the preparedness.

Results of student and teacher respondents on organizing, outreach, training, and mounting an early warning tool, averages of respondents answered do not really know, this is because only a small fraction of respondents to be included in such matters are held in the school

## 3. Provisionan dpreparation of basic need materials, facilities and infrastructure

### a. Student

**Tabel 5. Provision and preparation of basic need materials, facilities and infrastructure**

Question Number	Answer choices					
	yes	%	Do not really know	%	Do not know	%
6	-	-	7	46,6	8	53,4

**Source: Data of research (2014)**

Based on Table 5. above, respondents who answered do not really know as much as 7 respondents (46.6%), and do not know 8 respondents(53.4%), thus it can be said that more than half (53.4% ) students at SMAN 5 do not know the provision and preparation of basic needs materials, facilities and infrastructure in facing the earthquake and tsunami.

### b. Teachers

**Tabel 6. Provision and preparation of basic needs materials, facilities and infrastructure**

No Question	Answer choices					
	yes	%	Do not really know	%	Do not know	%
12	-	-	10	66,7	5	33,3
13	1	6,7	14	93,3	-	-
14	-	-	-	-	15	100
Average		2,2		53,3		44,4

**Source: Data of research (2014)**

Based onTable 6above, the average respondent who answered yes(2.2%), do not really know (53.3%), and do not know (44.4%), thus it can be said that half (53.3 %) of

respondents in SMA 5 less aware of the provision and preparation of basic needs materials, facilities and infrastructure in facing earthquake disaster.

Results of student and teacher respondents about providing and preparation of basic needs materials, facilities and infrastructure averages of them answered donot really know, this was due to lack of socialization on the preparation of the basic needs in disaster management.

#### 4. Directions, instructions and evacuation site

##### a. Siswa

**Table 7. Directions, instructions and evacuation site**

Question Number	Answer choices					
	yes	%	Do not really know	%	Do not know	%
7	4	26,7	3	20	8	53,3
8	6	40	5	33,3	4	26,7
9	14	93,3	1	6,7	-	-
10	8	53,4	3	20	4	26,7
Average		53,35		20		26,7

**Source: Data of research (2014)**

Based on Table 7. above, the average respondent who answered yes(53.35%), do not really know (20%), and do not know (26.7%), thus it can be said that more than half of respondent s(53, 35%) aware of any directions, instructions and evacuation site in case of earthquake.

##### b. Teacher

**Tabel 8. Directions, instructions and evacuation site**

Question Number	Answer choices					
	yes	%	Do not really know	%	Do not know	%
15	5	33,3	2	13,4	8	53,3

**Source: Data of reasearch (2014)**

Based on Table 8. above, respondents who answered yes (33.3%), do not really know (13.4%), and do not know (53.3), thus more than half (53.35) of respondents in SMA 5 Banda Aceh do not aware of any directions, instructions and evacuation site in case of earthquake and tsunami.

The results of the student respondents, a half of them know direction of evacuation paths; this is due to the students in the school SMAN 5 Darussalam know evacuation route directions and the presence in the school plan. While the teacher respondents do not really know the direction and path of evacuation, because they rarely see the existing plan of schools.

## CONCLUSION

From the data processed and the discussion above, the researcher can conclude that: (1) knowledge of the preparedness in SMA N 5 Darussalam towards emergency response to the earthquake and tsunami has been good, (2) organizing, counseling, training, and mounting early warning tools, in SMAN 5 Darussalam is still lack, (3) the

provision and preparation of basic needs materials, facilities and infrastructure in facing the earthquake and tsunami in SMAN 5 Darussalam is still lack even still there who do not know, (4) Direction, guidance and evacuation places, in SMAN 5 Darussalam in earthquake and tsunami the preparedness is good for students, but teachers is still lack knowledge.

## SUGGESTION

The most important things to be done to reduce the risk of disaster is by providing and teaching the disaster knowledge to others, so that they understand the magnitude of the risk of a disaster. One of the things that can be done in SMAN 5 Banda Aceh for earthquake the preparedness is through organizing, education, provision of basic needs and others.

This research was conducted in a relatively quick period of time, it is only six days. To get more in-depth results, it is proper if it is done in a much longer time.

In the case, the disaster was not discriminate. In fact, from the results of the study, subjects of disaster is taught in IPS or social major only, while majoring in IPA or science is not taught, so the future, in order the lesson can be obtained by students, both majoring in social studies and science majors. Due to the position of Master of Disaster is located exactly in front of the school SMAN 5 Banda Aceh, the socialization of disaster is possible to be done by the students at the school.

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# THE RELATIONSHIP BETWEEN POLICY, FACILITIES AND INFRASTRUCTURE WITH THE LEVEL OF PREPAREDNESS OF BANDA ACEH DISASTER PREPAREDNESS SCHOOL

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## Abstract

This study aims to determine the relationship of policies, as well as facilities and infrastructure to the level of community preparedness of Disaster Preparedness School (DSB). This study used a descriptive approach-quantitative method. This study was conducted in a pilot disaster preparedness, school SDN 2 Banda Aceh. Its population is school communities that is actively involved in all activities related to Disaster Risk Reduction (DRR) in school. Data were collected by questionnaire using preparedness parameters. Data were analyzed using statistics descriptive and correlation tests. The results showed that the level of community preparedness of DSB is very prepared for disasters. This is supported by the significant relationship between the parameters of preparedness with DRR program that has been implemented at the school. From the results of this study, it is concluded that the implementation of DRR related to the level of preparedness of the school community.

**Keywords:** Disaster Risk Reduction , preparedness , school community.

## INTRODUCTION

Based on the Hyogo Framework for Action (Hyogo Framework Action/HFA), disaster preparedness education has become one of the world priorities in establishing a culture of disaster preparedness from youths. Generally in a school based Disaster Risk Reduction (DRR) aims to create school communities which alert to disasters (International Strategy Disaster Reduction/ISDR, 2005). To achieve this, DRR Education aims to build an understanding on students and the school community about the causes, nature and impact of hazards. It also encourages a wide range of competencies and skills that enable learners to contribute proactively in disaster preparedness and mitigation. Knowledge and skills need to be informed through the attitudes and values that encourage learners to act pro-social, responsible and responsive when families and communities are threatened (Selby and Kagawa, 2012).

Priority of DRR program can be implemented through the education sector, which is in DRR education in schools. Because the school is a public space that can reach all levels of society. DRR education can be applied by using the knowledge, the willingness and the motivation, skills and attitudes to practice. Where those will become learners habit or experience in facing disaster, so they cultivate a culture of disaster preparedness in the school community. Disaster Preparedness School (DSB) which is an activity to build the school community through strengthening the knowledge and attitudes, school policies,

emergency response plans, early warning systems of school, and resources mobilization based on the existing school capacity in anticipating the disaster risk (Ministry of Education/Ministry of Education , 2010).

The creation of safe schools for the sake of creating a safe for school community requires a continuous and dynamic process. The management involves students, teachers, parents, and residents who live in the school environment. School disaster management involves; hazard assessment, vulnerability, capacity and resources; planning and implementation of physical risk reduction, maintenance of safe facilities, Standard Operating Procedures (SOPs) and training for disaster response, mitigation and preparedness planning and regular skills, with real simulation, and revise the plan according to the vulnerabilities that exist in the environment around the school. School disaster management reflect individual and family disaster prevention and disaster prevention efforts among the general population (World Bank Group, 2010).

A total of 28 disaster-prone schools in disaster Banda Aceh have been getting guidance from LIPI, UNESCO, TDMRC to become DSB. The schools are expected to continue carrying out the activities and programs of DRR sustainably (TDMRC, 2011). However, there are also those among the DSB which are not continuously implementing DRR programs. According to Khairuddin, et al., (2011), this occurs because the DPS mentoring done by non-governmental organizations that have less access to the government so the activities of DPS are not coordinated with relevant agencies.

Although despite getting assistance to became disaster preparedness school, it is not impossible that these schools still have a low index of preparedness. The low index value of preparedness at the level of school community has implications for the importance of the role and responsibilities of government, the society and the school community in a variety of facilities. Such facilities may include, among others, policy support for school about the importance of disaster education curriculum implemented in each subject. It is not separated from the role of the school community as a major stakeholder in improving disaster preparedness. Through the school community, the knowledge and awareness of the disaster can be given at an early age. Because knowledge underlie the changes in attitudes and actions of every individu to be a better person. In addition to the support of the policy, it also needs technical support such as the provision of facilities and infrastructure which are capable to support disaster risk reduction programs, such as: school buildings that withstand earthquakes, disaster early warning systems, as well as other things that support disaster preparedness (Tracy, 2010).

Based on the above, the research on the relationship between policy, facilities and infrastructure with the level of preparedness of Banda Aceh disaster preparedness school, needs to be held to clearly understand the state of preparedness of the school community in Disaster Preparedness School. Thus, information can be obtained about the level of success in controlling the disaster risk reduction knowledge that has been obtained.

## STUDY BIBLIOGRAPHY

### Disaster Risk Reduction in Schools

Disaster Risk Reduction is a systematic approach in identifying hazards, assessing and reducing the risks posed by the disaster, and aiming to reduce socio-economic vulnerabilities to disaster. In other words, DRR is an attempt to minimize the risks posed by disasters through the application, process, and maximum steps in confronting disasters (Benson, 2009).

### Disaster Preparedness

Definition of preparedness by Carter in LIPI-UNESCO/ISDR, (2006) stated that preparedness is actions that enable governments, organizations, societies, communities and individuals to be able to respond to a disaster situation quickly and appropriately. Preparedness is one of the disaster management process. In the concept of emerging disaster management, the increase of preparedness is an important element in terms of proactive Disaster Risk Reduction before the disaster. Definition of preparedness was also expressed in the Act 24 of 2007, that preparedness is a series of activities undertaken to anticipate disasters through organizing the appropriate and efficient steps.

### Aspects of Disaster Preparedness

Some aspects that require attention in the development of preparedness by LIPI-UNESCO/ISDR, (2006) are: a) Planning and organization: directions and policies related to appropriate and updated emergency management planning, as well as adequate organization structure countermeasures. b) Resources: resource inventory of all organizations of resources fully, division of tasks and responsibilities. c) Coordination: strengthening coordination between agencies/organizations and eliminate friction and increase cooperation among agencies/organizations concerned. d) Readiness: organizational unit to combat disasters should take full responsibility to monitor and maintain the standards of readiness of all elements. e) Society training and awareness: the need for adequate training and public awareness as well as the availability of accurate information.

### Factors Influencing Disaster Preparedness

Factors that can affect a community preparedness toward disaster, are; 1) external motivation includes policies, education and training, funding, 2) knowledge, 3) attitude, and 4) skills (Citizen Corps, 2006).

### Knowledge possessed by Disaster Community Schools

LIPI UNESCO / ISDR, (2006) states that knowledge is a major factor to the key of community preparedness. The experience of various disasters occurred provide a very valuable lesson on the importance of knowledge about the natural disaster that must be possessed by every individual particularly in disaster-prone areas. Disasters knowledge process generally affect the attitudes and concerns to be prepared in anticipating disaster.

## **Attitudes of School Community toward Disasters**

Attitude is one's reaction/response which is still covered to a stimulus or a particular object, not included in an action/ activity, but it is predispose action or behavior. In other words, attitude is a reaction or an appreciation of objects in certain environment. Attitude formation can take place through a learning process, personal and others experiences, as well as socialization. The attitude in facing disaster is the embodiment of knowledge that is implemented through an act of self-defense skills during a disaster (Notoadmojo, 2007).

## **Preparedness Measures of School Community**

Mc. Kiernan, et al (2005) suggested that the behavior or actions related to the formation or extinction of a habit. Mechanism of action is an observation that arises from the perception so that there is a response to realize an action. The basis of every human action and attitude are perception, knowledge and skills they have. DPS aims to build the capacity of the whole school community to cope quickly and appropriately. Thus, the entire school community be a target, not just students, to be able to act when disaster occurs (Notoadmojo, 2007).

## **School Policy on Disaster Preparedness**

Policy is essentially a form of formal support from school leaders as outlined in the school rules and agreements regarding things to do and not to do. School policy is a formal decision made by the school about the things that need to be supported in the implementation of DRR in school, either specific or integrated. The decision is binding. In practice, the school policy toward anvils, guidelines, directions of activities implementation are related to DRR in school. Policies related to emergency preparedness will be very influential because it is a concerted effort in the implementation of disaster preparedness activities, which include; public education, emergency planning, early warning systems (EWS) disaster and resource mobilization. Policies need to be translated into the kinds of policies to anticipate disasters, such as disaster management organizations, action plans for emergency response, disaster warning systems, education, and the allocation of disaster. Policies in the schools which are in the from of preparedness Standard Operating Procedures (SOPs) must be owned by schools (LIPI UNESCO/ISDR, 2006).

## **School Infrastructure**

In addition to the integration of disaster risk education into the school curriculum in countries vulnerable to natural disasters, campaign for school to have a secure and resilient to disaster construction and school building should be held as well (LIPI-UNESCO/ISDR, 2006). Government Regulation No.21 in 2008 on the Implementation of Disaster Management, Article 20 states that the regulation of development, infrastructure development, and the building structure, required to apply the rules of construction technical standards set by the institution/ authoritative body. The existence of supporting facilities and infrastructure such as school buildings that.



## METHODOLOGY

The method used in this research is descriptive-quantitative method using a questionnaire of the school community preparedness disaster. In addition, it is also used field observations and documentation.

### Preparedness Level Analysis

Analysis of the data processed using descriptive statistics, as follows:

$$P_n = \frac{f}{N} \times 100\% \quad (1)$$

### Correlation Test

Measuring the relationship antar preparedness parameters using the following equation (Sugiyono, 2013):

$$R_{YX1...XN} = \sqrt{\frac{r^2_{yx1} + \dots + r^2_{yxn} - 2r_{yx1}r_{yxn}r_{x1\dots xn}}{1 - r^2_{x1\dots xn}}}$$

## RESULT AND DISCUSSION

### Preparedness Level of Schools Community

The research that has been conducted on disaster preparedness level at DPS community is measured by a disaster preparedness parameter, as follows: knowledge, attitudes, and actions. Then the results obtained on the preparedness level of the school community can be seen on Table:

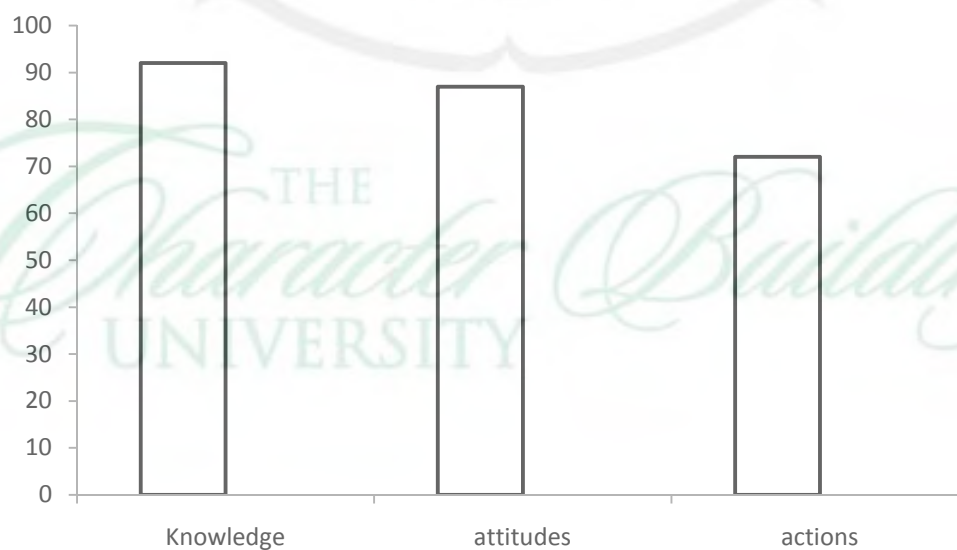
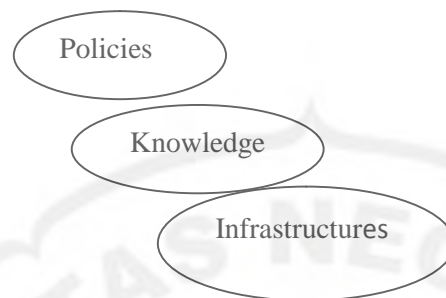


Figure 1. Community Preparedness Levels

## Relationship Among Preparedness Parameters



**Figure 2. Relationship Among preparedness parameters of DPS Community**

The results of the study were able to support this research are that studies done by Anderson and King, (2005) on tropical cyclone-prone in Northern Australia, showed that society awareness, preparedness and knowledge contribute in education and mitigation strategies.

Johnston and Becker, (2013) previously assumed that, if one had been given knowledge about the risks and dangers, then he would have prepared it himself to face future disasters. However, the results indicated that very low levels of individual readiness even on public education campaigns related to heightened awareness toward the risks of disaster. So is the case with this study, previous researchers suspected that the level of preparedness of the very prepared for disasters category in the non-DPS school community was influenced by the relationship among knowledge, attitudes, actions, responsibilities with the infrastructure and the policies owned by the non-DPS school community though in the category of almost and less prepared for disasters.

In order to create a culture of disaster preparedness and safety of the school community, it requires a continuous and dynamic process. As research conducted by Shaw, (2004) that the experience of the disaster was not the main factor to increase awareness of disaster preparedness. Disaster-related education in schools which implements various stages such as; knowledge, deepening material, decisions, and actions to take by each individual at the time of the disaster is more prominent than the experience. In addition, the study showed that the factors supporting the success of DRR were inseparable from various aspects, such as: knowledge, willingness, attitude, skills, and practices in DRR activities.

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusion

Implementation of policies, facilities and infrastructure that support preparedness in DRR programs in DPS related do to the level of preparedness that is owned by the school community. This study was measured using these following preparedness parameters, namely: knowledge, attitudes, and actions. This was proved by the preparedness level of DPS community that was very prepared for disasters. The high level of disaster preparedness owned by the DPS community occurred because they were supported by the

policies, it is also necessary technical support such as the provision of facilities and infrastructure that is capable to support disaster risk reduction programs, such as school buildings that withstand earthquakes, disaster early warning systems, as well as other case supporting disaster preparedness that has been implemented at the school.

### Recommendations

Instead, school-based DRR program is also applied in the area within the safety zone or not prone to disaster. So that disaster preparedness is owned by each school community in Indonesia.

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# THE EFFECTIVENESS OF CRISIS GROUP COUNSELING IN MINIMALIZING NEGATIVE LEARNING IN SINABUNG ERUPTION DISASTER CAMP

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## Abstract

The purpose of this study was to find out the effectiveness of counseling group to minimize the negative learning in Sinabung Eruption Camp North Sumatera. The study was very important to do, to understand and to control the quality of the effectiveness of victims daily living (EDL) in camp. An action research used in this study, consists of two cycles. 15 persons who live in the camp, got as population and sample, which got by purposive technique sampling. Data collected by using an interview and observation that analyzed through percentage calculation. The results showed that negative learning happened in the camp. Before an action, 80% EDL respondents' were in low level; 70% less adaptation to the situation and low autonomy to solve the problems. After the action, in the last meeting in the second cycle, 40% EDL respondents' were in low level and less adaptation and low autonomy to solve the problems. These results showed that more than the target. Target made before an action were 50%. These results showed that group counseling decreased the influence of negative learning, increased the victims adaptation and their autonomy to solve the problems in the camp. It was suggested that negative learning must be put as a consideration in disaster management.

**Keywords: Negative, Learning, Group, Counseling**

## INTRODUCTION

Negative learning is the adoption of negative value that developed negative behavior. Negative learning could be happened in disaster situation while people live in evacuation camp. This situation decreased the quality of the effectiveness of victims daily living (EDL). The victims behaved low autonomy, low confidence, low adaptation and low EDL. It happened caused of character connection among victims. Negative learning should be controlled. The victims should control the influence of negative learning to their EDL. Some of them did not aware of this. They thought that negative behavior could be tolerate because it made by disaster. They do not realize that it could make negative effect to other EDL.

The study of negative learning done in one of Sinabung evacuation camp in Berastagi. There were about 350 people there. Preliminary study showed that most of the victims were in low quality EDL. Most of them behave in negative manner. It seemed that they could not accept the situation. The intervention should be done. The Crisis group counseling choose to control the situation. Before, this technique effective to help people in that situation.

## MATERIAL AND METHOD

Ecological system by Bronfenbrenner (Milfa, 2014) used to explain environment around the camp. The people in the camp were a micro system to all of the victim. They interacted each other. There were a direct intense interaction among people. The interaction made a character connection also. Bandura (Milfa, 2014) told that this social situation became learning situation for the victims. It could be positive or negative. Positive, if some one behaved positive to the situation and negative, if he behaved negative. In disaster, some one need to adapt the situation soon. Although it was not easy, but they had to pass the crisis. Negative learning happened in this crisis periode (Oppenheimer Michael, O'Neil Brain, Webster Mort, 2008; Kohn,2009). The situation had to manage. It could decrease the effectiveness of daily living or EDL (Prayitno, 2014). Crisis counseling with cognitive behavior therapy (Hoffman SG,2011) used to help increase the victims EDL. The counseling process need to help the victims to develop their situation awareness, autonomy to solve problems, good confidence, good adaptation and good EDL.

An action research used in this study. All the victims in the camp got as population and sampling did by purposive technique. 15 persons, women, age about 25-40 years old, mothers and had low EDL take as a sample. An action research made two cycles. Every cycles did three times group counseling. Data collected by using interview and observation that analyzed through percentage calculation and descriptive qualitative.

## RESULT AND DISCUSSION

Before an action as showed in figure 01, below 50% of responden had good awareness, autonomy, confidence, adaptation EDL. Most of them did negative behave in the camp. After group counseling did in cyclus 1, about three times meeting the situation changed. Most of them grew, although still did not get the target. Before an action, the target put in 70% point. Because of this, an action continued to cyclus 2. The result showed that the target was caught. Two aspects that were autonomy and EDL caught above the target. After the second cyclus an action stopped. The result of the study showed that group counseling decreased the influence of negative learning and increased the victims awareness, autonomy, confidence, adaptation EDL.

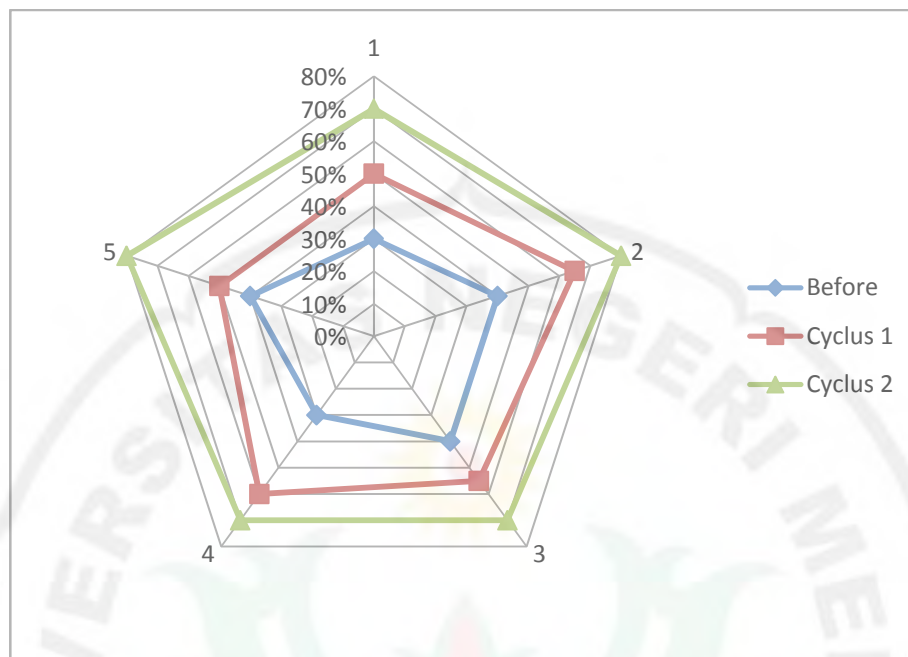


Figure 1 : The percentage before and after action

Some of responden advice to get an individual counseling, to help them to solve their individual problem.

## CONCLUSION

The result of the study showed that crisis group counseling help the victims to develop their situation awareness, autonomy to solve problem, self confidence, adaptation and EDL. It means that the effect of negative learning cold be minimize by doing crisis group counseling. It was suggested that negative learning must be put as a consideration in disaster management.

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## THE ROLE OF MANAGERS OF ACEH HEALTH POLYTECHNIC IN DISASTER PREPAREDNESS

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### Abstract

The aim of this study was to determine the role of managers about disaster preparedness. This study was done at Aceh Health Polytechnic Banda Aceh. Thirty respondents were selected as samples in this study. The methodology used by given the questionnaire were included: (i) the understanding about the disaster and its risks, (ii) the integration of the disaster into the day live of polytechnic, and (iii) the implementation of the Standard of Procedures (SOP) for disaster. Based on the results, it has been found that there was a different of knowledge between all respondents, whereas 82% of respondents were found to be have knowledge about the disaster and its risks. Besides that, there were 71% of respondents knew about the integration of the disaster into the day live of polytechnic. In addition, there were only 47% of respondents found to be understood about the implementation of the Standard of Procedures (SOP) for disaster. It has been suggested that the managers of Aceh Health Polytechnic were needed to be good in managing the disaster preparedness for environmental sustainable.

**Keywords:** The role of managers and disaster preparedness

### INTRODUCTION

The Aceh Health Polytechnic was founded in 2001 is a education of diplomatic under the Ministry of Aceh. Education formalize institute should be socialistic and created as container dissemination the knowledge is good and true about disaster and risk. Therefore, the role of managers Aceh polytechnic becomes important and interesting for any educational of manage to reduction effectiveness of disaster and risk. The disaster preparedness is a activities should be do always from the director until of the all employee in the institute agency goals can be realized.

Preparedness in the face of disaster is one of the activities that must be performed continuously from the leadership to all employees within the agency to provide reasonable assurance agencies to achieve a goal through the effective and efficient. These activities reduce the impact to minimize risk. The role of management in disaster preparedness and efficiency so that educational institutions can effectively provide continuous service to the entire management.

The research methodology used survey method using a closed questionnaire and descriptive nature of the 30 respondents drawn from Section Directorate polytechnic Aceh. Served by 3 classification questions, (i) the understanding of disasters and risks, (ii) implementation of disaster preparedness in the life of the institution, (iii) Implementation of infrastructure, emergency SOP in Aceh Polytechnic Building.

## METHODOLOGY

This research was conducted in Aceh polytechnic, on thirty respondents drawn from section of Director consists of Aceh polytechnic; part of makers, student affair, personnel and public. That are general divided into six of respondent every of part managers. The methodology by used by survey and quality descriptive by given the questionnaire. The instruments used in this research in the field of data collection in the form of questionnaire method techniques in the indirectly. The instruments or tool used in this research contained a kind of questions about disaster must be answered by the respondents.

## RESULTS DISCUSSION

The result of research conducted at Aceh polytechnic of management on the part of the Director. The role of the Aceh Polytechnic management is also vital in disseminating knowledge and internalization of Disaster. In increasing knowledge menwujudkan cultivate an attitude of awareness of disaster risk reduction.

Based on the result of the managers Aceh polytechnic answers the questioners above in the table. So, the role of managers polytechnic could be clarification in disaster preparedness included based knowledge of disaster and risk, the integration of the disaster into the day live of polytechnic, the implementation of the Standard of Procedures (SOP) for disaster. Based on the results, it has been found that there was a different of knowledge between all respondents. In the general of the objective the questionnaire have been divided into 30 respondents whereas 82% of respondents were found to be have knowledge about the disaster and its risks, and 18% of respondents were found to be have not knowledge about the disaster and its risks. So, could be clarification the role of managers polytechnic is best in the knowledge and ability about the disaster and its risks.

In the integration of the disaster into the of polytechnic institutional life 71% of respondents apply, and 29% of respondents did not apply about the integration of the disaster into the day live. So, it can be categorized as either Aceh Polytechnic management in implementing the institutional life

The implementation of the Standard of Procedures (SOP) for disaster in the building Aceh polytechnic there were only 47% of respondents found and respect about the implementation SOP for disaster. 53% of respondents found did not understand about the implementation of the Standard of Procedures (SOP) for disaster. So, could be clarification the role of managers polytechnic is decrease to understood the implementation of the Standard of Procedures (SOP) for disaster in the polytechnic building.

No	Questions	Yes (%)	No (%)	Do not known (%)
1	Do you understand what a disaster and risk?	90	0	10
2	Do you know If occur the disaster where do you go when disaster emergency?	100	0	0
3	Do you know the role of managers in polytechnic Aceh has been done a emergency simulation of disaster?	46,67	0	53,33
4	Do you know the polytechnic Aceh has a emergency of equipment?	66,66	0	33,34
5	If occur the earthquake, what are you doing for yourself?	100	0	0
6	Do you know the ever existed disaster of socialist emergency in the Aceh polytechnic?	56,67	0	43,33
7	According to you, the ofAceh polytechnic building has been requirement of emergency disaster?	56,67	0	43,33
8	When an earthquake occurs, the first who will you please? If occur a earthquake, the first who will you help?	(yourself) 66,66	(family) 33,34	(friend) 0
9	Do you know the Aceh polytechnic has been integrated of disaster curriculum?	70	0	30
10	Do you know the polytechnic Aceh have the emergency of disaster?	16,67	0	83,33

## CONCLUSIONS

The conclusions based on the result was done in the Aceh Polytechnic it has been found thatthere was a different in the understanding of conceptdisaster. whereas 82% of respondents were found have knowledge about the disaster and its risks, 18 % of respondents did not know about the disaster, In addition, there were only 71% apply 47% of respondents did not know 53% of respondents knew of the existence of infrastructure and SOP

Creating a sustainable platform for disaster and risk reduction, thus creating conscious communities to disasters. And being able to make sense of social solidarity and shared responsibility in reducing the disaster and risk . We suggested more socialized understanding and implementation of sustainable disaster preparedness with disaster kesiapsigaan done so well and has the domino effect on others outside the Aceh polytechnic environment.

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# SMART CLASS ROOM SYSTEM BASED ON ENERGY SAVING AND CLASS ROOM SCHEDULING INFORMATION SYSTEMS

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## Abstract

Education activities at educational institutions currently can not be separated from the use of electrical energy and highly in using paper, both in the class room and laboratories so that it is meaning wasting energy and use a lot of paper. That circumstances will put much concern for the environment in the future. Therefore this study aims to build a system of smart classroom system. The research would be carried out in several parts of the development namely the first student attendance information systems are integrated in to automation system based on RFID (Radio Frequency Identification) by using tablet device with android based as attendance reports for teachers. Second, scheduling the use of information systems development classrooms integrated with the automatic door locking system and information system management. Third, energy utilization in the electric devices in classrooms that are integrated with automatic power control system based on microcontroller Arduino MEGA2560. In this study, going to make the prototype and small-scale simulation. The results are expected by the end of this study were obtained by a prototype model of intelligent systems of smart classroom system which can provide a comfort in study in the class and well implemented learning system with efficiency in the use of electrical energy, safety systems for class room and learning systems which use less paper in attendance activities and at the end for making the campus environmentally friendly or The So – called Green Campus System.

**Keywords :** Smart class room systems, energy-saving, attendance information systems, scheduling class room and green campus system.

## INTRODUCTION

The development of technology currently, its so rapid that the presence of a new technology increasingly pamper of human kind. Even a word of automation is also becoming so close to our ears, it indicates that the reduction of human intervention in performing a routine activity on daily activities. Automation systems are now starting to spread to the educational environment system known as “Smart Classroom”.

It is known that the smart classroom technology previously inspired by smart home system. Smart home is usually identified on the use of the control system on the object itself as automatic doors, automatic watering, automatic drying clothes and other objects. However, smart classrooms have differences with smart home technology that many smart classrooms focused on student attendance system technology, scheduling for class utilization and smart learning media.

Conventional system in the classroom is usually identified with the manual attendance system that is set up by the lecturer by calling each name of the student in every

class session and noted in the attendance book. Similarly, in the use of classroom system, usually there is an officer that serve for opening classrooms before the class is starting until the end of the class with close and lock the class for safety reason procedure. Besides, the utilization and management of power mostly waste the energy by using the light, air conditioner and other whether there is activity in class or no at all.

It therefore requires a classroom management system that integrates in to smart and automated information systems in the form of efficiency attendance, security and energy in the class room activities. Information system in this study is firstly focused on student attendance information system integrated in to automation system based on RFID (Radio Frequency Identification) to use tablet devices based on android as attendance reports for lecturer. Secondly, the use of scheduling information system that integrates with the classroom locking door system and thirdly, is an automatic system management information on energyutilization for electrical devices in classrooms that are integrated with automatically system power settings based embedded systems.

Based on the background of the problem above can be formulated as follows:

1. How to design and create information systems that integrate to student attendance automation system by RFID (Radio Frequency Identification) with using tablet devices based on android as attendance reports for teachers.
2. How to design and also to built the scheduling information systems for classroom integrated with automatic door locking system.
3. How to design and create a management information system with utilize the energy from electrical devices in the classrooms which are integrated with automatically system power settings based on the microcontroller of Arduino MEGA2560.

### **The Research Urgency**

Class room system, most of its currently is still used conventionally method, and still rely on human power as controllers for students learning and teaching environment. There is limitations by using operator to control the class room, such as attendance student record that should be check and call student one by one. Therefore it is remain ineffective, so that by utilising attendance record by using information systems based on RFID card may accelerate the process and the lecturer can look at the attendance report by using tablet device only.

Meanwhile, the class room security is often seem to be remain lock or unlock in out of class hours, this certainly would impact to the security of the class room, which mean there is not any guarantee for the safety of class room when sometimes the class remain unlock and also where as worth class appliance keep in the class. Therefore, by utilizing schedule information system which integrated in to automatically lock system in class room can improve class room would be safety and prevent of lost of worth class room appliances. By utilize this system, the class room door will lock properly when there is no activity in the class and will automatically lock after completion of learning process.

Utilization of electric power in the classroom such as light and air conditioner mostly inefficient in the learning hours which is lights and water conditioners still on from class begin until end of class in fact sometime it is even class is not available but light and air conditioner

still on for 1 or 2 hour even more, Even sometimes it is not switch off at all by the operator by the end of class. So therefore needed an information management system that is integrated with the electric power automation system connected to electrical devices such as lights and air conditioners. System automation electrical device constructed by using a microcontroller as controller. Given this system, the utilization of electrical devices is more controlled in terms of consumption and energy saving.

## LITERATURE STUDY

Smart classroom is smart pseudo which can reconfigure itself and resources by automatically based on a standard profile for a particular user group. This can be conducted by using a predefined schedule or event driven basis for specific group-classes and certain lecturers (Ciaran, 2009:27).

Implementation of the development of smart class system in this study focused on three aspect to actualize the system for smart classrooms that are environmentally friendly or eco-campus that is the development of information systems integration of attendance record, scheduling information system and information system of power savings at the classroom so that can be reliaze the environmentally friendly of classrooms.

### Attendance System Information

Attendance information system presently has many conducted by researcher among them is lecturer attendance system which can provide presence information services to the academic and students section. This system was developed by I Gusti Agung Rai Sugiarta and Ni Nyoman Harini Puspita of STIKOM-Bali (2011).

In addition, there is research that has developed by In Mathali'ul Falah Islamic Education Pati, Central Java which is that student attendance system on a case study with the result that a system set up to be the center of information for teachers, the administration, counseling, as well as those who require to search for student attendance information. The information generated from a system set up can be accessed by anyone who has authority over the system and can be accessed from unit the work or each section. By using a database as a data storage center, then the attendance information is recorded into the system can easily be displayed again using the specified data filter parameters. Atin (2012:256).

It is quite different from research conducted by Maranatha Christian University where attendance system is design for computer laboratory attendance which is using user verification system where the results obtained are able to store student information system that consists of a number and name of students. It is also storing information computer consists of a computer's IP and computer name, store of computer usage information, can block the incoming access by unauthorized users or who are not registered. System is developed by Radiant Victor Imbar and Robby Kurniawan (2012).

## **Scheduling Information System**

Computer-based information system is needed, especially in the development of an organization, in this case a university. Scheduling and class room settings manually can be performed, however handling of this kind will face many obstacles, especially in terms of precision, to be able to handle it needed another system that could handle such things in order to get an accurate and fast, and can overcome the difficulties in management with manually.

Scheduling information system at present has been many research conducted including the class schedule information systems with Expert System method established by the Faculty of Engineering Department of Electrical Engineering Brawijaya University of Malang. The results of the application system can be seen that the application system for class learning on information systems can perform well process and correct. Testing was also conducted on some rules of the expert system that has been made to determine whether the system can work properly. Nurwarsito (2009:57).

It is also quite different with research that has been conducted by Malang University which is set up information systems the usage of class room based on class schedule base on ATmega 32 Microcontroller with results designing and testing a whole tools obtained class room status information that can appears on the LCD in real time. Siregar (2009).

## **Energy Saving System Information**

Eco-campus is a campus that has awareness, environment cultured and has conducted environmental management in a systematic and sustainable as well as a reflection of all academic members in a campus environment in order to always pay attention to aspects of health and respect to surrounding environment. SLHD (2010).

The objectives of providence of the Eco-Campus is to persuade the everyone in campus as well as to maintain the resilience of energy resources, water and natural resources and also to protect the environment through waste management, energy saving and environmentally friendlier behavior change, especially in the area of campus.

Many studies have been conducted by researcher about how to save electric power such as has been conducted by the Institute of Technology Sepuluh November (ITS) which is Design of Smart Class With Smart System Control Electrical Energy Use. The results obtained are realizing the Smart Controller Class-based microcontroller. This controller of Smart Class has 4 systems. Namely, RFID Smart System Log, System Manual, Database Systems, Systems Automated Systems. With describing, RFID embedded in lecturer attendance. Those Attendance brought near to the RFID reader is placed on the lecturer table. Furthermore, RFID reader will activate the microcontroller, the microcontroller will read the PIN code of the RFID and adjust the database in EEPROM memory. Then, the microcontroller will activate the Solid State Relay (SSR) and Remote to turn on the lights and air conditioning. After completion of learning activities, RFID is approximated again to turn off the lights and air conditioning. If in the middle of the lesson wants switch off the lights, lecturer can just turn off manually. With Smart Class system is expected the use of the lights and air conditioning to be effective and efficient, and helpful, Eco-Campus



program on campus ITS. The system was developed by Fauzi Rahmat, Djoko Purwanto and Suwito, (2012).

## RESEARCH METHODS

### Time and Place

The research is planned to be conducted for 3 years from 2014 to 2016 in the Laboratory of Automation and Robotics Engineering Faculty of Engineering Serambi Mekkah University.

### Equipment and Materials Research

The Needs for this research is using 1 unit of a computer, and need for materials used in this study such as:

- a. The software of Information System for attendance, scheduling information systems, information systems the use of electrical power.
  - Compiler Pemrograman Java J2EE, DBMS MySQL
  - IDE Arduino
- b. Hardwares for the device Attendance Information Systems, scheduling information systems, and information systems the use of electrical power.
  - Reader and Tag RFID
  - Tablet Android Samsung dan PC Server
  - Modul Arduino Mega2560 + Terminal relay
  - Electric door lock based on solenoid valve
  - Wifi Shield for Mikrokontroler and Wifi Router

### Design For Set Up System

This study is applied an experimental system that is directed at develop information and tools so that after this study a model system the user can use smart classrooms with a combination of centralized information systems and automation.

The system in overall is placed in a single server, where the server system consists of attendance information, scheduling information system for class room and electricity utilization management information system. Each data entered is attendance data by students and lecturer, scheduling data by academic staff and customized power management information system data scheduling and attendance data. The response or output of each system is absent reports, security doors that are adjusted with class schedule and process management in the form of electric control of switching on/off lights and air conditioning in the class room.

Meanwhile, the order of the process can be seen in Figure 2 fishbone diagram. In this diagram there are some progress in terms of sub processing and ends with the final result is an integrated in to system of early detection.

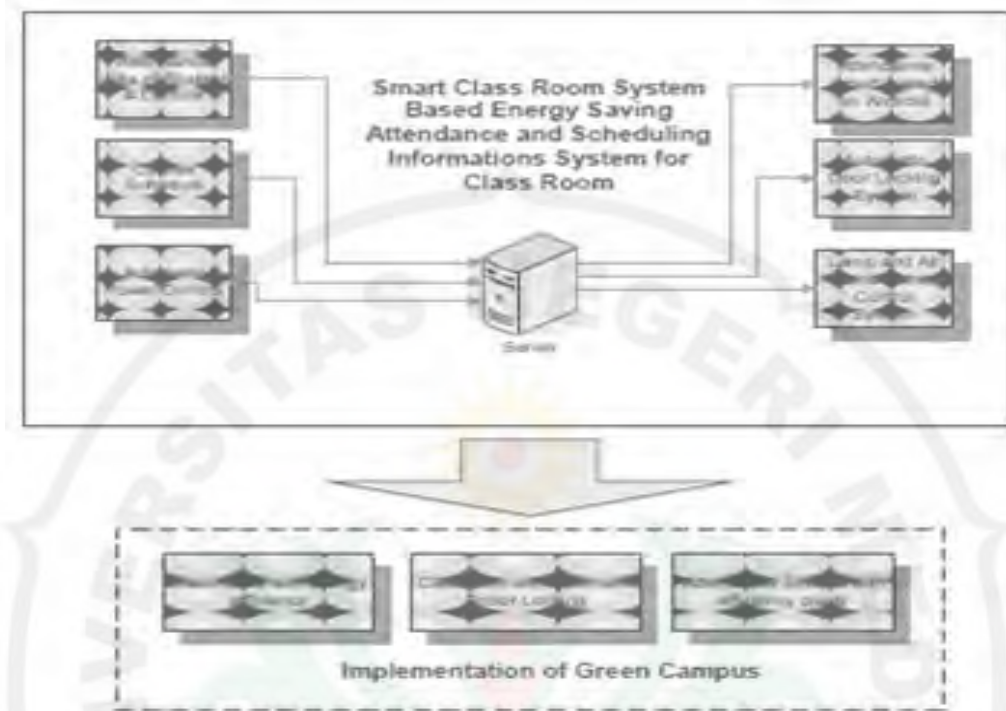


Figure 1. Smart Classroom system with the implementation of the Green Campus

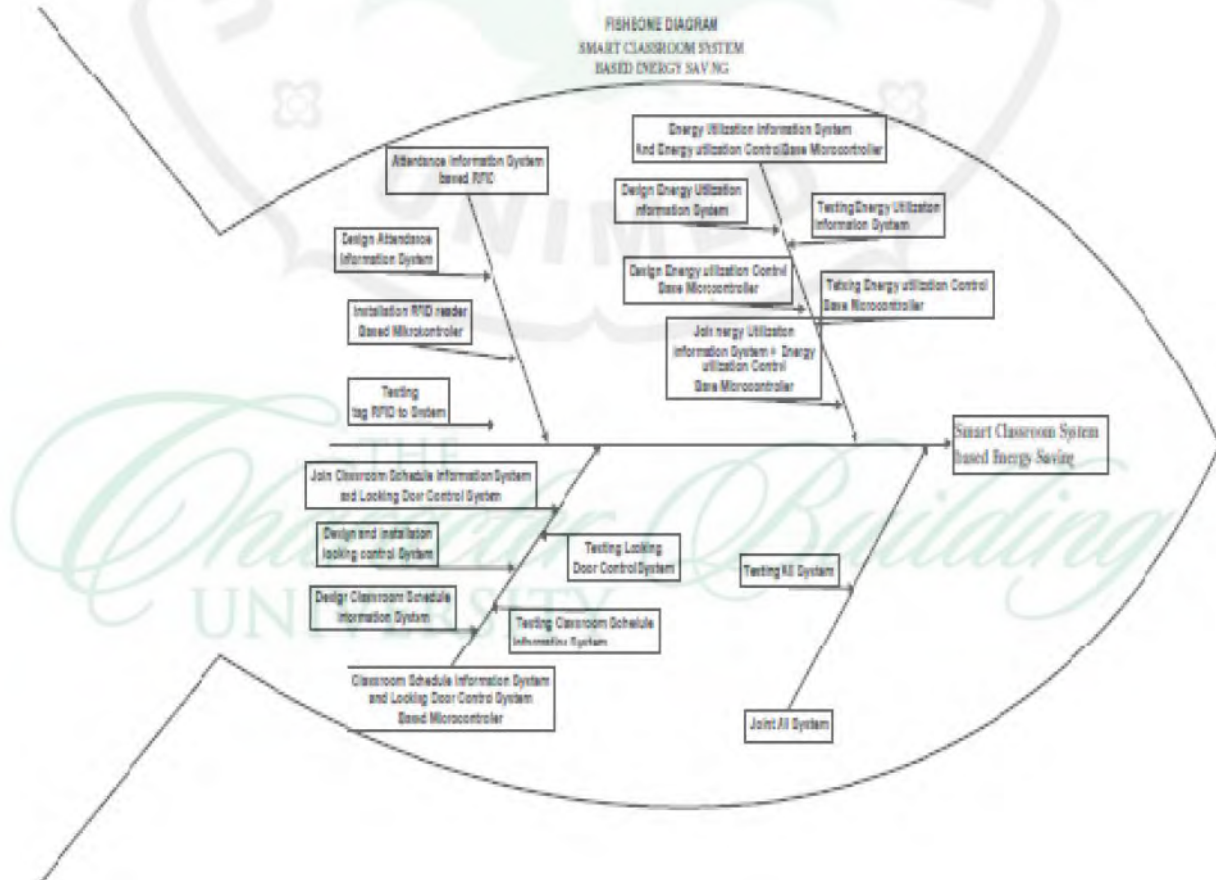


Figure 2. Fishbone Diagram of Smart Classroom System based Energy Saving

## The Set Up of Student Attendance Information System based on RFID and Android Applications as Media Attendance Reports

The proposed of attendance information system that set up by using RFID system with attendance reports based on android application. This system consists of student and lecturer attendance information systems which is attendance system identified by using RFID cards from each of student and lecturer. The identification data is put on the database server which has been integrated with information systems that are create based on Java technology. The result of attendance reports can be seen from the admin side or operator of attendance information systems from the server side or by the lecturer through a Tablet PC based on Android.

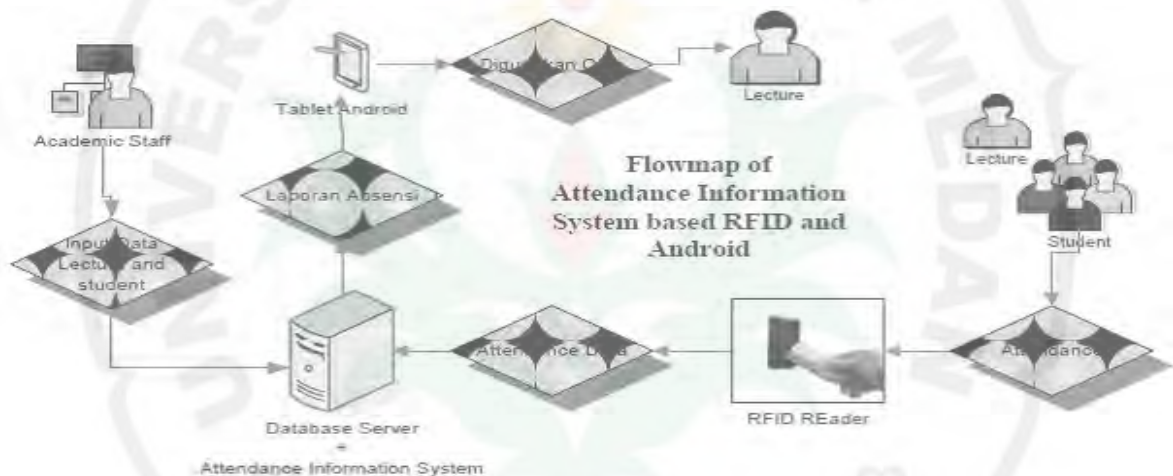


Figure 3. Flowmap of Student Attendance Information System based on RFID and Android Applications

In creation of student attendance information systems base on RFID and android application as media reports that there are two design that is information system design can be seen in Figure 4 and the RFID tag reader system design in Figure 5.

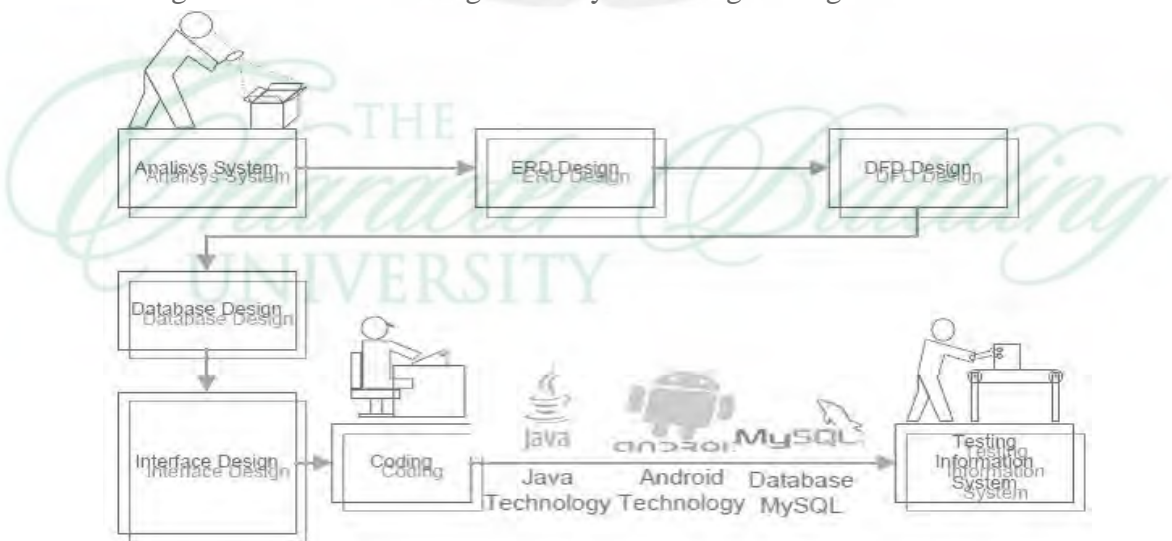
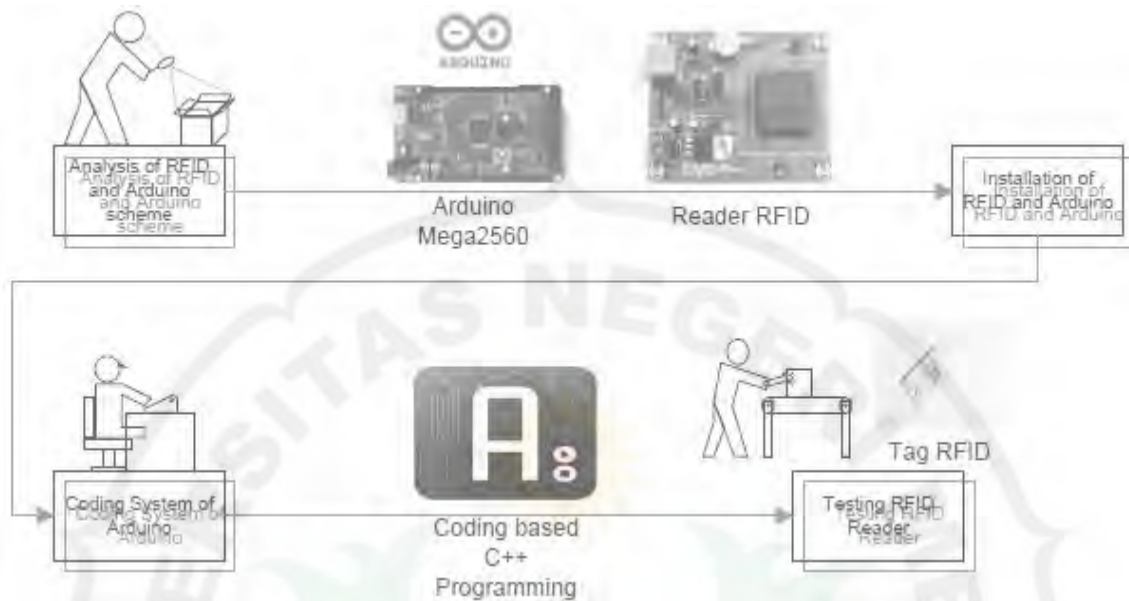


Figure 4. Flow analysis and attendance design of information systems



**Figure 5. Flow analysis and the design of system reader RFID base on mikrokontroler**

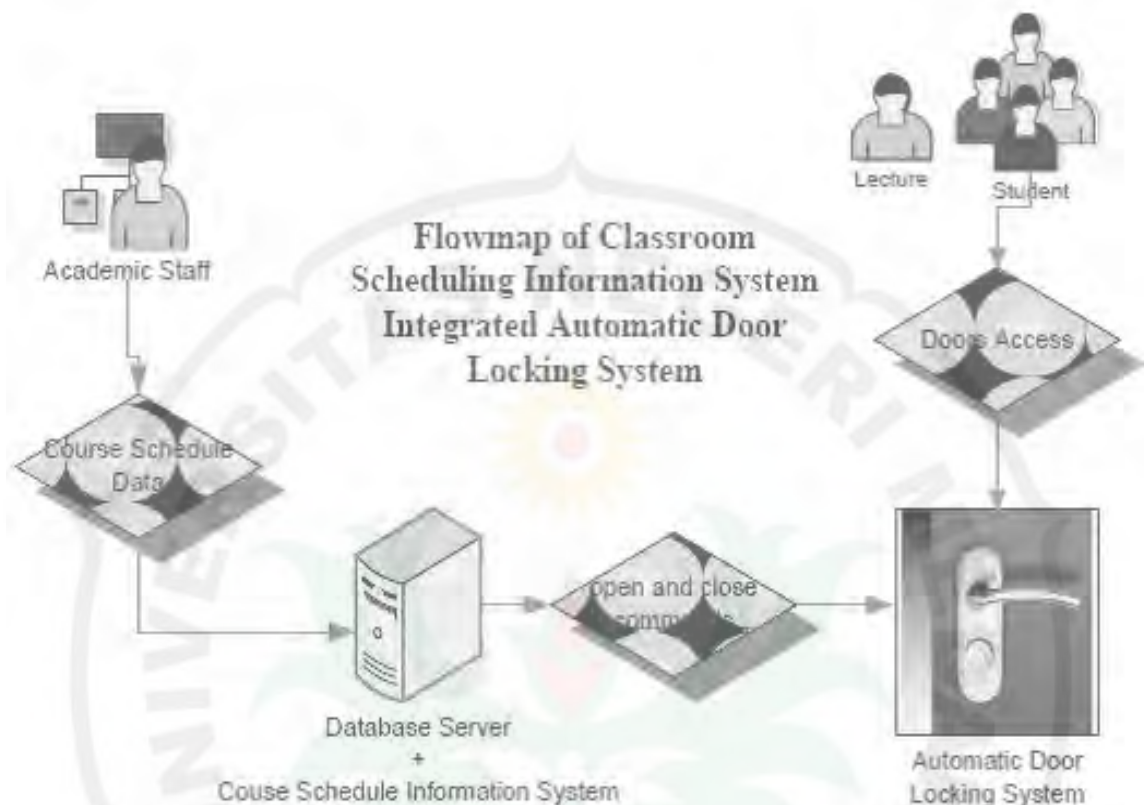
While in Figure 6 can be seen in the picture below on how a user attendance using RFID cards and RFID data process of the journey and the end user to the server and at end the report on the lecturer tablet.



**Figure 6. Flow of user uses RFID reader and trip information data system attendance of students and lecturers**

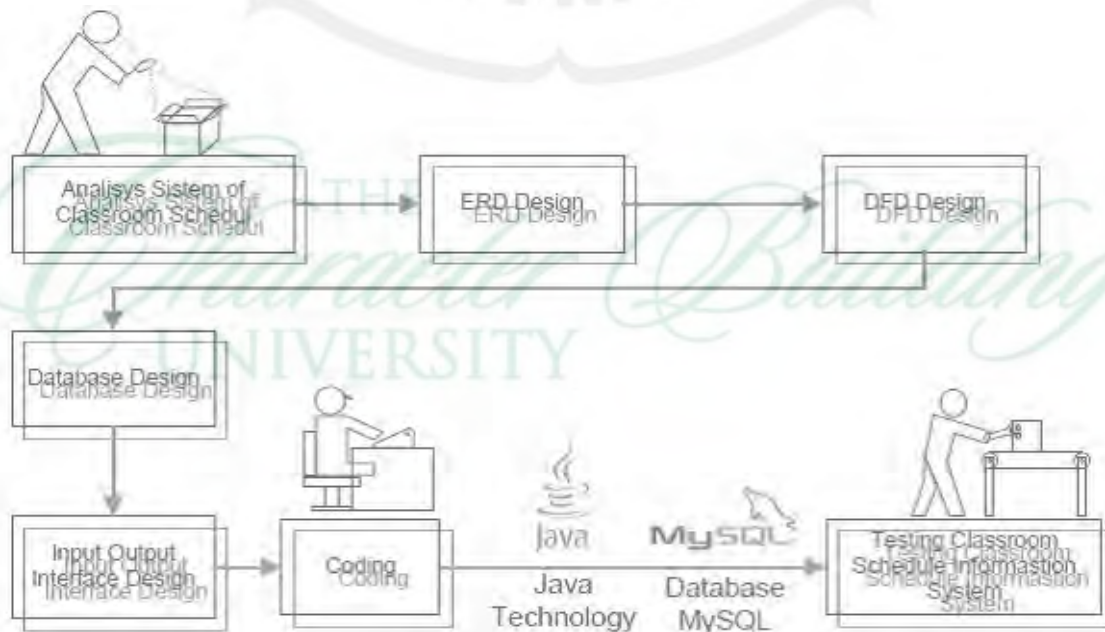
### The Set Up of Scheduling Information System By Using of Class Room That Integrated with Automatic Door Locking System.

The proposed research is scheduling system information for class room usage that integrated with Automatic Door Locking System. The system works with data scheduling by way of entered through scheduling information system based on Java technology and the data stored on the database server. Scheduling of information system will generate a command signal to the microcontroller according to the time and class room that have been set up in the database. The Signal are processed by the microcontroller will be delivered to the door lock system. Information received by the door lock system that is command for lock or unlock of the door.



**Figure 7. Flowmap Scheduling Information System for Usage of Class Room Integrated with Automatic Door Locking System.**

In set up of scheduling of information systems in usage of class room there are two design of scheduling that are design of scheduling information system of class room can be seen in figure 8 and the flow of analysis and design of automatic door lock system base on microcontroller Mega2560 as shown in figure 9.



**Figure 8. Flow analysis and design of information systems scheduling for Class Room**

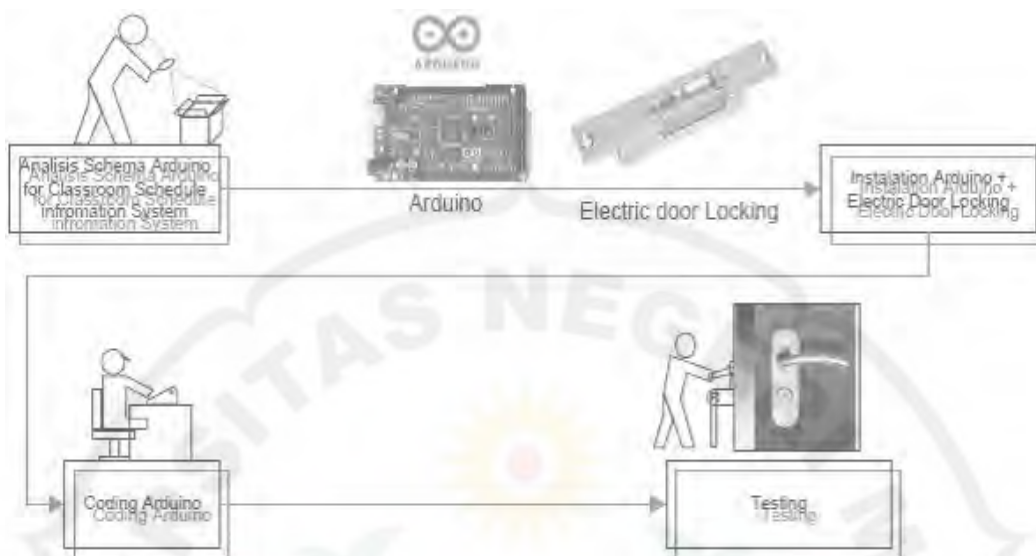


Figure 9. Flow analysis and design of door locking system base on microcontroller Arduino

**The Set Up of Energy Utilization Information System in Power Device in classrooms That is integrated with Automatic Power Settings System Based on Microcontroller.**

The proposed research is the energy utilization in management information system in power device in classrooms is integrated with automatic power system settings based on Microcontroller. This system works adapted to the scheduling information system and student attendance information system. If both systems are in accordance with the schedule and students and lecturer have been provide in classroom then the system power facilities in the classroom is activated. Besides, the use of light is adjusted for the student, if the number of students in a room full in the class room then all facilities of lights turned on.

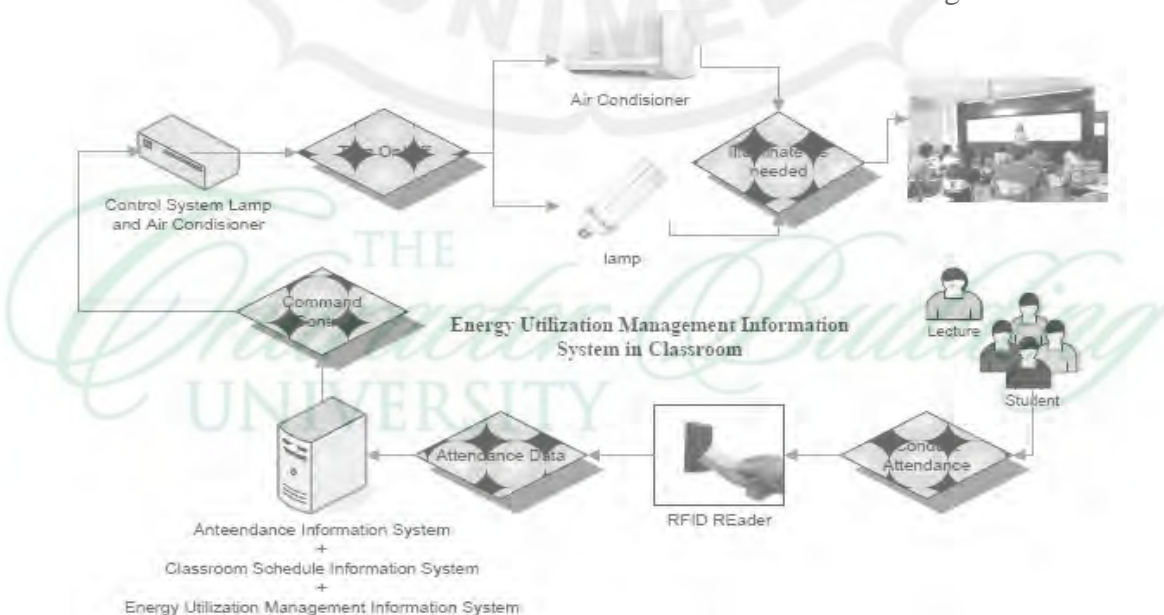


Figure 10. Flowmap Energy Utilization of Management Information System in Power Devices in Classrooms is integrated with Automatic Power System Settings Based on Microcontroller.

In set up of energy utilization of information systems in the electrical device of class room, there are two design, that is the design of information system can be seen in Figure 11 and the analysis and design of automatic door locking system based Microcontroller, shown in figure 12.

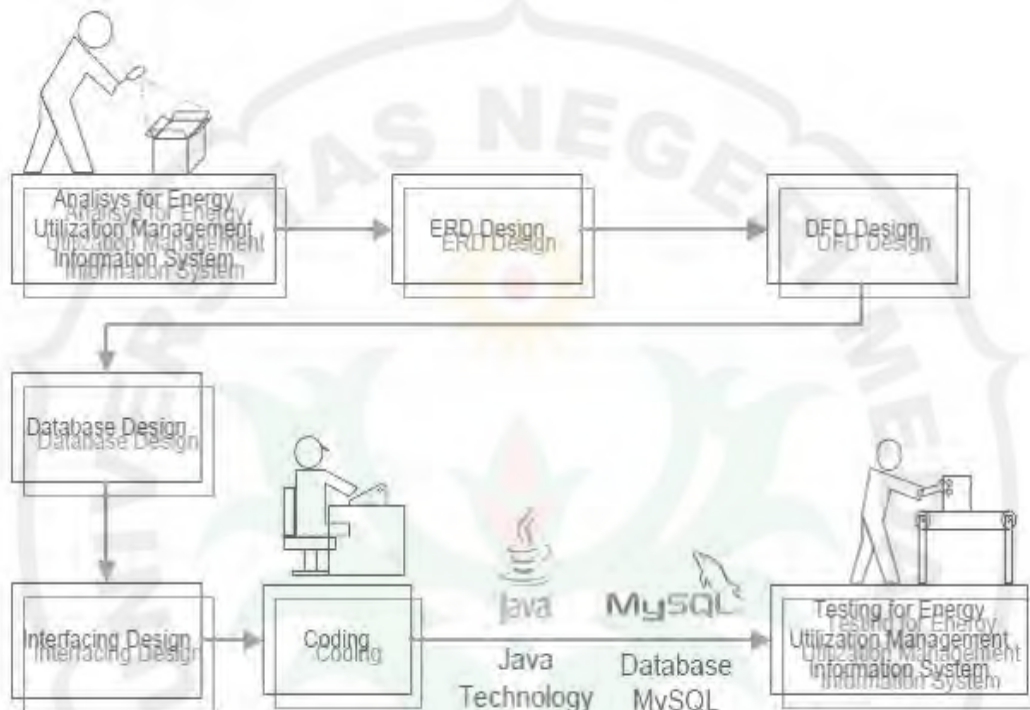


Figure 11. Flow analysis and design of information systems by usage of class room electricity



Figure 12. Flow analysis and utilization of electrical system design of class room based on microcontroller arduino

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## AN APPLIED MODEL OF TEACHING MATERIALS TO IMPROVE STUDENTS' SPEAKING SKILL

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### Abstract

*An Applied Model of Teaching Materials to Improve Students' Speaking Skill* has shown its ultimate aims at digging the needed data that concerning with its pursuits of the academic purposes. This subject is applied to the students of English Study Program of Teacher Training and Educational Science Faculty of Serambi Mekkah University, Banda Aceh, in terms of giving its impact of the teaching-learning process. In this case, the researcher would like to inform the reality of the students' speaking skill which referred to the principles of language teaching. According to Lado (1975:55), "The students must be engaged in practice most of the learning time. Here, he continued that, in the language learning process the students should do the presentation practically. The students are recommended devoting 85% of the class time to practice and no more than 15% of the time to use in the explanation and commentary." To support this statement, Byrne (1983:140) emphasizes that "In this way all the pupils will soon get thoroughly familiar with the language materials." So, based on the opinions expressed by the two experts above, we can understand that in teaching-learning process, the students should be taught by applying the teaching materials practically. In order to gain the purpose of the study, the researcher focuses this subject in the experimental design as suggested by Ary (1979). Since the target of this study is to produce a teaching material in the form of text book, it takes two years of research. The first year it is concerning with the identification of the teaching materials provided, especially in terms of its validity and its reliability. While in the second year, the research will be focused on its revision for the whole body of the textbook, either the contents or its physical appearance, in order to make it as good as possible to be a practical handbook which will be printed with its label of book-ISBN branded.

**Key Words: Applied Model, Teaching Materials, Speaking Skill**

### INTRODUCTION

#### Background of the Study

As the matter of fact, the students' English ability, especially in speaking skill is still very low. Ironically, they are the students of English department at private universities in Kota Banda Aceh and Aceh Besar, especially the English students of Teacher Training and Educational Science Faculty, Serambi Mekkah University, Banda Aceh. Regarding to the real fact, the researcher becomes enthusiastic to study deeper about how it occurred and how to find out its solution. This problematic case is very crucial to be focused, unless it would be worse if it is not cared seriously and there is no way out from lecturers, particularly those who teach the teaching subjects, i.e. the speaking skill, it can be certainly said that the educational quality will be getting left-behind sooner or later. It is like a nightmare when we try to imagine the students of English department do not speak English

well. The problem could be raised by asking who is to blame when this fact happens. It must be referred and aimed to lecturers who directly hold the front line in teaching, particularly those who teach about the subject of teaching skill.

Another concern is about the lecturers' efforts to improve the students skill in speaking English. They have to think and then create the proper way in teaching, therefore the students master the language that they are learning correctly and accurately. Such a kind of question can also come up together with the fact that the students' English ability is still low in speaking English showed in the daily conversation. How the lecturers should deal with English teaching model in teaching and learning process. Is there any proper English teaching model that could be developed to the students teaching process, especially to the students of English department at private Universities in Kota Banda Aceh and Aceh Besar, especially the Serambi Mekkah University, Banda Aceh.

Based on the problems mentioned above, the researcher is interested in doing a research entitled: An Applied Model of Teaching Materials to Improve Students' Speaking Skill.

### **The Problem of the Study**

The writer would like to formulate the main problem of this study, i.e. "Is the applied model of teaching materials to improve students' speaking skill used at teaching the TEAFL-I and TEAFL-II subjects better than using other approaches to the students of the English Study Program of Teacher Training and Educational Science Faculty, Serambi Mekkah University, Banda Aceh?"

### **Specific Purposes**

Based on the main problem formulated above, the writer would like to formulate about the specific purpose of this study, i.e. creating the valid and reliable research instrument in the form of teaching materials that could be used to identify the background of the problem in teaching English to the students of private universities in Kota Banda Aceh and Aceh Besar, especially for the teaching the TEAFL-I and TEAFL-II subjects to improve the students' speaking skill of the English Study Program of Teacher Training and Educational Science Faculty, Serambi Mekkah University, Banda Aceh.

### **The Significance of the Study**

Since this study is in the form of quantitative nature, that is done in experimental study, it is, ofcourse, its results could be transferred to whole subjects and objects under the same condition as done at the experimental occasion within the same sample of the students in this research. Theoretically, whatever the output of this study is, it could be disseminated to wholes subject and objects under the same condition. Furthermore, the output of this experimental research would have a double meaning and more value provided with it is being done in experimental design of study. This study is hopefully to be considered positively by the stakeholders for the sake of next generation that could be owned to be much better in the future.

## **The Scope of the Study**

Since the expected output based on this research title is to find out a teaching materials, so the orientation of this study is about the needs of producing an applied model of teaching materials to improve students' speaking skill. The basic reason to this scope of study is referred to the fact, generally the students who learn English, for instance, the students of the English department, especially at the Teacher Training and Educational Science – Serambi Mekkah University Banda Aceh could not sufficiently speak English well. Meanwhile, they have learned English for almost twelve years started from sixth grade of Elementary school until the third year in university. Considering about the real phenomena, the researcher assumes that there must be something wrong with the teaching method. Based on his assumption, the writer considers that the most important thing to do here is how to figure out the proper way that the lecturers should use the method in teaching application in terms of improving students' speaking skill.

## **THEORETICAL ORIENTATION**

In accordance with the plan, this study would take two years and divided into two stages. Each stage is going to be lasting for one year. In stage one, the team deal with preparation such as preparing instrument, setting and the indicator system of success determination, included with several things related to this study. In stage two, the team will process and analyze the collected data.

### **Teaching the Language Skills**

As we know that, there are four skills in teaching the English language. They are listening, speaking, reading and writing skill. From the four skills, speaking is called the key of skill. Thus, the speaking skill should be the first priority that has to be focused in teaching and learning process. This skill would be successful when it is applied in every teaching and learning session. A good understanding of the speaking skill is something special that can be a model of language use. As a result of teaching, speaking can be influenced by the development and tendency in language learning process and psychology.

Dealing with the statement, Lado (1975) mentioned that, "The study of language has gone upward within language from phonology to syntax to semantics, and outward to study of language as part of cognition and finally to the study of language as part of the total communication system within society-what Halliday calls it as social semiotic."

Halliday statement was also supported by Finn (1985) states that "It is important that speaking teachers be able to make intelligent choices concerning with method and curriculum in light of progress in such fields and linguistics, psychology, and sociology."

From Halliday and Finn statement, it can be understood that language teaching is closely related to the method of teaching. The smart choice in teaching method plays an extremely important role. Therefore, the lecturers who teach language should be smart in using the proper method in teaching language.

Based on the above explanation, we finally understand that there are a lot of purposes from speaking skill that can be gained through the process of teaching and

learning or dialogue. From all purposes of teaching speaking skill, there are two main dominant aspects that are related to it. They are the skill in dialogue and the skill in learning language.

### **Teaching Speaking for Dialogue**

Talking about the efficient method in teaching English, in this case teaching speaking, it would be better to clarify about the model of teaching materials to improve students' speaking skill. This kind of method development in teaching English toward the students who study the TEAFL-I and TEAFL-II subjects at the the English Study Program of the faculty of teacher training and education, university of Serambi Mekkah Banda Aceh.

Byrne (1980) states that "in speaking, the students' developing a considerable range of habitual responses to specific set of pattern of graphic shapes. When learning to speak his native language he has acquired essential space the direction habit, he can recognize the shapes of letters in his native language alphabet and has become skilled at speaking these in the direction his language prescribes"

Byrne then explains more that if a foreign language uses the same alphabet as in students' mother tongue, that is the language equivalent (as in English to French or English to German). By having good practices in getting used to speaking English will avoid the students from the difficulties in learning foreign language.

Here, Byrne (1980) gives details in his explanation about the development of teaching speaking skill as follows: "Students need to be encouraged to speak for the content of the material as they do in their own language. Meaningful reading requires concentration upon the important element which conveys the message. Constant attention to each word presents such an overwhelming amount of information that the mind cannot process it all, even in the native language."

Based on the above information, the writer would like to mention River (1971) opinion:

As we can see, we work together with students coming from the different field, talking with different text (stated in the survey, text book and theoretical analysis), and using different methodology approach as well. It can not be concluded that all are the same about the field of problem in certain text. The teachers had prepared text in years and if there are new thing that are being introduced about certain texts, then the text analysis will be confused toward the grammar such as in phrases from subject to object, the form of grammatical cohesion and non technical vocabulary.

Based on what was explained by River, we are aware that a lecturer must be paying full of attention to the teaching of speaking. In case a lecturer has to teach the students to understand texts, he still has to figure out how to make them understand it orally as well.

### **Teaching Speaking for Language Learning**

The most important thing in language teaching process is teaching speaking for language learning. Therefore, there must be a measurement or what is called as criterion to understand the tasks given to the students. According to Weir (1990):

The criterion of efficient learning is that after a long interval the matter learnt can be applied as effectively as necessary to new tasks. Simple memorizing has very limited value is that it is no help in applying the knowledge to new tasks. The only learning worth name, in fact, is learning by understanding.

Dealing with Webster statement above, we understand that in teaching language skill (not only speaking, but also reading, listening or writing) is the main thing to make the students recognize and understand the text content that is being taught. Thus, a test is needed for the students to be able to understand the given text. In this case, the traditional way in teaching speaking is mainly focused.

### **Steps in Teaching Speaking Skill**

To gain the purpose of teaching speaking skill, there are at least three steps that have to be followed by a lecturer, they are:

#### ***Pre-speaking Activity***

Before teaching speaking skill, a lecturer has to know that there is a strategy that has to be applied to teach speaking skill, it is speaking itself. What is meant by “speaking itself” is speaking activity before the class begins. A lecturer has to give time to students in order to read a text before they start learning.

Concerning with this matter, Byrne (1983) stated that pre-speaking is an activity that aimed at initiating students to read before they are taught.

Based on the Byrne statement above, we understand that the teaching of speaking skill is actually begun before the students pay attention and read the given text. Pre-teaching activity can be designed in such a way to let the students to review the information within the text in general, knowing what had happened and what would happen. Besides, pre-teaching is also aimed to invite the students to think about the possibility of the text contents.

#### ***While Speaking Activity***

As we all know, during the speaking activity, a lecturer is in a position of silence while the students are reading text to understand the tasks given to them.

According to Harmer (1986), “speaking is a practice which is controlled by mouth and brain. Mouth concern with the activities related to uttering any message. Brain has to cooperate to receive and produce the message uttering by mouth. While eyes would see problems and send them to brain and is uttered by mouth. Therefore, there will be communication in teaching and learning process. In general, the students is willing to participate in teaching and learning process, especially in language class where they want to express their ideas to people.”

This statement is also supported by Byrne (1983): “A student might be looking for of what is going to talk about, in the form of technical literature or may be he hopes to give a speech in his home country. The different participation level will also affect the level of receiving the message. They also apply some linguistic behaviors in different kind of skills. In skill term, they are called: writing, speaking, dictation and reading aloud.

### *Post Speaking Activity*

The third step in speaking skill teaching is “speaking”. In this case, speaking becomes the main point as the conclusion of what have been done during teaching and learning process.

At the time the teaching speaking skill is finished, there must be an evaluation by several questions. Finn said “when speaking has been completed, it is time to put questions of evaluation personally respond and to help students to relate all kinds of things with the real world which is replaced”.

### **THE RESEARCH METHODS**

The output of this research is expected to be an applied model of teaching materials to improve students’ speaking skill to the students of English Study Program of private universities in Kota Banda Aceh and Aceh Besar, especially the university of Serambi Mekkah, Banda Aceh.

Besides, the output of this study can also be transferred to the same objects and subjects. It means that if this research succeed, it would be useful for the students all over Indonesia.

In accordance with the expected output, the researchers refer to the following ways:

1. Determining the research methodology (experimental research),
2. Population and sample ( all students of the English Study Program of Teacher Training and Educational Science Faculty Serambi Mekkah University, Banda Aceh),
3. The technique of data collection (experimental teaching),
4. The processing and analyzing the data (using panel procedures), and
5. Conclusion (the finding of an applied model of teaching materials to improve students’ speaking skill).

Since this research is quantitative in the form of experimental study, thus the research design is done by referring to the pattern as suggested by Ary (1979) as seen in the following chart.

**Table 1. Chart : Independent and Dependent Variables**

	Group	Independent variable	Dependent Variable
( R )	I	Kinescope Film	Achievement Test
( R )	II	Classroom discussion	Achievement Test
( R )	II	Programmed booklet	Achievement Test

By following the design as shown in table 2, we can see the main aspects of that experimental research, they are: (a) a useful question to a researcher to figure out the answer- that is a question about the correlation between two variables; (b) hypothesis as a characteristic of the correlation between two variables; (c) the introduction of experiment condition and measurement; (d) data analysis, by having this, the researcher will be able to determine the whether there is a correlation between two variable or not.

## THE RESEARCH RESULTS AND DISCUSSIONS

The results of teaching speaking skill by using an applied model of teaching materials to improve students' speaking skill to the students of English Study Program of FKIP-USM Banda Aceh was done to TEAFL-I and TEAFL-II subjects of both Odd and Even Semesters.

There are only two classes of the odd and even semester students of English Study Program of FKIP-USM Banda Aceh. The total number of students is more than 800. But, for the need of this project, the writer just took 21 students as the controlled group and 21 students as the experimental group. After that, she then gave a pre-test and a post-test to both controlled group and experimental group. Prior to starting the teaching learning process, the writer gave them a pre-test that aimed at measuring their basic achievement about the speaking ability before they were taught and applied the theory and the way how to speak fluently and correctly using the realia methods and other methods.

At the end of the experiment, they were provided with a pre-test and post-test in order to identify how far the teaching learning process affects the students' achievement toward the subject matter.

The results of the pre-test and the post-test are processed and analyzed in two stages, namely:

- 1) Analyzing the achievement of the two groups of students who were taught by using an applied model of teaching materials method.
- 2) Proving the writer's hypothesis as stated in the first chapter of this study.

To work with the data, the writer found the mean score of the two groups that obtained by each student. Then, the mean score of the two groups were analyzed by comparing the both mean scores of the two groups.

To prove the writer's hypothesis, the writer used the formula t-test with significant level is 5% or level of validity (reliability) is 95%.

The students' scores of pre-test and post-test achieved by the students in experimental group can be seen in the following Table 2.

Below, the researcher just displayed the students' scores into a table that describes about the results of pre-test and post-test that is easily compared between the two groups as shown in Table 4.

**Table 2. The Students' scores of Pre Test and Post Test in Speaking By Using An Applied Model of Teaching Materials Method (Experimental Group)**

Nos.	Students' Codes	Pre Test	Post Test
1	132	70	80
2	133	65	80
3	134	60	80
4	135	70	80
5	136	65	80
6	137	70	80
7	138	55	65
8	139	60	75
9	140	60	80
10	141	65	70
11	142	70	80
12	143	50	60
13	144	65	70
14	145	65	80
15	146	70	75
16	147	70	70
17	148	65	70
18	149	55	70
19	150	55	70
20	151	50	65
21	152	75	80

**Table 3. The Students' scores of Pre-Test and Post-Test in Speaking By Using Other Methods (Controlled Group)**

Nos.	Students' Codes	Pre Test	Post Test
1	111	60	70
2	112	70	70
3	113	50	60
4	114	50	60
5	115	45	60
6	116	80	80
7	117	60	80
8	118	65	65
9	119	65	70
10	120	70	70
11	121	65	70
12	122	60	70
13	123	55	65
14	124	55	70
15	125	60	70
16	126	60	65
17	127	60	70
18	128	60	70
19	129	55	60
20	130	60	60
21	131	60	75



**Table 4. The Scores of Students' Pre Test and Post Test by Using An Applied Model of Teaching Materials to Improve Students' Speaking Skill**

Speaking Using Other Methods				Speaking Using Applied Model			
Subject	X1	X2	X	Subject	Y1	Y2	Y
1	60	70	10	1	70	80	10
2	70	70	0	2	65	80	15
3	50	60	10	3	70	80	10
4	45	60	15	4	65	80	15
5	80	80	0	5	70	80	10
6	60	80	20	6	55	65	10
7	65	65	0	7	60	75	15
8	65	70	5	8	60	80	20
9	70	70	0	9	65	70	5
10	65	70	5	10	70	80	10
11	60	70	10	11	50	60	10
12	55	65	5	12	65	70	5
13	55	70	15	13	65	80	15
14	60	70	10	14	70	75	5
15	60	70	10	15	70	70	0
16	60	65	5	16	65	70	5
17	60	70	10	17	65	70	5
18	60	70	10	18	55	70	15
19	55	60	5	19	55	70	15
20	60	60	0	20	50	65	15
21	60	75	5	21	75	80	5
21	1255	1540	410	21	1335	1550	485

With the parameters:

- X1 = The pre test score of other method group
- X2 = The post test score of other method group
- X = Deviation of Score X1 and X2
- Y1 = The pre test score of other method group
- Y2 = The post test score of other method group
- Y = Deviation of score Y1 and Y2
- S = The Samples or subjects

Based on the data from all tables above, we can understand that both group students have different achievement, either in individual form or in group form. The data analyzed using the formula as suggested by Arikunto (1996:305) that is:

$$M_x = \frac{\sum X}{N} \text{ and } M_y = \frac{\sum Y}{N}$$

As the results, the mean of each group is as follows:

1. The mean score of students treated the other method in teaching speaking using other methods (controlled group) is :

$$M_x = \frac{\sum X}{N} = \frac{410}{21} = 19,5$$

2. The mean score of students treated the model realia method in teaching Speaking skill (experimental group) is:

$$M_y = \frac{\sum X}{N} M_y = \frac{485}{21} M_y = 2,2$$

## RESULTS

As it has been mentioned above that the hypothesis of her study is that the result of teaching speaking by using model realia method is better than teaching speaking by using other methods.

In this case, to see whether or not the hypothesis is accepted or rejected, the writer used the hypothesis proving formula, namely the t-test as suggested by Arikunto (1996:301) as follows:

$$t = \frac{M_x - M_y}{\frac{\sqrt{\sum x^2 + \sum y^2}}{N(N-1)}} t = \frac{(1,9 - 2,2)}{\frac{\sqrt{410 + 485}}{21(21-1)}} t = \frac{-1,901}{\frac{\sqrt{895}}{420}} t = \frac{10,01}{3,19}$$

$$t = 3,14 \quad db = (N_x + N_y - 2) = 21 + 21 - 2 = 40$$

The critical value of t (t-table) with significant level of 5% and degree of freedom 40 is 2,68. The criteria to accept or reject the hypothesis offered by Sudijono are:

1. Hypothesis null or Null hypothesis ( $H_0$ ) is accepted if the t-count equal to t-table or t-count is greater than t-table.
2. Hypothesis alternative or Alternative hypothesis ( $H_a$ ) is rejected if t-count is smaller than t-table.

The calculated value of t-count is 3,14. Since the result of t-count (t-test) is greater than t-table, the hypothesis is accepted. It means, the result of teaching speaking by using model realia method is better than the result of teaching speaking skill by using other methods.

## DISCUSSIONS

After doing the teaching in an experimental study to the fifth semester students of English Study Program of FKIP-USM Banda Aceh from May 03, 2012 until June 06, 2012, the writer processed and analyzed the research results by using a simple calculation. In another words, after doing an experimental teaching at the fifth year students of the mentioned class above, it can be understood clearly about the results of the research. Here, the writer applied the the model realia method in teaching speaking skill to the students of the fifth year students of the English Study Program of FKIP-USM (Experimental Group), while the there was no use of the model realia method or the writer applied other methods

for the second group (Controlled Group). Through these two different ways or methods, we could find out that, the students' scores of the fifth semester students of the mentioned class, that is, teaching speaking skill by using model realia method get higher scores compared to the students who are taught speaking skill by using other methods.

## CONCLUSIONS AND SUGGESTIONS

### Conclusions

After having discussions as given above, the writer can conclude that teaching speaking skill to the fifth semester students of the English Study Program of FKIP-USM Banda Aceh by using an applied model of teaching materials to improve students' speaking skill method gave a much better result compared to teaching speaking skill by using other methods to the same subjects

### SUGGESTIONS

Here, it is fairly suggested that those who want to teach speaking skill to the same subjects as done by the researcher, should apply the applied model of teaching materials to improve students' speaking skill method as well as others under the same conditions.

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# BUILDING PERFORMANCE EVALUATION (BPE) FOR QUALITY IMPROVEMENT IN POST-DISASTER RECONSTRUCTION

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## Abstract

This paper explores the possibility in applying BPE in every building life-cycle stages as part of built-in assessment for post-disaster reconstruction. Literature reviews provide description of BPE historically and conceptually, explain disaster management paradigms, compile the challenges and key consideration in applying BPE in reconstruction circumstances, and discuss the possibility and gaps in applying it. There is a possibility for conducting BPE through post-disaster reconstruction building life cycle together with the problems that need follow up in further study. This paper will help stakeholders in aid sector to consider BPE as built-in assessment in order to solve quality problems in post-disaster reconstruction project especially for public buildings evaluation and monitoring. By applying building performance assessment during post-disaster reconstruction building life cycle there is bigger opportunity to gain better quality of buildings, accountable project towards aid donors and beneficiaries, and a strengthen resilience buildings.

**Key Words: Building Performance Evaluation (BPE), Post-Disaster Reconstruction, Disaster Management**

## INTRODUCTION

The primary aim of recovery management is to build or to strengthen resilience of a society, its citizen, its assets, its building, its critical facilities, its livelihood and economy, its government administration, and its natural environment (Davis 2006). This paper elaborated on how building performance evaluation (BPE) method can be applied in post-disaster reconstruction life cycle in order to gain better disaster resilience buildings or assets. Post-disaster reconstruction is a complex process involving a number of interrelated activities (Jha et al. 2010). A report from the task force on the accountability for and audit disaster-related aid published by Netherlands court of audit noted:

We learned from the Tsunami that the task is very complicated. Many organisations have difficulty completing contracts, including INGOs that have a wealth of experience in providing aid in disaster areas. Houses were left unfinished, money ran out and the agreed quality was not delivered. Similar findings were made in audits conducted by the US GAO on the aid donated for the Katrina disaster (Netherlands Court of Audit 2008).

Another synthesis report published in 2006 by Tsunami Evaluation Coalition (TEC) – a multi-agency learning and accountability initiative in the humanitarian sector established in February 2005 explained why quality continues to be such an issue in humanitarian projects and it is because the model of quality control in normal business is driven by its costumers however, does not operate in the aid sector. They noticed the same

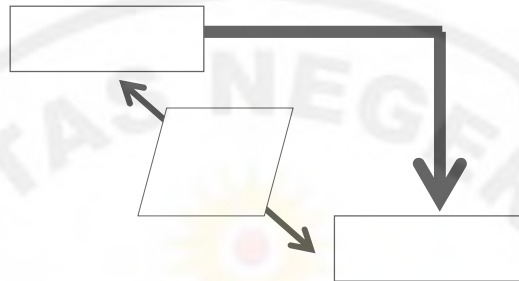
problems that occurred in tsunami 2004 is similar to the report from the Joint Evaluation of the Emergency Report by Rwanda as result of civil war and genocide in 1994 (Telford et al. 2006). A study of evaluation in the links between relief, rehabilitation, reconstruction and development (LRRD) published by Swedish International Development Cooperation Agency or (Brusset et al. 2009) noted that respondents complained about building quality where the performance of contractors has not been adequately monitored or where the owners have not been sufficiently guided during the reconstruction. The report added, based on the evaluation observed that both approaches can be equally successful or unsuccessful according to the level of monitoring and guidance. This paper argued with BPE method as the monitoring and evaluation system in post-disaster reconstruction may help to aid agents to deliver a better quality buildings since the method provide access for user buildings (beneficiaries in disaster recovery terms) or any stakeholders related with the project to participate in the evaluation process. (Hidayat and Egbu 2010) had listed in their study that effective project control and monitoring is one of the most cited factors in publication for critical success factor of a project. Even knowing that transparency and accountability will not necessarily guarantee good outcomes, but they can increase the odds of success (Labadie 2008).

Quality control driven by beneficiaries, donors and public should be obligatory model in disaster management. (Thampi 2005) stated that without built-in assessment mechanism, projects cannot learn from their past mistakes and determined where they have gone wrong. While (Thampi 2005) recommended Citizen Report Cards (CRCs) to evaluate public services, this paper recommended BPE to evaluate reconstruction projects specifically public buildings. (Preiser and Vischer 2005) claimed that BPE is proven as a universal evaluation concept and tool, offers a broad and adaptable framework for professionals affiliated with the building industry at all levels to find ways of implementing a user-oriented, cost-effective and high quality approach to produce all types of buildings. BPE has been proven and has been used for many years in many countries for commercial projects and now it is the time to start applying it in aid sector as well. Theoretically BPE concept has a big possibility to be applied in post-disaster context but also will face challenges and need to overcome limitation.

## **BUILDING PERFORMANCE EVALUATION**

Historically, building performance was evaluated in an informal manner, and the lessons learned were applied in the next building cycle of a similar facility type (Mallory-Hill et al. 2012). According to (Preiser 1995) this situation has totally changed today, with ever-increasing proliferation of specialization, not only in the construction industry, but also in the demands the clients placed on the facilities. Practically, BPE actually comes after post-occupancy evaluation (POE) which now as the sub-process of BPE. POE started in one case study evaluation in 1960s (Preiser 1995) and in the Royal Institute of British Architects (RIBA) in 1963 included a final Stage M (feedback) when the architects would examine the success of what they had done (Leaman and Bordass 2001, Hadjri and Crozier 2009). Only until 1970 the process model was developed into an Integrative Framework

for Building Performance Evaluation by Preisler and Schramm in 1997 (Preisler and Vischer 2005). Conceptually BPE is adapted from cybernetics system because that model holistically links diverse phenomena that influence relationships between people, process and their surroundings including the physical, social, and cultural environments (Preisler and Vischer 2005).



**Figure 1. The Performance Evaluation Concept**  
Source: (Preisler and Vischer 2005)

Evaluation involves assessment against a value measure (Figure 1). For this to occur, four elements have to be presented:

- A set of standards – a planned outcome or level of performance against which actual outcome is to be measured;
- A unit of measurement – quantifiable terms such as dollars or numeric scale for subjective opinion. Since there is no single unit of measurement that can be applied to all features and qualities of buildings, it is recommended to adopt a numeric scale for all attributes;
- Actual measurement – collection of data for comparing with the standard;
- Judgment – a decision or choice on whether or not deviation is significant (Baird et al. 1996).

In the building performance evaluation process the entire life cycle of a building is being considered. Basically project life-cycle can be organised into five phases: initiating, planning, executing, controlling, and closing process (The Project Management Institute 2004). Recent developments in POE have been focused on BPE and universal design evaluation (UDE) emphasizing a “more holistic and process-oriented evaluation” (Federal Facilities Council 2001). An interesting facet of quality assessment made during each building life cycle has now become more common to rate individual firms as well as projects (Toakley and Marosszeky 2003). POE specifically or BPE generally is beginning to be viewed as a business management tool by today’s occupiers and as a crucial building appraisal system for property owners, managers and designers (Kauntze, 2008 as cited in (Adewunmi et al. 2011).

BPE had been commonly used since 1960s in industrialised countries such as UK, US, Canada, Australia, Netherland, New Zealand, Japan and many more (see (Horgen and Sheridan 1996, Leaman and Bordass 2001, Brooks and Viccars 2006, Preisler 1995, Mallory-Hill et al. 2012). However, BPE is still rarely practice in developing countries (Adewunmi et al. 2011) while they are the one whose suffer more when disasters struck. Disasters have been increasing in frequency and effects in recent decades in many

countries in the world but had a disproportionately heavy toll on developing countries both in terms of loss of lives and damage to property as they are less able to cope with the causes and impacts of it (Ofori 2001). Taking into consideration that BPE is still uncommon practice in most developing countries, there might be cultural, contextual or even technical gaps that need to be encountered. Moreover, conceptually in the context of disaster management field, BPE needs to blend in with post-disaster paradigms and to adjust with post-disaster circumstances. In any event, the principles of evaluation have universal application, and the best results are more likely when an evaluation process is designed to focus on specific objectives in a unique situation (Baird et al. 1996).

## **DISASTER MANAGEMENT PARADIGMS : INVULNERABILITY , SUSTAINABILITY AND ACCOUNTABILITY**

(Moe and Pathranarakul 2006) considered disaster management as public project management, has aims to produce unique product in certain duration and to elevate living condition of people, not profit oriented which government as the client. Post-disaster reconstruction in nature is a bond with humanitarian essence that distinguished it with commercial or business oriented project. All this time BPE is more in responding evaluation assessment for commercial or research projects. As what (Bordass et al. 2001) concluded that the main drivers in building performance in use in the building industry are sustainability and the Kyoto agreement for implementing the recommendation of “The Egan Report” and commercial competitiveness in seeking to reduce costs in use and to add value through increased productivity. In order to enable BPE to be successfully applied as a part of built-in assessment mechanism in disaster management it needs to understand the paradigms that shape humanitarian noble.

### **Sustainability**

Previously, post-disaster reconstruction vision is limited only to help to restore the basic infrastructure and services which the people need so that they can return to the pattern of life they had before (Davis 1994). Emergency managers are now moving beyond immediate disaster response and short-term recovery and they are now re-focusing their efforts more on the survivability of communities; environmental professionals are placing greater emphasis on the sustainability of environment quality (Labadie 2008). While sustainable concept and initiative has been part of building performance assessment such as Leadership in Energy and Environment (LEED) in US, Building Research Establishment Environmental Assessment Method (BREEAM) in UK, National Built Environment Rating System (NABERS) in Australia, or green building rating system by the World Green Building Council formed in 2002 (Leaman and Bordass 2001, Preiser 2001, Mallory-Hill et al. 2012), it has broader meaning in disaster management context. The concept of sustainable development is frequently associated with long-term recovery, which strongly aligns to the multiple-state definition of resilience whereby a community should maximize the capacity to adapt and focus on long term growth to a state of reduced vulnerability (Haigh and Amaratunga 2010). Sustainability in disaster recovery is beyond



than just “green building”. (Mileti 1999) elaborated six central components of sustainable hazard mitigation paradigm:

1. Maintaining and enhancing environment quality;
2. Maintaining and enhancing people’s quality of life;
3. Foster local resilience to and responsibility for disaster;
4. Recognize the sustainable;
5. Identify and ensure inter- and intra-generational equality;
6. Adopt a consensus-building approach through the process of local participation.

### **Invulnerability**

According to (McEntire 1999) disaster mitigation paradigm that impact recovery efforts is invulnerability development. Based on one of the UN proposition for a key test of a successful recovery effort is whether it leaves survivors less vulnerable to natural hazards (Telford et al. 2006) like-minded in Hyogo Framework for Action 2005-2015 is to reduce risks and vulnerabilities. Ideally, reconstruction should be able to build with better standard than before the disaster as what the famous idiom introduced by Bill Clinton as the UN special ambassador during post-tsunami in 2004 is “build back better” (Clinton 2006). The concept of “better” is explored from a vulnerability perspective arguing that in order for disaster recovery to be effective it must reduce vulnerability to future events and should be addressed as a main component of recovery efforts (Joakim 2008b). However there are debates in describing the meaning “better”, as (Kennedy et al. 2008) argued with the practical constraints of funding mandates, timelines and organizational focus on product as opposed to the process, the interpretation in some sectors was to “build back faster” and suggested idiom of “building back safer”.(McEntire 2001)elaborated invulnerability development related with disaster recovery process:

1. Link development activities to vulnerability reduction;
2. Foment a culture of safety, prevention and preparedness among all individuals and groups;
3. Increase the capacity, cooperation, coordination and effectiveness of all public, private and non-profit organisation and agencies involved in or related to disaster management.

Essentially, vulnerability is part of attainment sustainability and vice versa. Every action taken on account of one disaster must be designed and managed to reduce vulnerability in the future, in this way, vulnerability itself would be socially and environmentally sustainable development (Lewis 1999). Perhaps invulnerability is one of the paradigms that still lacking in building performance evaluation method since this concept initially from humanitarian sector. Therefore examining vulnerabilities of structures and exploring all available avenues with the help of technology in order to identify possible changes in design control mechanism, improvements on building standards and control standards have become the top priorities(McDonald 2003).

## Accountability

In TEC reports, their concern is not only the practical aspects of moving beyond immediate recovery into long-term reconstruction and sustainable improvement, but also the credibility and accountability of the process used for this transition (Telford et al. 2006). In principle, accountability is overlapped with sustainability and invulnerability. (Labadie 2008) justified that by performing auditing of reconstruction programs and activities could help to create the new normal in which a community not merely returns to what it was before but becomes a more environmental sustainable and physically survivable community. Performance auditing includes determining:

1. Whether the entity is acquiring, protecting, and using its resources;
2. The causes of inefficiency or uneconomically;
3. The extent to which the desired results or benefits are being achieved;
4. The effectiveness of organisation, programs, activities, or functions;
5. Whether the entity has complied with significant laws and regulations applicable to the program (Labadie 2008).

Based on (International Federation of Red Cross and Red Crescent Societies 2011), such assessments come under accountability but are not limited to: evaluation as an assessment as systematic and as objective as possible, of an on-going or completed project, programme or policy, its design, implementation and results; appraisal or initial assessments of the potential value of an intervention prior to the investment in implementation; monitoring is the routine collection and analysis of information in order to examine progress, track compliance and make informed decisions for project management; reviews are periodic assessments of performance, emphasizing operational issues; inspections are general examinations to identify and correct shortcomings and malfunctions; investigations are examination to collect evidence for prosecution or corrective action in response to a claim or wrongdoing or misconduct; audits are assessments to verify compliance with established rules, regulations, procedures or mandates. Therefore, BPE plays the role as an accountability measure for post-disaster reconstruction buildings.

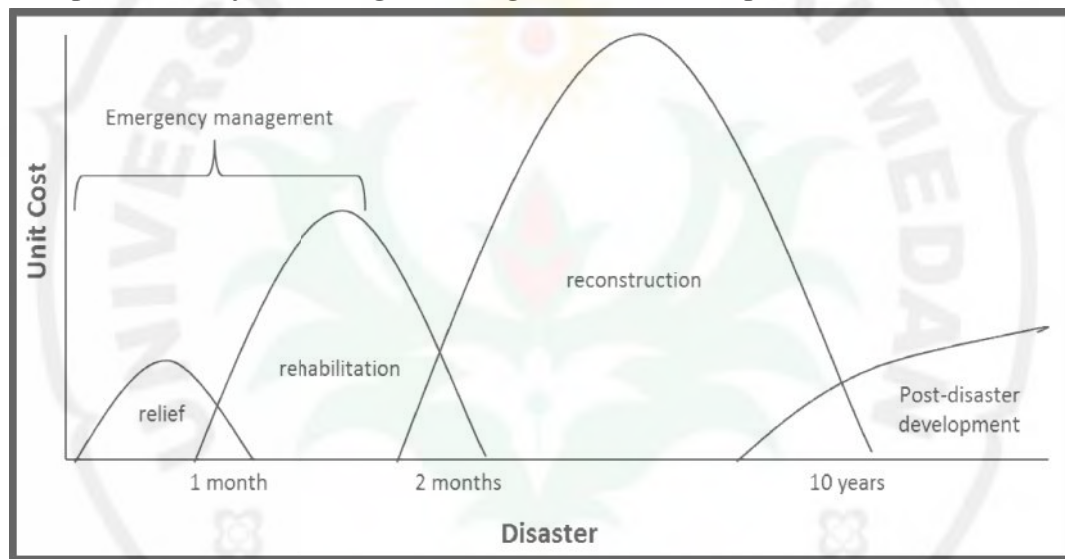
## BUILDING LIFE-CYCLE IN POST-DISASTER RECONSTRUCTION CIRCUMSTANCES

The general visualisation of disaster management is divided into two phases: post-disaster recovery and pre-disaster risk reduction, vice versa (de Guzman 2002). To be more precise, basically disaster management cycle recovers four phases: emergency response, rehabilitation, reconstruction, and post-disaster development that includes pre-disaster risk reduction (Davis 2007), (Haigh 2011, Alexander 2002). Haas, Kates, and Bowden (1977, as cited in (Joakim 2008b) systematically explained the disaster recovery or management process:

1. Emergency period: the initial period following the disaster, lasting few hours or days, where the community begins to cope with losses of life, property and injury as well as

initiating the beginning of cleanup. The normal functioning of the community is disrupted during this period.

2. Restoration or rehabilitation period: covers the time where major service, transportation and communications are being restored. Depending on the community and resources available, this period may take several weeks or months.
3. Reconstruction period: the city's capital stock is being rebuilt to pre-disaster levels, and social and economic activities returned to pre-disaster levels or higher.
4. Post-disaster development period: involves three interrelated functions, including memorials and commemorations of the disaster events, major reconstruction activities to improve the city and to begin future growth and development.



**Figure 2. Phases of recovery in the aftermath of disaster (Alexander 2002)**

Whereas disaster management has many dimensions, it would appear that those related to the built environment is high in priority (Ofori 2001). From Figure-2 shows that reconstruction takes longer times compared to the other phases (Joakim 2008a) and (Mileti 1999) and according to (Hidayat and Egbu 2010) it plays the most important key role in disaster management because the quality of constructed houses or buildings and infrastructures during the reconstruction phase will influence vulnerability for next disaster. (Mesurier et al. 2006) concluded that greater degree of coordination with policy and legislation required for large scale disaster, while routine construction processes have proven adequate for small-scale disasters. The additional challenges are as follow: condition after disaster aftermath is under uncertainty condition, resources for the project are scarce (Davidson et al. 2007). Therefore in post-disaster situations where regulatory measures do not exist, rehabilitation and reconstruction should reflect the experience and standard practices and guidelines used internationally for similar disasters (Jha et al. 2010). Since existing legislation was not drafted to cope with an emergency situation and was not developed to operate under the conditions that will inevitably prevail in the aftermath of a severe disaster (Mesurier et al. 2006).

While (Moe and Pathranarakul 2006) comparing project life-cycle with disaster management phases in general, in this paper, the standpoint is to analyse project life-cycle inside reconstruction phase. As stated before because reconstruction is the longest and the most important phase in disaster recovery as physical projects will be constructed in this phase. To have a better picture of the uniqueness of reconstruction, the next table elaborated the challenges and key considerations that need to be encountered in building life-cycle phases within disaster management context.

**Table 1. Challenges and Key Consideration in Post-Disaster Reconstruction**

	Descriptions <sup>1</sup>	BPE <sup>2</sup>	Key Considerations <sup>3</sup>	Challenges <sup>4</sup>
Feasibility	The stage during which the client considers the need to acquire, build or refurbish a building, outlines his requirements for building works, selects advisors to assist him and commissions an initial appraisal or feasibility study.	Effectiveness review is the feedback loop applied to the strategic planning phase. It is a tool to review alternative strategies (options) and their attributes as they develop during strategies planning. Effectiveness review involves managers in focus group interviews, as well as selected representatives from user groups in workshops of four to eight people (group interview).	<ul style="list-style-type: none"> <li>• Understanding the context and impact of disaster;</li> <li>• Understanding the local governance structures, regulatory framework and establishing methods of coordination;</li> <li>• Understanding funding streams and timescales;</li> <li>• Identifying beneficiaries;</li> <li>• Determining which method of assistance is most appropriate;</li> <li>• Establishing partnership with other stakeholders in order to provide assistance;</li> <li>• Recognizing natural hazards which pose a future risk;</li> <li>• Capturing the objectives, timescales, resources and risk in the programme plan.</li> </ul>	<ul style="list-style-type: none"> <li>• Coordination between stakeholders;</li> <li>• Availability of resources;</li> <li>• Capacity of local government/ agency;</li> <li>• Quality of the construction and its inspection;</li> <li>• Information and Communication;</li> <li>• Reconstruction that culturally fit local people;</li> <li>• Conducive safety and political situation in the reconstruction region;</li> <li>• Land acquisition and location;</li> <li>• Organisation of Reconstruction;</li> <li>• Adequate number of qualified people;</li> </ul>
Planning				
Programming				

Design	<p>Translation of a client's aspirations for the building into firm proposals.</p>	<p>Design review is the phase when users and decision makers begin to see what kind of spatial solutions are available and appropriate. In determining options that fit into existing constraints and solve problems effectively, designer develop two and three-dimensional images that begin to respond to the priorities established throughout the strategic planning and briefing process (Preiser and Schramm 1997).</p>	<ul style="list-style-type: none"> <li>• Selection of appropriate sites for reconstruction;</li> <li>• Resolving issues of land tenure;</li> <li>• Physical planning of settlement;</li> <li>• Definitions of appropriate quality for reconstruction;</li> <li>• Identifying appropriate types of construction;</li> <li>• Minimizing the environmental impact of reconstructions;</li> <li>• Incorporating disaster risk reduction strategies;</li> <li>• Design of houses, schools and health centres;</li> <li>• Capturing the scope of works, programme, human resource, cost plan and risk management plans into detailed project plan to inform constructions.</li> </ul>	<ul style="list-style-type: none"> <li>• Regulation and legislation that apply to big disasters;</li> <li>• Finance the reconstruction;</li> <li>• Rising materials, labour cost;</li> <li>• Adequate skills for reconstruction;</li> <li>• Start reconstruction as soon as possible; tight schedule;</li> <li>• Establish property rights (land ownership, leaseholds and tenant);</li> <li>• Accountability and transparency;</li> <li>• Corruption;</li> <li>• Lack of services and facilities, infrastructures;</li> <li>• Construct housing that withstands future disaster;</li> <li>• Transportation and distribution, logistic coordination;</li> </ul>
Appointment of Contractor	<p>The project's production phase in which the contractor has possession of the site to carry out the works planned during the briefing, design and procurement process.</p>	<p>Building commissioning is a formal process to ensure and document that building system performs in accordance with design intent and owner expectations. As the complicity and integration of building system increases, building commissioning will become an essential activity within the building delivery process.</p>	<ul style="list-style-type: none"> <li>• Different methods of implementation;</li> <li>• Management of construction projects;</li> <li>• Specifications, procurement and transportation of materials;</li> <li>• Management of labour and workmanship;</li> <li>• Handover, maintenance and post-occupancy evaluation of completed projects.</li> </ul>	<ul style="list-style-type: none"> <li>• Turn the reconstruction into development opportunities;</li> <li>• Selection of beneficiaries;</li> <li>• Introduce and implement new technology (e.g. materials) in reconstruction;</li> <li>• Limited site information;</li> <li>• Meet the minimum standard of house design requirement;</li> <li>• Keep reconstruction process equal;</li> <li>• Governance;</li> <li>• Planning as a whole system of</li> </ul>
Procurement				
Construction				
Handover	<p>Making the good of defects, agreement of the final account and the issue of the final certificate.</p>			

Occupation	<p>Building has been handed over by the contractor is being converted to one which is fully operational by the supply and installation of equipment.</p>	<p>Post-occupancy evaluation (POE) is determining whether a recently occupied or remodelled building is performing as was intended in its programming and design (Horgen and Sheridan 1996). POE is differs from other evaluations of building performance in that it focuses on the requirements of the building occupants, including health, safety, security, functionality, efficiency, psychological comfort, aesthetic quality, and satisfaction(Federal Facilities Council 2001)</p>	<p>reconstruction;</p> <ul style="list-style-type: none"> <li>• Social-cultural difference (i.e. language and religious) between organisations and victims;</li> <li>• Clear debris and its disposal;</li> <li>• Community participation in local decision.</li> </ul>
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Source: <sup>1</sup>(The Chartered Institute of Building 2002)  
<sup>2</sup>(Preiser 1995)  
<sup>3</sup>(Hidayat and Egbu 2010)  
<sup>4</sup>(Silva 2010)

## BUILDING PERFORMANCE EVALUATION IN POST-DISASTER RECONSTRUCTION

As the challenges in post-disaster reconstruction are countless, evaluators must be well-prepared for all possibilities that even need imaginative and creative skills where Labadie has phrased the tasks clearly:

In auditing post-disaster reconstruction activities faces a be wildering variety of possible audit targets, conceptual approaches, audit design parameters, and situational roadblocks. Auditing under these conditions will require a thorough understanding of the socio-political conditions, legal-regulatory requirements, economic limitations, physical circumstances of the environment in which one is required to operate. If that weren't enough, auditors will also need to apply an imaginative and creative methodology in order to add value to the reconstruction process(Labadie 2008).

Before discussing all aspects that are required in applying BPE in post-disaster reconstruction, there are several universal principals or standards in humanitarian aid sector that need to be reflected. These are some standards that are used by International Federation of Red Cross and Red Crescent Societies (International Federation of Red Cross and Red Crescent Societies 2011) all over the world:

- **Utility** – evaluation must be useful and used;
- **Feasibility** – evaluation must be realistic, diplomatic, and managed in a sensible, cost effective manner;
- **Ethics and legally** – evaluation must be conducted in ethical and legal manner, with particular regard or the welfare of those involved in and affected by the evaluation;
- **Impartiality and independence** – evaluation should be impartial, providing a comprehensive and unbiased assessment that takes into account the view of all stakeholders;
- **Transparency** – evaluation should be conducted in an open and transparent manner;
- **Accuracy** – evaluation should be technically accurate, providing sufficient information about the data collection, analysis, and the interpretation methods so that its worth or merit can be determined;
- **Participation** – stakeholders should be consulted and meaningfully involved in the evaluation process when feasible and appropriate;
- **Collaboration** – collaboration between key operating partners in the evaluation process improves the legitimacy and utility of the evaluation.

The next discussion is structured as a set of questions and a further set of issue in post-disaster recovery context that need to be addressed in planning and managing a building evaluation.

- *What – is to be evaluated?*

There are overloaded issues that need to be evaluated for building performance. Centre for Building Performance Research (CBPR) has extended a checklist and made it applicable for more general use in building evaluation. This checklist is structured into six attributes (cited in (Baird et al. 1996): **Corporate** attribute is all the overall requirements of an organisation purchasing or renting a facility. It is the broadest level of requirements and is concerned with what the building achieved or is intended to achieve rather than how i.e. corporate objectives, image of building, tenure, etc. **Site** attribute is concerned with the site, regardless of the building that is on it i.e. site, conditions, microclimate, etc. **Construction** attribute includes all those items which make up the physical building i.e. structure, cladding materials, access, safety, etc. **Space** attribute includes items which ensure that the building provides spaces for all the functions required of it and can be adapted with a reasonable flexibility to changing requirements in the future i.e. zone, spaces, storage, circulation, etc. **Internal environment** attribute includes those items whose main function is to modify the environment and to provide enclosed space for particular activities and materials i.e. air quality, thermal comfort, lighting, noise, etc. **Building services** attribute includes those items which play an essential part in the quality of internal environment created

by the building i.e. maintenance, water service, heating, ventilating, and air-conditioning (HVAC) systems, etc.

*Post-disaster recovery context:*

There is a need to develop building performance evaluation criteria that considered the scope of disaster recovery context. (Lizarralde 2002) proposed ten aspects that need be evaluated of a reconstruction project: efficiency, results, timing, quality of product, pertinence, acceptability, strategy, scope, impacts, and external aspects. Meanwhile, the Tsunami Recovery Assessment and Monitoring System (TRIAMS) initiative has suggested some disaster risk reduction (DRR) indicators that need to be included in supporting invulnerability (TRIAM 2006):

**Table 2. Core indicators of DRR in post-disaster reconstruction**

DRR Indicators	Potential use in risk reduction
Hazard assessment	This will provide essential guidance to the public, private and individual decisions in siting and design structure
Hazard zonation	This will influence the behaviour of builders, developers, public agencies and individuals in the location on critical activities and assets.
Building standards	This will provide bases for training of architects, engineering, developers, construction labourers, self-builders, and inspectors. They are the basis for positive behaviour changes for risk reduction.
Plan check and inspection	Effective local land use and building inspection and enforcement are the most valuable assurance of actual risk reduction implementation
Master plan hazard annex	Long-term risk reduction requires comprehensive planning including the selection of safe sites for future development and infrastructure investment.
Safe siting and construction	The example of attention to risk reduction in siting and construction especially for public buildings will influence the decisions of the rest of community.
Infrastructure system vulnerability assessment	Infrastructure service delivery systems are critical to the functioning of urban areas and as extended network systems are practically vulnerable to geographically distributed hazards. Infrastructure owners have responsibility for the well-being of their costumers and must be held accountable for risk reduction measures.
Standards for reconstruction	This survey will serve to reinforce attention to risk reduction in reconstruction projects and to document the range of standards being applied.

- *When – is the time frame to evaluate?*

**Ex-ante evaluations** are conducted before the implementation to inform feasibility and potential benefits. **Mid-term evaluations** are formative in purpose and occurred mid-way through the implementation. **Final evaluations** are summative in purpose and are conducted at the completion of the implementation. **Ex-post evaluations** are conducted sometime after the implementation to assess long-term impacts and sustainability (International Federation of Red Cross and Red Crescent Societies 2011).

Meanwhile in BPE method, the evaluation should be conducted in every building life cycle: **Planning** is the starting point of the building delivery cycle which established medium and long-term needs or an organisation needs analysis. **Programming** is necessary when the clients or the future building users are attempting in consultation with building specialist, to document needs, aims, resources and the context of the project. **Design** is the phase which includes schematic design, translating programming parameters into one or more building solutions, design development in detail, and



producing construction development. Construction includes construction administration and quality control to assure contractual compliance. **Occupancy** is the longest phase of all where the building users received the buildings and start to use it (Preiser and Vischer 2005).

*Post-disaster recovery context:*

There is a need to compare and analyse building performances between the different time frames (ex-ante, mid-term, summative, and ex-post evaluation or planning, design, construction, and occupancy) to have a holistic evaluation of disaster reconstruction building performance. However, in the field time is the one of the most challenging elements in post-disaster reconstruction since survivals urgently need the building as soon as possible. There is a classic dilemma to consider that concerns the opportunities for utopian idealism versus pragmatic realism in post-disaster recovery (Davis 2007). Therefore proposing BPE as built-in assessment in every building life-cycle must be able to overcome this issue so this method is not justified applicable theoretically but also technically and empirically.

- *Who – conduct the evaluation?*

Generally evaluation can be divided into several role players: **Internal or self-evaluations** are conducted by those responsible for implementing a programme or policy and can help building staff capacity and ownership. **External or independent evaluations** are conducted by evaluator/s outside the implementing team, lending it a degree of objectivity, and often technical expertise. **Joint evaluations** are conducted collaboratively by more than one implementing partner, and can help building consensus at different levels, credibility, and joint support. **Participatory evaluations** are conducted with the beneficiaries and other key stakeholders, and can empower, building their capacity, ownership and support (International Federation of Red Cross and Red Crescent Societies 2011).

In building performance there are four possible role-based structures for the evaluations such as: **User-only evaluation** is in which the user groups manage and do the evaluation. **Provider-driven evaluation** is in which the providers plan and manage the evaluation and draw on users' knowledge and experience. **User-driven evaluation** is in which the users plan and manage the evaluation and employ provider groups as experts to conduct the evaluation. **Provider-only evaluation** is in which the provider groups manage and do the evaluation (Baird et al. 1996).

*Post-disaster recovery context:*

Those categories are not mutually exclusive. For instance, an external evaluation can use participatory approaches. This paper recommended both internal and external evaluation or preferable joint and participation evaluation on every stage of building life cycle to be linear with the relief principles of evaluation that mentioned above such as transparency, participation, and collaboration. One example is from the case of the Tsunami in 2004 where the lead agency formed by Indonesia central government, Reconstruction and Rehabilitation Bureau for Nanggroe Aceh Darussalam and Nias

Island (BRRNAD-Nias) have raised many condemnations since they refused to carry out project appraisals by external appraisers after the projects have been completed (Adamy 2011). (Netherlands Court of Audit 2008) has defined main stakeholder roles in humanitarian aid sector as donors, intermediate agencies, implementers, and beneficiaries. BPE method must recognize and includes these stakeholders too as it commonly identify providers and users in profitable building assessment.

- *Why – the reason to evaluate?*

Motivation in conducting BPE falls into one of the following categories: fix something that is wrong with the present facilities, decide what is to be done or not to be done with respect to future accommodations, select or choose between two or more facilities, persuade someone or some group that changes are justified, develop new generalized knowledge about building types, or develop new knowledge of environment/ behaviour relation (Baird et al. 1996). The variety of reasons to conduct building evaluation has been identified as level of evaluation by (Preiser 2001) which are: **Indicative** is short inspection period by experienced personnel to highlight the building performance issues. **Investigative** is in-depth study of the building's performance and solutions to problems. **Diagnostic** is to show up any deficiencies (to rectify) and collect data for future design of similar facilities. The level undertaken will depend on the availability of finance, time, manpower and the required outcome.

*Post-disaster recovery context:*

Here, “why” factor is overlapping with the “when” and “who” factors. An internal evaluation is characterized by a desire to have the answers now as distinct from later to assist with decisions that are context-specific and have to be reached quickly, say in hours or days. External evaluation is directed to knowledge that can be applied generally to many buildings and assist with decisions about buildings other than those used to derive the knowledge (Baird et al. 1996). In post-disaster recovery, the motivation in conducting BPE ranges from transparency or accountable with public funds, fix something wrong with the grant facilities, strengthening communities or local government vulnerabilities, until developing new knowledge regarding post-disaster reconstruction buildings.

- *How – to conduct the evaluation?*

The data-collection tools (Becker and Quinn, 1994 cited in (Baird et al. 1996) include: **Focused interviews** with senior management, key administrative people, and representatives of different job functions and levels. The purpose is to understand values, philosophy, organisational challenges, etc. **Occupancy survey** to understand how much time staff spends in the office. **Demographic data** is set of data on employees and clients from archival data sources. **Focus group** is to obtain responses to organizational and work pattern descriptions and then to propose changes in work patterns. **Information technology and physical setting inventories** is to document what actually exists and in what number. A **walkthrough** is essential tour of the

building to observe what technology is available, the space and design of the building, and how it is being used.

(Kernohan et al. 1992) introduced generic participation evaluation method as it enables representative of building providers and users to determine action about the physical and social issues in the building. There are three approaches in generic participation evaluation: **Introductory meeting** is a meeting with the participant groups to discuss their involvement with the facility and to raise topics they wish to be part of the evaluation. **Touring interview** is a chance for the groups to discuss and reflect on its view of the facility while walking through the building together. Review meeting is where ways for dealing outcomes of evaluation are formulated and agreed on.

*Post-disaster recovery context:*

In humanitarian aid sector, participation approach as a long root of track explicitly in monitoring and evaluation programme. (Estrella 2000) listed some methods used in participation evaluation (see Table 2) that can be used as references if perhaps BPE method needs to evolve to be applicable in post-disaster context.

**Table 3. List of methods in participatory monitoring and evaluation**

Methods	Benefits and Output
Visualized forms that give a score or rank	Provoke reflection and discussion; inclusive of non-literate; simple
Semi-structured interviews	Provided more in-depth information through confidentiality
Impact flow diagrams	Appraising team internal dynamics and visioning for their organisational future; unanticipated impacts (particularly for outsiders)
Matrix ranking	Identify criteria to assess performance and for villager assessment of extensionist performance
Wealth ranking/social mapping	Provides baseline information for assessing poverty changes; helps to construct a useful sample
The grassroots development framework or the 'cone'	Identifying indicators; provides an analytical framework for the data
Household livelihood strategies	Provides baseline information
Bio-resource flows	Identifying local indicators of change, learn about farmers' priorities
Story-telling	Helps researcher and participants to switch roles; is a familiar tradition of information exchange
Mapping	Collects data, facilitates sharing, stimulates discussion
Key Judges	To synthesize findings from open-ended discussions
Questionnaires	Data collection

## CONCLUSION

In coping with disaster, man-made structures often constitute the weakest link. Buildings, roads, bridges, and dams – structures that normally serve and protect us become the most dangerous places to be in when disaster strikes (McDonald 2003). Therefore, there is a need for research and development (R&D) on various aspects concerning the relationship between disaster and constructed items (Ofori 2001). This paper tries to contribute with practical solution for quality problems that repetitious occurred in post-disaster reconstruction projects even until today where built-in evaluation driven by

beneficiaries and donors will help to minimize it. Furthermore, (Ofori 2001) emphasized a need for a change in the mind set of governments, international agencies, companies and practitioners to recognize the need to assess the risks of disaster and take necessary precautions at all stages of the planning, design and construction processes. This paper proposed BPE method to be conducted in every building life-cycle in post-disaster reconstruction phase. BPE have proven to be a significant tool for building assessment in commercial sector and there are challenges to apply it in aid sector which need follow up with further study.

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# THE POLICY OF REGIONAL TRANSPORTATION KENDAL DEMAK UNGGARAN SEMARANG SALATIGA PURWODADI (KEDUNGSEPUR)

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## Abstract

Transportation policy Semarang City and its vicinity need regional collaboration. That is Kedungsepur's regional collaboration (Kendal, Demak, Unggaran, Semarang, Salatiga, Purwodadi). Centre of Kedungsepur transportation is at Semarang City Because in Semarang City bands that have played important regions linking the which is among province and in Intermediate Javanese Province. Transportation kedungsepur hence the movement pattern cover band in circular, circular outer band and radical bands. Varieties are about problems faced by the hour at the which is that kedungsepur's Borderland because of personal vehicle ownership that progressively increases from year to year. Other factors are the level of resistors environmental damage that begat by transportation activity have reached a critical point, Ministering Decrease road quality; delay's time bearing it with whatever available about economic problems; society perception to service/performance given by the bus transportation that was unsuccessful expectation Pock society; easy look for public transport with climax and bottom most hygiene criterion.

**Keywords : Transportation policy, transportation movement pattern**

## INTRODUCTION

Within the framework of autonomy and the pressures of globalization, regionalization developing in phenomenon of national development. Urban development has grown not only as a growth center but has expanded function to the region shape, where is the city requires cooperation with the surrounding area. A City as an autonomous region is not strong enough to do their own development (exclusive), but has limitations and requires attachment to a regional system for synergy.

Determination of transportation policy of Semarang and surrounding areas in need of regional cooperation. Regional cooperation of Semarang City and surrounding areas are embodied in regional institutions of Kedungsepur (Kendal, Demak, Unggaran, Semarang, Salatiga, Purwodadi).The existence of regional cooperation of Kedungsepur as the development of regionalization is not everything held well even without activity is suspected. To be able to see regional cooperation in inter-regional transport policy is need information about the Kedungsepur Institutionand transportation policies that have been done. That is become a reason to do research about Kedungsepur–regional transportation policy.

On regionalization centralized, directive-coordination authority factor is a powerful component and is owned by the planning authority institution and implementation of

development. These examples are former residency called *Bakorwil* (*Badan Koordinasi Wilayah/Regional Coordinating Board*), the results of structural-administrative regionalization depend on the orders (*ex mandato*) based on the interests of top-level government (Province). *Bakorwil* consist of some administrative areas. Decentralized regionalization is the region that made by local initiatives of regional stakeholders (*ex mera motu*). These examples is a priority area in Central Java and formation begins with the mandate through the Central Java Provincial Regulation No. 21/Year 2003 on Spatial Planning of Central Java. (Warsono, et. al., 2008). *Kedungsepur* legal power that is increasing with the rising of the Indonesian Government Regulation No. 50 Year 2007 on Procedures for the Implementation of Regional Cooperation. This Government Regulation/*PP* is a guideline for the implementation of the Constitution 1945 Article 5, paragraph (2) and further elaboration of the Law 32 Year 2004 on Regional Government, section 197, needs to enactment of Government Regulation on Implementation Procedures for Regional Cooperation. The issuance of this regulation also makes *Kedungsepur* stronger and needed.

*Kedungsepur*'s main characteristics include of:

1. Spatial boundaries are dynamic and it is not describe the syatic boundary line and closed.
2. Seed Potential and endogenous power into the background and be a basic capital in implementation of activities.
3. Regional actor become a motor for formed and the worked of a container of cross-regional cooperation (platforms)
4. Aspects of communication, cooperation, and coordination always dominate in implementation of the collective agreement.
5. Presence goals (vision) and a common goal to achieve development (Warsono , et al . , 2008)

Prominent regional cooperation in Central Java Province, at this time include of: *Barlingmascakeb*, *Sapta Mitra Pantura*, *Subosukawonosraten*, *Ratubangnegoro* and *Kedungsepur*.

There are 3 negative phenomena in regional cooperation (Warsono , et al . , 2008):

1. Phenomenon of "local egoism" is still strong.
2. Competition between regions is counter productive and
3. Tendency "inward lookin " of each region and the number of "overlapping".

There are three things are making the competitiveness of the region weakly.

Cooperation between Kendal, Demak, Unggaran, Semarang, Salatiga and Purwodadi at this time have been shaded by a institution called *Kedungsepur*. *Kedungsepur* is a quango, it is set up by the Government of Central Java and it is in the Cross-Regional Coordination Board (*Bakorwil*) Semarang. *Kedungsepur* role is still relatively passive, it is waiting for the recommendations of the Government of the Province of Central Java in implementing inter-regional cooperation. Sources of funds for *Kedungsepur*'s operation according to *Bakorwil* informant, "it is derived from the amount of dues along with dues set also by inter- district and municipal in *Kedungsepur*."



*Kedungsepur* as one of the areas of regional development in Central Java province has a metropolitan transport activity and high mobility, thus requiring transport that is both fast and mass. Congestion, mobility and some other effects have emerged as a result of transportation problems. This is the reason for the policy research conducted Inter-Regional Cooperation Transportation Policy: Government of Kendal, Demak, Unggaran, Salatiga, Semarang, Purwodadi (*Kedungsepur*) with Semarang City as the Centre.

### **Formulation of The Problem**

1. How is the implementation of the transport policy of *Kedungsepur* with Semarang City as *Kedungsepur*'s centre?
2. What the motivate and obstacle factors in the implementation of transport policy of *Kedungsepur* with Semarang City as *Kedungsepur*'s centre ?

### **Purpose of Research**

1. Describe and analyse transport policy of *Kedungsepur* with Semarang City as *Kedungsepur*'s center.
2. Describe and analyze the motivate and obstacle factors in the implementation of transport policy of *Kedungsepur* with Semarang City as *Kedungsepur*'s center.

### **LITERATURE**

Transportation is a transfer business or movement of something, usually people or goods from an origin location to the destination location for specific purposes using certain tools. The public transportation system may be transporting passengers with very little resource that he uses (including the land, fuel, and other environmental costs). Problems commonly encountered in developing the city's public transportation is the lack of political goal, weak institutions, and not exactly a decision taken in overcoming various obstacles technical, financial, social and political incurred (Susanto, B. and Parikshit, D., 2004).

The city's transportation system is a union of elements, components that support each other and cooperate in the procurement of transport that serve in urban areas. The implementation of urban public transport in Indonesia is based on Law No. 14 Year 2001 about Road Traffic and Road Transportation. Arrangement of Transportation requires sustainable transport policy with 4 principles (Blowers, 1993) they are: 1) the mechanism of regulation aimed at limiting the level of pollution generated by vehicles; 2) financial mechanism through energy taxes, including fuel taxes and spending emissions into the air; 3) encouraging research and development of vehicles that are efficient in fuel consumption, as well as alternative transportation technologies; 4) lack of integrity in land use planning and transportation to minimize the distance, wearing push public transport, and increasing the ease of attainment of the transport facilities.

Determination of transport policy Semarang and surrounding areas in need of regional cooperation. Inter-regional cooperation policies or regionalization is performed by cooperation across regions and across sectors to establish a common policy for the common good. Regional cooperation of Semarang City and surrounding areas are

embodied in regional institutions of Kedungsepur (Kendal, Demak, Unggaran, Semarang, Salatiga, Purwodadi).

## METHODS

This study used an instrumental case study with a single case and try to gain a deep understanding of the subject involved in the case of a regional transportation policy of Kedungsepur. Informants came from *Bakorlin I* and the Department of Transportation Central Java with snowball sampling technique in taking informants.

The phenomena of this study are:

- 1) The implementation of transport policy of *Kedungsepur* with symptoms :
  - a. Semarang City as Centre of *Kedungsepur* Transportation.
  - b. Movement patterns.
- 2) Factors motivate and obstacle in the implementation of transport policy *Kedungsepur* .
  - a. Transportation problem.
  - b. Perceptions of motivate/obstacle factors in transport policy *Kedungsepur*

The researcher is the research instrument and after the data collected, the data linking is done toward the proposition and its interpretation through the steps: 1)open coding, 2)axial coding, 3)selective coding.

## RESULT AND DISCUSSION

Semarang city as a city of trade, services, industry and education are very attractive to residents of other areas to urbanization to Semarang. Interesting sights associated with urbanization can be seen when the morning and evening, the workers from the hinterland or the area around this city into Semarang City to work. In 2008 the rate of in-migration amounted to 30.33 which means every 1,000 residents for 1 year the population increased by 30 people, while the out-migration rate is 23.12 per 1,000 people. When the in-migration minus out-migration obtained a value of 7.21 or 0.72 %, this is called a rate of population growth due to migration (netmigration rate).

Urbanization resident to Semarang City need transport policies are arranged in the region Kedungsepur. Likewise, population density, growth and population heterogeneity of Semarang City as a center of which is very decisive a regional transportation policy of Kedungsepur.

### Implementation Policy

Regional transportation policy of Kedungsepur is concentrated on the urban areas of Semarang. That consideration was taken because of Semarang City is the center of the mobility and urban activities in the surrounding areas Kedungsepur, besides that, Semarang is the capital of Central Java province which is one of the major cities in Indonesia, which has a fairly complex transportation problems. The direction of development of mass transit systems is the city government 's commitment set out in the Long Term Development Plan of Semarang for 2005-2025 in which contains the direction of sustainable regional development in the next 20 years is " the development direction of

network transport system geared to the realization of the road network system effectively and efficiently in accordance with the hierarchy and functions as well as the realization of an integrated transportation system between land transport modes (road and rail way), marine modes and modes of air transport. Development of transport system geared to the availability of rapid transportation modes and mass (mass rapid transport)."

### *Semarang City As Kedungsepur Center*

The position of Semarang with different potentials is expected to support growth in the region. Some of the potential of Semarang to further spur the growth of the city, namely:

- a. Lane primary artery between provinces in the north (lane coast) through Semarang is potentiation that can support the growth of Semarang City. Movement of goods and people from Jakarta to Surabaya via Semarang will surely;
- b. Semarang city is the node movement for areas/towns in Central Java, particularly around *Joglosemar* (Jogya - Solo- Semarang) and *Kedungsepur* (Kendal -Demak-Unggaran-Salatiga-Semarang-Purwodadi).

Road transport system in Semarang City traversed the main route linking key areas, both among the provinces and in the province of Central Java. The position of the city's influence on the density of traffic through in Semarang City.

Implementation of transport policy of Kedungsepur follow the pattern of RTRWK Semarang 2000-2010. Spatial Planning of Semarang divided into BWK (part of the City) at RTRUK Semarang is divided into ten (10) BWK as follows.

- a. BWK I, covering East Semarang, South Semarang, and Central Semarang;
- b. BWK II, covering Candisari and Gajahmungkur ;
- c. BWK III, covering North Semarang and West Semarang ;
- d. BWK IV, covering Genuk ;
- e. BWK V, covering Pedurungan and Gayamsari ;
- f. BWK VI, covering Tembalang ;
- g. BWK VII, covering Banyumanik ;
- h. BWK VIII, covering Gunungpati ;
- i. BWK IX, covering Mijen ;
- j. BWK X, includes Ngalian and Tugu.

Urban areas is not the main agricultural activity with the composition as a function of the area of urban settlements, concentration and distribution of government services, social services and economic activities. Semarang city has an urban area as follows.

- a. Trade and services, located in commercial service centers with local services scale (BWK) and the scale of the city and regional services (at BWK I)
  - 1) Modern shopping complex, located in Simpang Lima area;
  - 2) Modern shopping complex and The traditional markets in Johar area;
  - 3) Ttraditional market, located in Region of Peterongan, Bulu, and Karangayu;
  - 4) They will also be developed of local shopping complex in the new center areas in developing region are Pedurungan, Tembalang and Mijen.
- b. Industry

The planned area is in BWK III (Industrial and Warehousing Zone Tanjung Emas), BWK IV (Genuk), BWK X (Region industry of Tugu and Mijen) and BWK III (Ngalian Industrial Area, Port Industrial Area) as well as industrial locations in BWK V, industrial activities to be priority for the development with local resources and small industry.

c. Office complex

Offices and public service facilities was planned in BWK I for city services scale and regional/national, and in each district/BWK for local services. As for the types and location are as follows.

- 1) Provincial Government Office located at Pahlawan Street;
- 2) Municipalities Office located in Pemuda Street;
- 3) Mixture of Government Office located at Madukoro Street;
- 4) Private Office is located in Kota Lama area and Madukoro Street and Mijen area.

d. Housing

Housing, development directed at BWK IV, V, VI, VII, IX and X. Housing on BWK II, VI, VII, IX, and X is planned with a low to moderate density.

Results of visual-spatial analysis using aerial photographs in 1981 *Citra Satelit/Satellite Imagery SPOT* in 1987 toward Semarang gives an overview of inclination/direction of development of the city as follows.

- a. the south is Jatingaleh and Banyumanik to the south is still potentially powerful of the settlement aspect.
- b. the east is Genuk and Pedurungan district to south and southeast is still potential for development of sketor.
- c. industrial and residential.
- d. westward is the Tugu District to the west is still potential for the development of industrial and residential sectors .
- e. southwest is the Mijen and Gunungpati District have agricultural potential as well as a buffer zone.
- f. the beach area, for residential is less potential because of its density as well as the flood threat, while the potential of marine and shipbuilding industry is pretty well.

That trend was influenced by the level of activity between cities and regions, as well as potential areas to be passed behind the main road network linking Semarang-Jakarta/Bandung, Semarang - Yogyakarta/Solo, Semarang - Surabaya. Especially trade activities and transport inter-regions . The development of the road network and residential land is always constructed in tandem so as to encourage physical development of Semarang. Direction of development to the south will be more dominant because of the relatively high topography, the air is relatively fresh and free from the threat of flooding (Mijen, Mount Pati, and Pudukpayung). Developments to the south is also to be controlled because of *Kota Atas*/high area of city should be used as a rain catchment areas (cited scientific papers Sudarsono, D. Bambang (2000), *Potret Perkembangan Fisik Kota Semarang Secara Spaciaf*/Portrait of Semarang Physical Development In Spaciaf).

### *Movement Pattern*

Based on topography, existing land transport conditions, the development of land use and development activities of the city visible in the movement pattern of the transport system of Kedungsepur with Semarang City as center, as follows:

a. In a circular path

Is a path that circled downtown environment acts as a reservoir and flow divider in the center city, a circular Toll road section C, cut off the road between Toll road Section C and Section A Jatingaleh, Arteri Toll road Rim north and Usman Janatin Street.

b. Out of circular path

It is a path to be the reservoir flows of the regional activities into radial roads. Its function is to accommodate the traffic flow internal to external or otherwise. The line is very important to liberate the city center area (WP I) free and the flow of heavy good vehicles or goods vehicles inter-city buses. The planned path is Genuk-Pedurangan street, Tegal Kangkung, and Kedungmudu Raya street.

c. Radial path

Semarang road network as regional radial there are five movement path, they are towards Kendal, Ungaran, Purwodadi, Demak and Boja. The line is a distributor of flow of traffic from regional areas. For the purposes of local self was developed local radial lines include lines of Mijen to Ngalian, lines of Gunungpati to Manyaran and Patemon Village to Manyaran, from Sekaran to Sampangan.

Circumference and radial paths above are the main patterns and the development of transport links (road) Semarang city. While the environment was developed further environmental path ways that distinguish between patterns of network in the city center and surrounding area as an environmental collector lanes/paths of inter-environment, and the divider streets in environmental.

In general the whole area of Semarang already affordable public passenger transport. However, in quantity and quality of public transport is still lacking, so it needs revamping and restructuring to improve services to Semarang city in both quality and quantity.

In the public transport system in addition to the needs of public transport, it also use pattern of the road network and other supporting infrastructure, namely :

- a. The division of public passenger transport pathway into three interurban lines (AKAP, AKDP), and public transportation lines.
- b. The development of the terminal, comprised of :

Terminal type A which is located at the edge of the city, namely Terboyo Terminal, Mangkang Terminal, Pudak Payung Terminal, Terminal Type B, which is located in Penggaron, The location of type C is covering Sendowo, Genuk, Sendangmulyo, Tembalang, Banyumanik, Gunungpati, Cangkiran and Ngaliyan.

Means of transportation or mass transit that will be used to serve the public in Semarang City, among others:

- a. Large-scale of city bus, with seating for 50 people which are serving transport between major areas with other major regions with stopping points at the terminals in downtown environment (sub-district) within distant;
- b. Medium scale of city bus, with seating for 26 people to serving public road inter-district roads in Semarang city within distant;
- c. Public transportation (minibus/*mikrolet*), with seating for 12 people to serving transportation of inter-area based on short distance.

Especially for inter-city buses are not allowed into the city center in an attempt to overcome the problem of traffic in the city center.

The railway network that is enhanced in accordance with the increase of the service, in accordance with the development of railway technology. Plans for the development of rail passenger transport, airport routes, as well as to the west of Jakarta by passing along the northern coast cities such as Pekalongan, Tegal and Cirebon. To the east of Surabaya, and to the southeast towards Mranggen-Kedungjati-Gundih-Solo. The development of rail transport that serve Kendal, Demak, and Purwodadi can reduce the density of roads in serving commuting workers to Semarang. For services that need to be developed facilities of Alastuwo Railway Station (RTRWK Semarang 2000-2010).

The growth up of Semarang population is increasing, giving the effect of the needs development of the place of settlement, activity (activities) and transportation is difficult to avoid. Most people who are socio-economically is capable but they are entered in "mediocre" categories, they can choose a more comfortable place for living and not be bothered with bustling city. Although the distance to the center of activity may be far relatively, but with the availability of infrastructures and facilities are growing, then the distance constraints can be resolved fairly. Residents of the city who have the minimum income are forced to increase the bustling of cities, because they want to reach the center of daily activities. In socio – economic, conditions of the communities are less able to find a more comfortable place for living. Proximity of the center range of activities is more important than the need to think comfort. Generally a comfortable home, the purchase price or rent is relatively expensive, so people who are "boro" with minimal income can live in lodges in the city center and surrounding areas. Saturation of resident building and its population in the city center more visible. While on the outside of the city center start to established new estates that still has the growth potential.

Semarang road network as regional radial have five movement path is towards Kendal, Unggaran, Purwodadi, Demak and Boja. The line is a distributor of flow of traffic from regional areas. For the purposes of local is developed local radial lines include lines of Mijen to Ngalian, lines of Gunungpati to Manyaran and Patemon villages to Manyaran from Sekaran to Sampangan.

Traffic flow conditions which is existing in Semarang-Kendal pathway may be noted that there are movements that are relatively similar to that heading in and out of Semarang. In the morning, the number of vehicles into the city much more than that out of Semarang. The amount of the total volume of traffic in the morning peak occurs reached 2947 smp/hour at 6:30 to 7:30 am, and it is the highest volume at the survey time for the highest hour. Then the traffic volume gradually drops until 03:00 pm, after it the flow is

rise again and then nearing completion survey (06:00 pm) the volume decreases again. The volume of traffic that occurred in afternoon peak reaches 2,813 smp/hour on the 04.15 p.m.-05.15 p.m.

With the known value of the highest volume that occur when the survey is equal to 2,947 smp/hour and road capacity values obtained for 5,705 smp/hour, then the calculated volumes value per capacity is 0.51. This value indicates the flow of vehicles in the border region of Semarang and Kendal is not too saturated and the level of service in the category C.

## **Motivating And Obstacle Factors In Implementation Kedungsepur Transportation Policy With Semarang As The City Center Of Kedungsepur**

### ***Transportation Problems***

Problems encountered in the transport sector are :

- a. Mixing local movement (in the city) with inter-city movement. This happened on segment of Terboyo street, Raden Patah Street, Dr . Cipto Street, Perintis Kemerdekaan Street, Siliwangi street and Walisongo street;
- b. Network capacity is not commensurate with the intensity of the movement on some roads, especially at rush hour. This is especially true in Brig. Katamso street, Brig. Sudiarto street, Siliwangi, Walisongo, Setiabudi, and Perintis Kemerdekaan street;
- c. The efficiency of the movement, the movement of the vehicle lane Jakarta - Semarang and Semarang - Surakarta has a higher intensity than the Semarang - Surabaya.

With the blending mode of the lane, it is often causing problems of congestion, so the anticipation is needed to avoid traffic jams. Because of the blending modes that is track with diversion route mode.

- a. Kendal - Krpyak highway can be done by increasing the manufacture of way dimension ie. dividing lines between slow and fast lane modes;
- b. Path of Purwodadi-Semarang, congestion due to mixing in the city and intercity modes can be resolved by moving the inter-city transportation, with Terminal Terboyo - toll - Arteri - Terminal B Penggaron route or Terminal Type A Terboyo - Banjardowo - Arteri - Penggaron Terminal Type B ;
- c. Semarang - Surakarta lanes, congestion due to the mixing mode inter-cities and within cities can be overcome by moving the inter-city transit lines, to toll route, but solving like this is need of support to developing of terminal Type A in Pudukpayung area, Banyumanik.

As a result of the movement of urban transport activities in Semarang and it is supported by the pattern of land use in Semarang which is mix use (mixed land use) resulted in several problems that arise. Identify the problems which may arise, among others, congestion, accidents, pollution, loss of quality of service roads.

#### **a. Congestion**

Traffic congestion to be regular sight in major cities, as well as Semarang City. Congestion causes increased costs for the traveler and the movement of charged, such as lost of time, accidents, and psychological pressure. It is not only the congestion on

the roads, but also occurs in <sup>+</sup>four transit vehicles during peak periods. Pedestrian congestion on the road often occurs<sup>1</sup> in downtown areas of big cities during the lunch time. Congestion is not something new, there is congestion in cities for centuries. Congestion is the most common thing that people meet when traveling in the city. It is very complained, because if there is no congestion, most people would be happy to use their cars and transportation will no longer be a major problem.

Due to needs of the movement with the increasing of vehicles without offset of service capacity road and supported with side barriers that reduce the effectiveness of such activity space segment capacity, street vendors/*PKL*, parking and other social activities to stimulate and accelerate the congestion points at certain locations in Semarang City. Almost in every corner of the city at a certain time and place looks pretty long queue of vehicles and can be grouped based on travel resident time. Traffic congestion is caused by patterns of activity for the trip to company, offices, schools and colleges usually occurred at 07:00 to 08:30 a.m. This activity pattern is generally towards the center city of resident area of region contained of office area, trade centers, schools, colleges and other places of activity. Otherwise at 04:30 a.m. to 06:00 p.m, the pattern of backflow activity is also causing congestion on the same road.

Location of congestion in Semarang City is giving effect on congestion of *Kedungsepur*. Ease of getting a private vehicle is motivating ownership which is significant growth. Prices of private vehicles is relatively cheap and relatively easy credit offered by one of the drivers of private vehicles increased. The entry of vehicles with smaller engine capacity and vehicle from Asian countries such as Korea, China makes stronger competition price and the price of the vehicle to be cheaper. The proportion of vehicle ownership in Semarang City is dominated by motorcycles with as much as 77 % and for passenger cars owned is 19 %. As for each bus or car load has a contribution of 3 percent and 1 percent. Growth of vehicles every year shows an average of 6 percent.

b. Contamination

With a high level of need, the transport technology develops very rapidly and it is always associated with all activities of modern society. But behind the harmonious relationship between the two is stored negative impact caused by transportation facilities, especially road transport. The negative impacts include of environmental degradation which has also resulted in a decrease in the quality of public health. CO gases derived from combustion in the combustion chamber of vehicle which is not perfect. This substance is largely contributed from vehicle exhaust emissions especially using fossil fuels. CO gas can survive 1 to 5 years in atmosphere because it can bind to hemoglobin in the blood 200 times greater than the power of oxygen to bind to hemoglobin and if the levels are more than 60 % is may causing death. The impact of this pollution, such as obstruction of the drainage of oxygen in the blood, respiratory system is damaged and cause a black color on the lungs. Lack of oxygen will cause a variety of diseases and psychological effects in addition to the flu, cough, fever, asthma, headaches, stress, high blood pressure. (Jawa Pos, 2004)



While Pm10 is combustion in the form of dust and black smoke can damage the lungs and attack the eye because inhaled particles can not be removed so attached to the nose and lungs. The dust particles will also cause disruption of the respiratory tract such as airway infection. (Bappedal Central Java, 2003)

In Semarang, the level of environmental damage caused by transport activities have reached a critical point with exceeded predetermined threshold of 800 vehicles was tested at 2004 approximately 50 % of vehicles tested exceeded the standard limit according to Governor Decree No. 5 in 2004. (Kompas, 2005)

c. The decreasing in the quality of service road

Quality of service road in Semarang in 2008 recorded that there is no road service in A -level that signifies the level of the service is excellent. There are 4 (four) road service in B category, they are Pemuda, Boja Raya, Dr.Cipto, and Kompol Maksุม street. Even then, in some stretches of the roads are still occurring congestion at certain times, due to activities such as education and office on Pemuda and Dr. Sutomo Street, queue of transport on Dr. Cipto street and in front of Java Mall.

d. Other issues

In addition to the problems that directly affect on the transport, there are some problems associated with economic problems. The problem was caused by a delay time (delay) happens. Transport is functioned to support the economy. Delivery of production or economic sectors may be delayed due to congestion, thereby harm the economy significantly and energy wastage and time at the point of congestion. Similarly, it is rising of social problems in the behavior of drivers on the road such as stress, emotional driver.

### ***Public Perceptions about Performance of Public Transport Services***

Public perception of the performance of existing public transport services covering the route that borders Kedungsepur, they are:

- a. Route of Semarang- Kendal (PP)
- b. Route of Semarang - Purwodadi (PP)
- c. Route of Semarang - Demak (PP)
- d. Route of Semarang - Unggaran (PP)

*Penglajo* who go to and from Semarang are through the four way entry and exit of Semarang. This stretch is a cornerstone concept of urban mass transit.

Conditions of service/performance are provided bus transportation serving the line of *Kedungsepur* generally known that there are no criteria submitted successfully meet the expectations of society. The best performance is the ease of finding public transport satisfaction with the level of achievement of 88.08 %. Criteria of hygiene lowest with 71.03% of the respondents' satisfaction level. Among these criteria, there are the two dissatisfied issues, they are queue/*ngetem* and must transfer pathways.

Semarang as region lines connecting has four entrance gates through a network of highways and two major railway network traffic. On the road network through the town entrance in Brig. Sudiarto (border of Mranggen), Mangkang Street (border of Kendal),

Perintis Kemerdekaan street (Pudakpayung), and Kaligawe Street (border of Demak). Services at this location is still less because of congestion and flooding.

Unsatisfactory conditions of service contained on the type of transport that dominates in the region remains freight transport types and sub-urban public transportation. As for busing has a large contribution of around 15 percent. It is possible to transport large buses usually occurs in the peak evening traffic.

Dissatisfaction occurs because the passenger occupational level is also high. This condition causes the motorcycle type dominate the each roads with an average proportion of about 45 % of the roads. For bus transport has contributed an average for the network only by 4 % and 13% of urban transportation. As for car personal vehicle type has proportions of 28% and the rest is owned freight transport and non-motorized.

## CONCLUSION AND SUGGESTION

### Conclusion

#### a. Implementation of transport policy of Kedungsepur with Semarang as central of Kedungsepur

Urban mass transit that will be developed in the region of Kedungsepur is centered development of mass transit in Semarang. The development plan urban mass transportation models contained in Semarang City is a model of public transportation that is mass character which is possible applied in Semarang and surrounding areas relating to transportation and energy policies.

#### b. Movement Pattern

Semarang city is an urban sprawl Cities give up on the outskirts of the city of Semarang region through the development of spatially entered the district administrative region directly adjacent to areas such as the District of Semarang Semarang, Demak, Kendal and District Grobogan. Beside those region, one of the areas that need attention is Salatiga though doesn't have directly relationship, but there is also a link of movement pattern with Semarang city. Buffer areas (hinterland) that has been linked either directly or indirectly in the development of urban mass transportation which in this case is focused on the area of Semarang with both frontier town located in the area of administrative districts bordering Semarang city.

#### c. Problem faced

- 1) Transportation problems, namely the mixing lines mode is often causing congestion problems.
- 2) The number of private vehicle is increasing from year to year that each year has average 6 % of increasing.
- 3) Contamination  
The level of environmental damage caused by transport activities have reached a critical point
- 4) The decline in the quality of service road
  - There is no road service in level A (very good)

- There are 4 sections in Category B
  - 5) Another problem, related to the delay time (delay) that are related to economic issues
  - 6) Public Perception Of Service/performance given busing has not managed to meet the expectations of society.
- d. Ease criteria of finding public transport with the highest level (88.08 %) of the lowest hygiene criteria (71.03%).**

### Suggestion

- a. The city of Semarang as a center of Kedungsepur transportation, urban mass transit should be implemented in accordance with the needs of the community. Here the necessary synergy between the government, the public and private sectors.
- b. The right mass transport model for the urban areas where serve of trip generation in the suburb of Semarang into town (center of pull trip) and possibilities of circuit power service of public transport in the city as a transportation tools. Required cooperation between the Provincial Transport Department and District/City.
- c. Improving the quality of service roads for smooth flow of transport, vehicle test (KIR) which is not really feasible path must be applied to reduce the CO gas, stretches which are not interesting for private is given special treatment and ease ain give permission of stretch.
- d. Services rendered by public transport should be improved too, for example about the cleanliness or the ease of finding public transport itself.

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