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# PROCEEDINGS

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**(online conference) September 11<sup>th</sup>, 2021, Bandarlampung**



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*Social Sciences and Humanities, Economics, Education, Law, and Sustainable Development (SHIELD); Sustainable Development During and Post Pandemic*

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# FOREWORD

In this globalization era, advancement in science and technology has led to remarkable gains in life. However, despite the remarkable gains, many countries particularly Asian countries face inequalities and uneven progress. Even worse, these countries are facing many problems such as poverty, terrorism, drug abuse, and other social issues. These problems are complex and multidimensional. We should give a real contribution to solving these problems. Because the problems are multidimensional, we need people from cross-disciplinary interests to work hand in hand with strong commitment, not only to face, but also to change these problems into opportunities.

Therefore, the Postgraduate Program in collaboration with Institute of Research and Community Service of University of Lampung provides a place for academicians, practitioners, policy makers, researchers and professionals from multi-disciplines related to Social Sciences and Humanities, Economics, Education, Law, and Sustainable Development (SHIELD) to meet and interact with members inside and outside their own particular disciplines. All participants are challenged to give their real contribution to helping solve the real-world problems.

The authors of Proceeding of 5th SHIELD International Conference come from academicians, practitioners, policy makers, researchers and professionals from multi-disciplines related to Social Sciences and Humanities, Economics, Education, Law, and Sustainable Development.

This conference aims to share information and discuss recent developments and innovations arising from research in a wide range of disciplines. Through this conference, it is expected that the research articles can be documented and communicated throughout the countries.

Head of Committee

Dr, Junaidi, S.Si., M.Sc.

# TABLE OF CONTENTS

|  | <b>Page</b> |
|--|-------------|
| Guided Discovery Learning Based on E-Learning During the Covid 19 Pandemic: Analysis of critical thinking skills based on students' perceptions on the topic of ecosystems<br><i>Desi Purwanti, Tri Jalmo, and Dewi Lengkana</i>         | 1 – 11      |
| The Development of Mobile Learning Media in Learning Procedure Text in Junior High School<br><i>Fadilla Chintiya Dewi, Yulina Winda Rahma, Rian Andri Prasetya, and Kahfie Nazaruddin</i>  | 12 – 18     |
| The Development of STEM-Based Practicum Tool on Cell Metabolism Learning for Science of Junior High School Grade VIII<br><i>Egy Razka Likita, Mida Ayu Restanti, and Dewi Lengkana</i>   | 19 – 25     |
| Evaluating the influence of accessibility on coastal development in Asahan Regency, North Sumatera Province, Indonesia<br><i>Muhammad Syafiq, Sirojuzilam, Badaruddin and Agus Purwoko</i>   | 26 – 35     |
| Agroforestry Model at FMU Gedong Wani: Agroforestry Financial Analysis to Support the Post-Covid19 National Economic Recovery<br><i>Imawan Abdul Qohar, Christine Wulandari and Samsul Bakri</i>   | 36 – 40     |
| Sociodemographic Factors, Physical Area Characteristics and Health Service Associated Interventions with Malaria Cases in Pesawaran District, Lampung Province<br><i>Firman, Betta Kurniawan, Samsul Bakri, and Indra Gumay Febryano</i> | 41 – 49     |
| Adok and Traditional Wedding Attire for The Indigenous People of Lampung Saibatin Marga Way Lima<br><i>Andriansyah</i>   | 50 – 61     |
| Character Value of Syair Song Lampung Pesisir Single Guitar<br><i>Novri Rahman, Farida Ariyani, and I Wayan Mustika</i>  | 62 – 71     |
| Advocacy Model of Civil Society Organizations and Its Contributions in Public Problem Solution (Study on the Role of Islamic Boarding Schools in Lampung Province)<br><i>Maulana Mukhlis and Syarief Makhya</i>                          | 72 – 79     |

# **Guided Discovery Learning Based on E-Learning During the Covid 19 Pandemic: Analysis of critical thinking skills based on students' perceptions on the topic of ecosystems**

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## **Abstract**

This study is a quantitative research that aims to describe critical thinking skills based on students' perceptions on the topic of ecosystems during the covid-19 pandemic after the implementation of guided discovery learning based on e-learning. Guided discovery learning based on e-learning consists of 6 stages, namely stimulation, problem statements, data collection, data processing, verification and generalization. This research was conducted in class X MIPA 2 SMAN 13 Bandar Lampung who had implemented guided discovery learning based on e-learning. Class X MIPA 2 was chosen as the subject of this research because the material about ecosystems has been studied in this class and the ability of students in this class is balanced between low, medium, and high abilities. The data were obtained by giving questionnaires and students' work results to 35 students. The results of the analysis describe critical thinking skills based on students' perceptions on the topic of ecosystems during the covid-19 pandemic after the implementation of guided discovery learning based on e-learning, has an average of 86.26% with most criteria. Data analysis shows that the implementation of guided discovery learning based on e-learning on ecosystem materials can be implemented well, meaning that students admit that they understand most of the ecosystem materials even though they are learning virtually. In addition, this study shows that the application of this e-learning-based model can be used as a response effort during and after the pandemic that can stimulate the emergence of meaningful experiences, encouraging students to think critically.

**Keywords:** Guided Discovery Learning, E-Learning, Critical Thinking, Covid 19 Pandemic

## **1. Introduction**

Since the end of 2019, the pandemic Covid 19 has spread massively to various countries, thus hampering all activities in daily life. One of the broad impacts due to the Covid 19 is on the education segment, both in terms of components that regulates educational policy as well as on the practitioner component. The implementation of the learning system in the education unit underwent a change in the generalized operational form through learning policies. The United Nations organization in charge of education, science, and culture UNESCO stated that more than 1.5 billion students in the world cannot study in school due to the pandemic Covid 19 which requires each individual to practice social distancing so as not to transmit the virus to each other [12]. This is supported by the circular letter of the Minister of Education and Culture No. 4 of 2020 concerning the implementation of education policies in the emergency period of the spread of coronavirus disease (Covid-19), namely the process of teaching and learning

activities carried out from home through online/distance learning to provide meaningful learning experiences for students [8].

This distance learning policy requires educators and students to be able to quickly adapt to existing changes, synergize with the needs and interests of preventing the spread of Covid 19. However, there are still many educators who have difficulty carrying out learning because they are not accustomed to teaching using technology and are not familiar with teaching. all educators are familiar with operating online learning applications. As revealed from the survey results that the obstacle that most often arises during the implementation of online learning is one of them being unfamiliar with learning online. Most of them hold lessons and only give assignments through social media applications such as WhatsApp [7]. This is also supported by the results of a survey on the implementation of distance learning for students throughout Indonesia conducted by KPAI (Indonesian Child Protection Commission) that during distance learning, only 20.1% of respondents stated that there was interaction between students and educators, while as many as 79.9% of respondents stated that there was no interaction at all except giving assignments and collecting assignments, without any learning interactions such as direct questions and answers or teacher activities explaining the material. In addition, according to 81.8% of respondents during distance learning, it turns out that educators place more emphasis on giving assignments, even rarely explaining material, discussing or asking questions. Meanwhile, 11.3% of respondents stated that there were discussions between educators and students [9]. On average, educators still find it difficult to implement the learning model when learning online. Therefore, a synergy of appropriate learning strategies and methods is needed so that educators can clearly instruct learning, not only giving tasks as a formality of learning implementation. This is a challenge for all educators in Indonesia to plan and implement distance learning with good quality so that distance learning can provide a meaningful experience for students when learning from home.

Distance learning will certainly be less meaningful without the synergy of appropriate learning strategies and methods [1]. One application that can integrate distance learning is by combining the model guided discovery learning based on e-learning. Guided discovery learning is a model that is carried out with guidance from educators. The learning model Guided Discovery Learning is an instructional model that facilitates learners in improving critical thinking skills, and experience success in finding the concept of a problem faced by the discovery of scientific information with a series of activities facilitated by educators [11] The ability to think critically in need of learning optimized even through distance learning, by applying appropriate and innovative learning models, so that the learning process takes place optimally and is able to develop students' critical thinking skills [16].

In addition to students gaining knowledge and skills while studying, with e-learning students can also find their own answers and learn collaboratively with their groups or study with classmates through e-learning [17]. Such efforts will be able to have a positive impact in order to improve student performance during and after the pandemic Covid-

19. So that students do not find it difficult because of interactions, discussions, and clear learning instructions. This study aims to determine critical thinking skills based on students' perceptions on the topic of ecosystems during the pandemic Covid 19 after the implementation of guided discovery based e-learning-learning.

## 2. Methods

This study used a descriptive quantitative method [5]. The subjects of this study were students of class X MIPA 2 SMAN 13 Bandarlampung, totaling 35 students. Class X MIPA 2 was chosen as the subject of this research because it has implemented guided discovery learning based on e-learning on the topic of ecosystems. The research instrument used in this study was a pretest-posttest multiple choice questions accompanied by reasons by using 3 of 5 aspects of critical thinking according to Ennis in 1993, namely; elementary clarification, advanced clarification, and inference [6]. In addition, using an observation sheet in the form of giving a perception questionnaire on the ecosystem material to 35 students. The questionnaire was measured using the Guttman scale, each statement has a score of 1 (one) to agree with a positive statement and a score of 0 (zero) to disagree with a negative statement. The total score of each statement in the questionnaire is calculated in percentage form [2]. The following are the criteria for the level of student responses to the application of the model guided discovery learning based on e-learning.

**Table 1.** Criteria for the level of student responses to the application of the learning model guided discovery learning based on e-learning

| No | Percentase (%) | Criterion   |
|----|----------------|-------------|
| 1. | 100            | All         |
| 2. | 76-99          | Most        |
| 3. | 51-75          | Generally   |
| 4. | 50             | Half        |
| 5. | 26-49          | Almost half |
| 6. | 1-25           | Minor       |

## 3. Results and Discussion

The implementation of guided discovery learning based on e-learning in this study was carried out in learning ecosystem materials. Pretest and posttest were conducted to get a profile picture of students' critical thinking skills who were the research subjects. In addition, using a questionnaire on the perception of students' understanding on the topic of ecosystems during the pandemic Covid 19.

### 3.1. The implementation of guided discovery learning based on e-learning

Implementation of guided discovery learning based on e-learning in this study was carried out by utilizing technological advances in the form of WhatsApp group applications and virtual meetings via Zoom. Zoom is a web-based conferencing service provider that can be used in learning. The Zoom application used in this study provides facilities for teachers to give presentations in the form of pictures and videos to students. In addition to using zoom, based e-learning-learning is carried out by utilizing the



WhatsApp group application which is used as a means of classical discussion that is easily accessible.

There are several obstacles faced by students and teachers in implementing e-learning. The biggest obstacle is the internet connection which is sometimes not always smooth, when carrying out virtual meetings via Zoom. This requires students to be independent in solving problems given in online learning. When there are obstacles in virtual meetings via Zoom, students and teachers coordinate and confirm in WhatsApp groups even though they do not interact directly.

Student-centered learning by requiring students to actively carry out learning activities is the key to the success of any online learning so that students actively contribute to creating meaningful learning experiences for themselves. The implementation of online learning by applying the guided discovery learning model is carried out in the same stages as when we carry out offline learning in class, namely through 6 stages consisting of stimulation, problem identification, data collection, data processing, verification and generalization. The difference is to apply the guided discovery learning model based on e-learning. In the early stages of learning starting from the stimulation stage, problem identification, data collection to data processing, students with teachers or other students interact and discuss classically via whatsapp. Furthermore, at the verification and generalization stage, students with teachers or other students conduct virtual meetings via Zoom to interact and discuss. The description of the implementation of online learning using the guided discovery learning model at each stage will be described as follows:

### **3.1.1. Stimulation**

At this stage students get a stimulus in the form of a problem that must be observed by students. The teacher creates a large group as a means of classical discussion on WhatsApp and provides a stimulus through the group. The teacher asks students to pay attention to video shows about an ecosystem. The problem given as a stimulus is a problem related to critical thinking, how students give simple explanations, analyze and provide explanations or statements based on video shows.

### **3.1.2. Problem statements**

After watching a video about an ecosystem, the teacher asks students to identify problems based on the video. At this stage, the teacher gives time for students to write down whatever is on their mind related to the problem given based on the video. The teacher also provides follow-up questions that can stimulate students related to the statements given by students. Then one of them is selected and formulated in the form of a hypothesis (temporary answer) to the question of the problem.

### **3.1.3. Data collection**

At this stage students are asked to move from the large group and join the whatsapp group provided by the teacher based on their respective groups. Large groups are used for classical discussions or where students ask questions when there are difficulties in

collecting data. While small groups are made based on their respective groups, used to discuss between group members in collecting data. Students are allowed to find all the information they need by utilizing the internet and utilizing all the information technology media that students have.

#### **3.1.4. Data processing**

At the data processing stage, students are still discussing in small groups based on their respective groups. They discussed whether through chat, voice notes or video calls in WhatsApp groups depending on the needs of each group. In this discussion, all students use their thinking skills to solve the problems given in the LKPD (student worksheet). The teacher is only a facilitator in this online learning. If students face problems in solving problems in the given LKPD (student worksheet), the teacher facilitates students by asking several questions. The teacher does not immediately give answers to students when students face difficulties. For example, one of the students asked a question about the ecological pyramid based on the problems in the LKPD, "Based on the biology textbook that I read, the ecological pyramid consists of three types, namely the pyramid of numbers, the pyramid of biomass, and the pyramid of energy. to answer the problems in LKPD?" Then the teacher does not immediately answer by choosing one of the ecological pyramids "please choose the ecological pyramid based on the information you get in the video". It is intended that students apply their critical thinking skills, one aspect of which students can conclude.

#### **3.1.5. Verification**

At this stage, students verify the correctness of the results of group work discussions that have been carried out in small group discussions. Students carry out a careful and thorough examination to prove the truth of the statement of the problem that has been determined previously, and is associated with the results of data processing. Furthermore, at this stage students are welcome to join virtual meetings via Zoom. The teacher asks group representatives to present the results of their discussions at the Zoom meeting. After the presentation is finished, the teacher asks other students to give opinions or questions about what the presenter said. At this stage all students are expected to verify the results of their group work to get the correct answer.

#### **3.1.6. Generalization**

At this stage, each group representative is asked to provide a final conclusion regarding the given problem. The teacher asks each group to present the final conclusion they got from the classical discussion. The teacher asks students to give reasons for the conclusions they draw. After each group presented their conclusions based on the group discussion, the teacher asked several students at random to present their conclusions about their understanding. Thus, conclusions can be obtained through understanding in groups and individuals.

### 3.2. Profile of students' critical thinking skills in implementing *guided discovery learning based on e-learning*

Students are given pretest and posttest questions each consisting of 20 reasonable multiplechoice questions based on aspects of critical thinking skills, namely elementary clarification, advanced clarification, and inference. Based on the results of the pretest, most of the students could not solve the questions on the critical thinking aspect. Students only rewrite the answers from the available choices, not giving further reasons. Here are some pictures that present the results of the pretest-posttest comparison of students after carrying out *guided discovery learning based on e-learning*.

In the aspect of elementary clarification, students are asked to analyze the arguments, identify the reasons put forward, and look for similarities/differences in answering a question that requires explanation [14]. One of the questions given in this aspect is to ask students to be able to explain the causes of the interactions that occur between mango and orange trees from the problems presented. The results of students' answers on this aspect are as follows figure 1 and 2.

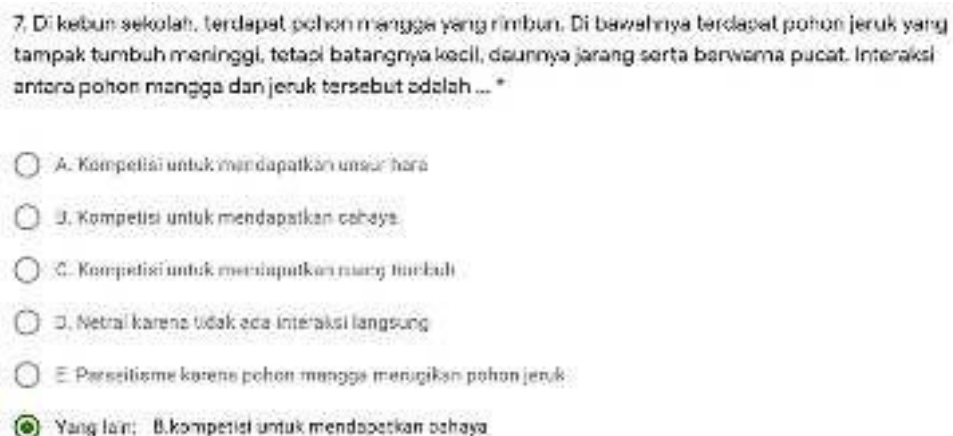


Figure 1. Students' answers to the pretest questions for aspects of elementary clarification

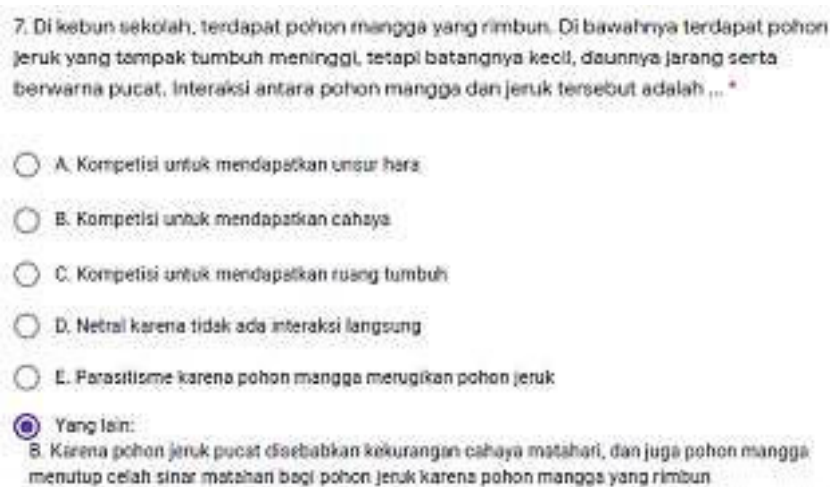


Figure 2. Students' answers to the posttest questions for aspects of elementary clarification

Based on the students' answers, it can be seen that there are differences in students' abilities in providing simple explanations between before carrying out learning and after carrying out guided discovery learning based on e-learning. After carrying out learning, students can provide simple explanations correctly, can explain the causes of interactions between components that occur, can identify the reasons put forward and provide reasons for the choice of the problems presented.

In the aspect of advanced clarification, students are asked to define terms and consider them, as well as identify assumptions in solving a problem [14]. In this aspect, questions are given by asking students to be able to define terms and identify assumptions about the relationship between fellow biotic components. The results of students' answers on this aspect are as follows figure 3 and 4.

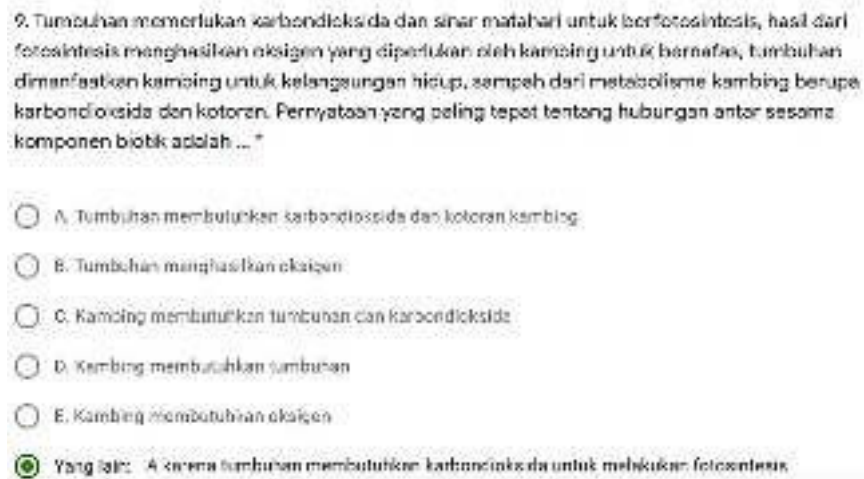


Figure 3. Students' answers to the pretest questions for aspects of advanced clarification

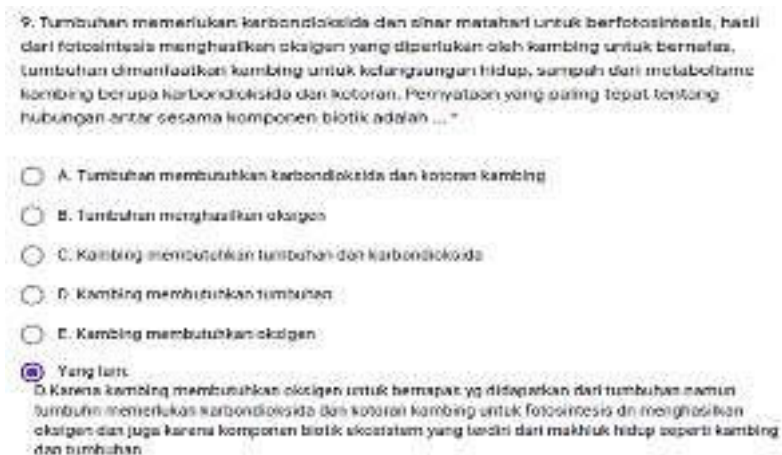


Figure 4. Students' answers to the pretest questions for aspects of advanced clarification

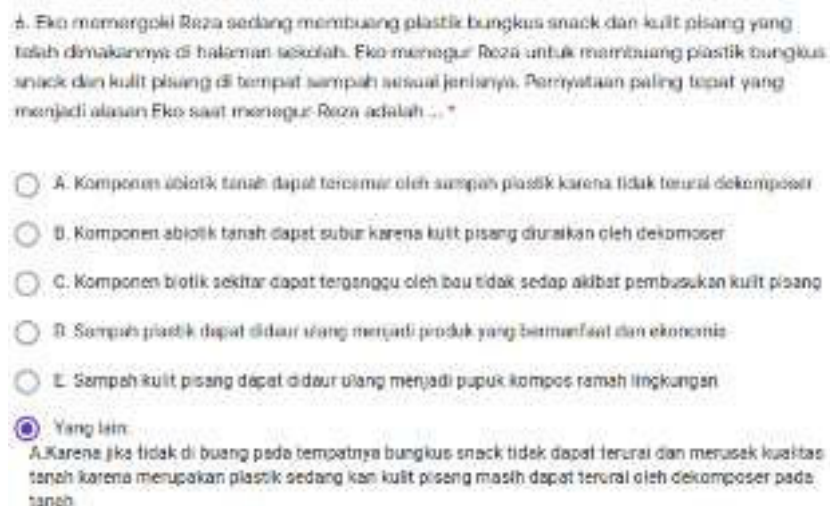
Based on the students' answers, it can be seen that there are differences in the ability of students to provide further explanation between before carrying out learning and after carrying out *guided discovery learning* based on *e-learning*. After carrying out learning,

students are able to provide further explanations appropriately, can make statements of terms and consider them, and identify assumptions in solving a problem from the problems presented.

In the aspect of inference, students are asked to deduce, induce, and consider the results of induction deduction in solving a problem [14]. One of the questions given in this aspect asks students to provide opinions and reasons then conclude the causes of the problems presented. The results of students' answers on this aspect are as follows figure 5.



**Figure 5.** Students' answers to the pretest questions for aspects of inference



**Figure 6.** Students' answers to the posttest questions for aspects of inference

Thus, it can be said that guided discovery learning based on e-learning can stimulate critical thinking skills of SMAN 13 Bandarlampung students. The application of discovery learning through e-learning gets better results and has a positive effect compared to conventional discovery classes [4]. Online learning with discovery learning learning methods can stimulate students' HOTS [13]. In addition, discovery learning in e-learning based learning has criteria for student interaction with good learning materials. This shows that discovery learning is an alternative method in online learning [15].

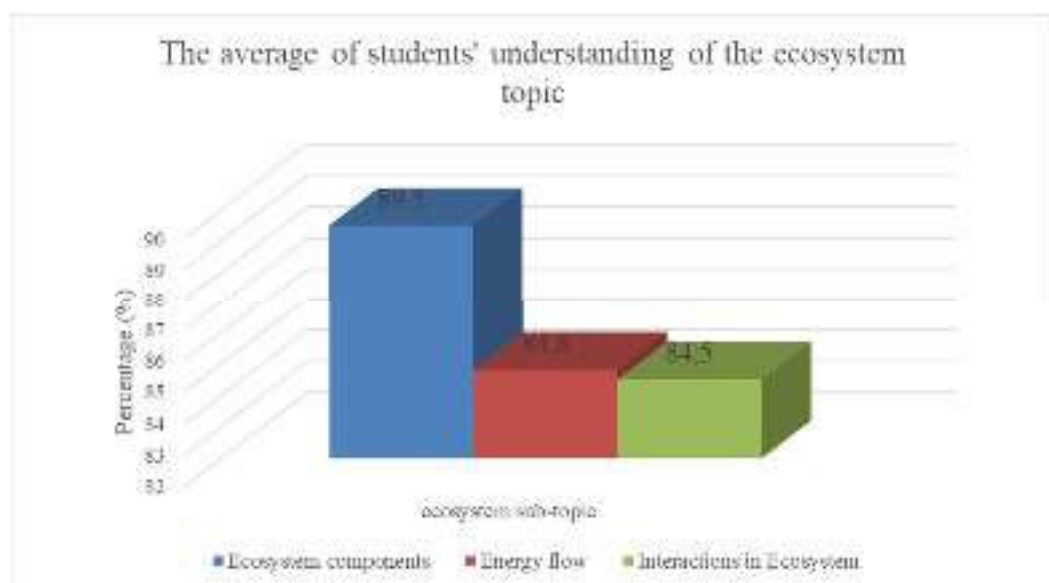
Analysis of students' perceptions of understanding on ecosystem materials after the application of the model guided discovery learning based on e-learning, can be seen from the ecosystem sub-topics presented in the following table [10].

**Table 2.** The results of the distribution of student understanding questionnaires on ecosystem material after the application of the model guided discovery learning based on e-learning

| No.     | Statement                 | Percentage (%) | Criteria |
|---------|---------------------------|----------------|----------|
| 1.      | Ecosystem Components      | 89.5           | Most     |
| 2.      | Energy Flow               | 84.8           | Most     |
| 3.      | Interactions in Ecosystem | 84.5           | Most     |
| Average |                           | 86.26          | Most     |

Based on Table 2. it can be seen that the ecosystem component sub-topic has the most criteria (89.5%), this This shows that students have understood most of the sub-topics of ecosystem components. The energy flow sub-topic has the most criteria (84.8%), this shows that students have understood most of the energy flow sub-topic. In the sub-topic of interaction in the ecosystem, most of the criteria (84.5%), this shows that students have understood most of the sub-topics of interaction in the ecosystem. So that the total average perception of students' understanding of ecosystem materials after the application of the model *guided discovery learning* based on *e-learning* has the most criteria (86.26%).

Comparative analysis of students' understanding of the ecosystem sub-topic after the application of the e-learning-based guided discovery learning model can be seen in Figure 7. as follows.



**Figure 7.** The Average of Students' Understanding of The Ecosystem Topic

Based on the comparative analysis of students' understanding of the ecosystem sub-topic. The material that is best understood is the ecosystem component sub topic, because in this sub topic students are still stimulated to think critically to analyze what ecosystem components are. Meanwhile, the lowest sub-topic among the sub-materials is the interaction in the ecosystem sub-topic, because in this sub-topic students are stimulated to think critically to analyze the form of interaction in the ecosystem that occurs in an ecosystem. However, all of the sub-topics of the ecosystem material stated that most of them understood the topic of ecosystems because the scores obtained ranged from 76-99 with most criteria.

#### **4. Conclusions**

Based on the results of the analysis and discussion, some conclusions that can be concluded are 1) e-learning in biology is very possible using the guided discovery learning model which consists of 6 stages, namely stimulation, problem identification, data collection, data processing, verification and generalization, 2) *Guided discovery learning* based on *e-learning* can be said to stimulate critical thinking skills of SMAN 13 Bandarlampung students based on the results of the students' posttest and a questionnaire on the perception of students' understanding of the ecosystem topic compared to the results of the pretest. There is a change in the mindset of students in answering the problems posed by the teacher from time to time in the implementation of *guided discovery learning* based on *e-learning*. Further research is needed regarding the effectiveness of e-learning-based learning to improve critical thinking skills. In addition, several important things that must be considered in online learning are teachers must increase motivation to learn and apply high discipline regarding the limits of task collection, so that good time management is needed in learning activities. The teacher must also actively guide students at every stage of the discovery learning model, so that it requires students to reason at every opportunity. Thus, students can be more active in using critical thinking skills in solving all problems.

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#### **References**

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# The Development of Mobile Learning Media in Learning Procedure Text in Junior High School

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## Abstract

This research aims to develop mobile learning media in learning text procedures in junior high school and its feasibility as a learning media. The method of this research uses a modified model of research and development (R&D) method by Hannafin and Peck theory which consists of three phases: 1) need analysis, 2) design, and 3) development or implementation. This research produces a product in the form of mobile learning media for learning text procedures at Junior High School with an offline operational system using a smartphone (Android). The product of this research can be operated by the student's or teacher's smartphone which is a built-in Android operating system. The product development process was done using Construct 2 software and Adobe Phonegap in <https://build.phonegap.com/>. The product feasibility was validated by a learning expert, media expert, and has also been tested to a teacher and students by teacher trial, one to one learner trial, small group trial, and field trial with the score of very feasible. Based on the result obtained, it could be concluded that mobile learning media is very suitable to be used in learning procedure text in junior high school.

**Keywords:** development, mobile learning, procedure text, junior high school, media.

## 1. Introduction

Learning in Indonesia requires standards regulated in Permendikbud No 22 of 2016. This provision states that the learning process in educational units is carried out interactively, inspiring, fun, challenging, motivating students to participate actively, and providing sufficient space for the initiative, creativity, and independence by following the talents, interests, and physical and psychological development of students [1]. This is realized by implementing the 2013 Curriculum which requires students to be active, think creatively, and be innovative. In addition, the 2013 curriculum also requires educators to be able to make innovations in choosing and determining learning resources and designing learning that is more meaningful for students and appropriate with the times. This demand is also in line with the needs of the fifth educational revolution in the form of packaging and the use of Information and Communication Technology (ICT) in learning activities [2].

One of the things that must be done by educators to answer the above demands is by improving the literacy skills of information and communication technology as well as developing the learning media used. The use of learning media in the teaching and learning process can generate new desires and interests, motivation and stimulation of

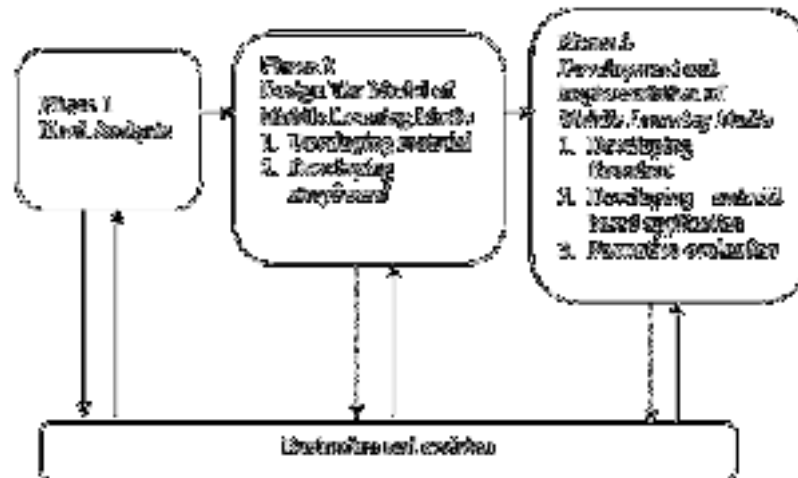
learning activities, and even bring psychological effects on students [3]. One of the media that can be used is mobile learning media. Mobile learning applications can be used as a means of supporting activities in the classroom and making students more independent in learning [4] enabling the realization of a learning process all the time (long life learning), and fulfill a learner-centered learning perspective [5].

In addition, mobile learning applications based on Android phones can also be developed based on the number of smartphone users in Indonesia reached 92 million units [6] and the number of Android-based smartphone users in Indonesia in 2017 reached 88.37% [7]. This is an opportunity to maximize the use of students' android phones for learning needs through the development of mobile learning media in the form of android applications. The use of android applications in learning is also considered feasible and able to improve student learning outcomes [8,9].

One form of mobile learning media development is the development of android applications using the Construct 2 software. Construct 2 is an HTML-5 based game editor with many features, but it is sufficient for people to use in starting their first two-dimensional game development work [10]. This application can be use to develop mobile learning media in the form of an android application to accommodate Indonesian language learning in Procedure Text material. The development of this media tries to answer the problems found in Junior High School 12 of Bandarlampung. Preliminary research produces data in the form of learning problems such as learning that is still carried out in the form of lectures, monotonous, and less interesting. Coupled with the lack of learning resources and appropriate learning media. This results in a lack of learning motivation in students so that there are still many students who have not reached the Minimum Completeness Criteria (KKM). From the research that has been done, there are 41% of class VII students at Junior High School 12 of Bandarlampung who have not succeeded in meeting the minimum completeness criteria in learning procedure text. In addition, data is obtained that the majority of students have Android-based smartphones that can be used as learning tools. Therefore, the development of android application-based mobile learning media is used in this study.

## **2. Methods**

This study used the model development method of Hannafin and Peck. Hannafin and Peck's model has three phases with modifications, namely 1) needs assessment, 2) design, 3) development and implementation [11]. Each phase is connected with evaluation and revision activities. This model is used because it aims to create a product in the form of computer-aided learning media so that it is suitable for use in this study.



**Fig. 1.** The Syntax of the Modified Mobile Learning Development Model by Hannafin & Peck (Source: Hannafin and Peck)

The first phase of Hannafin and Peck's model is needs analysis. A needs analysis was carried out to see if the development of android-based mobile learning media was needed. This phase consists of two activities, 1) conducting observations and interviews, and 2) formulating the user's initial behavior. From this phase, we will also get an overview of the development of the right mobile learning media prototype to answer the problem.

Designing mobile learning media that will be developed is the second phase. This second phase includes two steps. The first step is developing the material. The material developed is adjusted to the needs of students obtained from the results of interviews and observations. The second step is to develop a storyboard. This storyboard is used as a guide for researchers to design the appearance of the developed mobile learning media application.

The third phase is to develop and implement mobile learning media. This stage consists of activities 1) compiling a flow chart, 2) developing an android application, and 3) formative evaluation. The flow chart is used as a reference for producing and developing mobile learning media. Development activities are carried out by making the display of mobile learning media according to the storyboard. After that, mobile learning media was developed using the Construct 2 application. A formative evaluation was carried out to obtain primary data in the form of expert validation. In the formative evaluation, input and assessment were also found to improve or revise the media that had been developed. In implementation activities, researchers carried out trials to determine the feasibility of the media that had been developed.

Data collection techniques in this study used techniques such as observation, interviews, and questionnaires. Interviews were conducted at the beginning of the study to practitioners/teachers at Junior High School 12 of Bandar Lampung to map the problem and determine the right media to be used in procedural text learning. Furthermore, the

researcher used a questionnaire for expert validation as a step to obtain information about the shortcomings of the media that had been developed. Questionnaires are also used to determine the response of media users, namely practitioners/teachers and students. Assessments that have been carried out by experts, practitioners, and students are used as data to determine the feasibility of the products that have been developed.

### **3. Results and Discussion**

This research produces a product in the form of mobile learning media for learning procedure text in junior high school with an offline operating system using an Android-based smartphone. The product contain materials about learning procedure text in Indonesian language for class VII. There are two types of evaluation questions on the application. The first is multiple choice type and the second one is essay. The product resulted from three phases of research and development of the model proposed by Hannafin and Peck, namely 1) needs analysis, 2) design, 3) development and implementation. The first phase is needs analysis. Needs analysis is done through observation and interviews to determine the needs of students and teachers, identify student characteristics, collect additional material to develop mobile learning media, and determine the right mobile learning media to be developed.

The second phase is the design of mobile learning media. In this phase, the development of materials that will be used in mobile learning media is carried out. The material used is taken from the VII grade Indonesian book published by the Ministry of Education and Culture. Next, the storyboard development process is carried out. The storyboard that has been developed is then used as a reference in designing the display of mobile learning media. The display of mobile learning media is designed using the Adobe Photoshop application. Images and assets are downloaded from Google and Freepik. The provision of audio and video is downloaded from the sites youtube.com, zapsplat.com, and the researcher's recordings. These are some pictures of the mobile learning media that has been designed.



Fig 2. Display of homepage and menu (Source: author's work)

The third phase is the development and implementation of mobile learning media. This phase begins with developing a flow chart. Flowcharts are used to describe the flow of application operations and as a reference in application development. Furthermore, the development of a mobile learning application using the Construct 2 application is carried out. This step is carried out after the display design is complete. After the development is complete, a formative evaluation is carried out in the form of validation to experts and trials to practitioners and users. In addition, at the implementation stage, the process of installing .apk extension applications is also carried out. to android phones and trials to practitioners/teachers and students in the form of individual trials, small group trials, and large group trials. The following are the results of the assessments from experts, practitioners/teachers, and users/students.

Table 1. Results Validation from Experts and Trials

| No. | Respondent               | Aspect  | Average of Score | Average of percentage | Category      |
|-----|--------------------------|---|------------------|-----------------------|---------------|
| 1.  | Learning Expert          | Material feasibility  | 3,6              | 73 %                  | Feasible      |
|     |                          | Design of learning  | 3,8              | 76%                   | Feasible      |
| 2.  | Media Expert             | Visual communication, usability, and reliability                                | 4,5              | 90 %                  | Very feasible |
| 3.  | Teacher                  | Content, design of learning, user interface, graphic, multimedia and navigation | 1,0              | 100 %                 | Very feasible |
| 4.  | One to one learner trial |   | 3,5              | 88 %                  | Very feasible |
| 5.  | Small group trial        |   | 6,8              | 85 %                  | Very feasible |
| 6.  | Field trial              |   | 19,4             | 93%                   | Very feasible |

The results of the questionnaires filled out by experts were also used as a reference for revising and improving the developed mobile learning media. After expert validation was carried out, the mobile learning media was tested on practitioners/teachers and

users/students. In the one-to-one learner trial, four students were chosen randomly. In the small group trial, eight students from class VII were selected from different classes. In the field trial, twenty-one grade VII students were selected from the superior class and the regular class. From the results of the evaluation by experts and the trials that have been carried out, it can be concluded that the mobile learning media in the form of an android application that has been developed is feasible to be used as a learning media in Indonesian language learning regarding procedural texts in class VII.

The results of this study are in line with research on the development of mobile learning media that has been carried out by several previous researchers. The aspect that makes this study different from the previous studies lies in the object of the research. Research conducted by Koderi and Maulana, et al. [8] using mobile learning media based on android to improve the quality of Arabic learning. Meanwhile, research conducted by Alhafidz and Haryono [9] developing mobile learning media based on android to improve students' knowledge in learning economic subjects in senior high school. This study which developing mobile learning media based on android using Construct 2 stated successful to help in learning procedure text in junior high school as it is success to be use as mobile learning media with interesting layout, easy to use by teacher and students, and increase student's motivation to study. The mobile learning media that has been develop in this study generate new desires and interests, motivation and stimulation of learning activities, and even bring psychological effects on students [3]. This based on the results of validation and trials process.

#### **4. Conclusions**

The development of mobile learning media is needed in order to make the learning activities becomes more meaningful, make students independent in learning, give learning media that more appropriate with the time, and fulfill needs of long life learning. The development process of mobile learning media of learning procedure text in junior high school was done using Construct 2 software and Hannafin and Peck development model. Hannafin and Peck's model has three phases. The phases are needs analysis, design, and the last is development and implementation. Each phase is connected by evaluation and revision. The product of this research is an android based mobile learning media that can be used without internet connectivity. This application was declared valid and can be used as a mobile learning media in learning procedure text in junior high school grade seven. This is indicated by the results from the learning expert with the score of 73% (feasible) for its material feasibility aspect and 76% (feasible) for the learning design aspect, by the media expert with the score of 90% (very feasible). The product has also been tested to a teacher and students by teacher trial with the score of 100% (very feasible), one-to-one learner trial with the score of 88% (very feasible), small group trial with the score of 85% (very feasible), and field trial with the score of 93% (very feasible). It can also be concluded from the trials process that the mobile learning media of this research has helped students to understand the procedure text and make the learning process become more fun.

### **Acknowledgement**

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# The Development of STEM-Based Practicum Tool on Cell Metabolism Learning for Science of Junior High School Grade VIII

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## Abstract

The limitation of practicum tools make it difficult for educators to prove science phenomena, especially in cell metabolism material. Therefore, it is necessary to develop a STEM-based practicum tool in order to prove the science phenomenon on the topic of cell metabolism that is abstract. This research aims to develop a practicum tool for cell metabolism learning to determine the results of cellular respiration through fermentation that produces carbon dioxide which has an effect on plant photosynthesis activities. This development model consisted of four stages, namely definition (Define), design (Design), development (Develop), without dissemination (Disseminate). The result of this practicum tool development was that it can prove cell metabolism phenomenon, namely respiration and photosynthesis events which stated that carbon dioxide resulting from anaerobic respiration was very influential in plants photosynthesis process. This could be seen from the result of 5 days observation; first, there was an increase in the plant height. Second, it had stable green leaves. And the last, it had plant leaves that were in fresh condition when receiving carbon dioxide supplies from respiration. This tool is also validated by users, namely science teachers. Based on the results of the responses of 52 science teachers in Lampung Province, they stated that 50% of teachers considered this tool to be in accordance with basic competencies. So from this research, it can be concluded that the development of a STEM-based practicum tool in cell metabolism learning can help to prove cellular respiration phenomenon and photosynthesis.

**Keywords:** Practicum Tool, STEM Approach, Cell Metabolism

## 1. Introduction

Living in 21<sup>st</sup> century has created increasing numbers of competitions, particularly in education field. Education has become currently important matter. Education in the present era has demanded students to develop more of their skills; in communication, critical thinking, collaboration, and creativity which is very fundamental for modern life [7, 11, 12]. Education standard of 21<sup>st</sup> century can be obtained by creating educational innovations; one of them is integrating STEM approach in learning process. There are numerous aspects which are possible for STEM implementation in teaching learning process. STEM learning demands the students to be more independent and active during the learning which has already stated in 2013 curriculum principles [3].

Teaching learning by applying 2013 curriculum is commonly known as scientific approach. It is a methodical/experimental-based teaching learning approach [9]. The teaching learning which applies scientific approach needs a proper method. Practicum



is one of essential methods supporting Science teaching learning. Students will be directly involved in this method during teaching learning process which can lead to gaining experience and scientific process of certain phenomenon, developing understanding about science, as well as practicing their inquiry skill and discovering natural phenomenon on their own [1,6]. In Science learning, especially on Biology, has a very distinctive activity in order to support meaningful learning, which is known as practicum. Implementing practicum-based learning in teaching Science can affect significant improvement on students' learning outcomes, not only their cognitive domain, but also their skills [8].

A material about cell metabolism is an abstract major topic in Science. Students mostly find difficulty during the learning process. This topic needs the existence of practicum in its learning process. Practicum is an activity which can develop students' knowledge and actively attract them in the learning process [4,14]. One solution to overcome the issue is by providing a proper learning media. Science KIT media can improve learning activities either through discussion or practicums which firmly be retained in the students' memory [9]. Science KIT can achieve 85% of learning outcomes [10].

## **2. Methods**

The method applied in this research was descriptive method since it aimed to establish practicum tools and measure students' creativity during sell metabolism practicum. This research used development model which was a (4-D) (Four-D models). It consists of 4 stages; namely define, design, develop without disseminate [13]. However, disseminate stage could not be done because of time limitation during research field examination, so this research was limited only in the development stage to gain direct feedback from Science teacher relating to make ideal practicum tools. During the evaluation of practicum tools efficacy, validity test was done by using product validation questionnaire. Subjects of filling in questionnaire were all Science teachers in Lampung Province. The samples were 52 teachers and selected using cluster random sampling. Product validation questionnaire by the teachers were then analyzed descriptively using percentage.

## **3. Results and Discussion**

The results obtained in this research were data of sprout growth and practicum tools validation from all Science teachers in Lampung Province. The result of sprout growth had been observed for five days and showed that the sprout height increased every day. The result particularly could be seen in the fifth day. In the fifth day, there was an increasing number of sprout heights. The first plant which was 6 cm height on the first day had grown 14 cm on the fifth day, the second plant which was 8 cm height on the first day had grown 14 cm on the fifth day, the third plant which was 9 cm height on the first day had grown 18 cm on the fifth day, the forth plant which was 8 cm height on the first day had grown 17 cm, and the fifth plant which was only 9 cm on the first day had grown 18 cm.

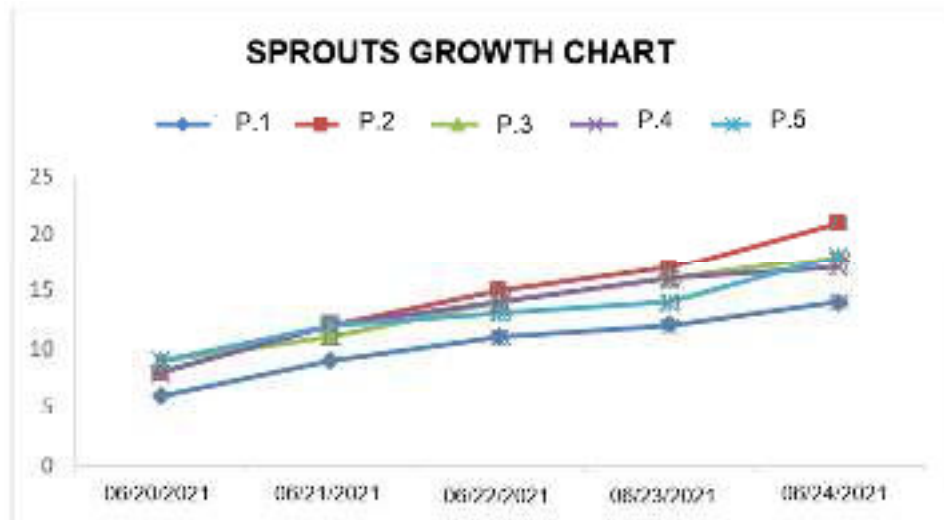


Chart 1. Sprouts Growth for Five Days

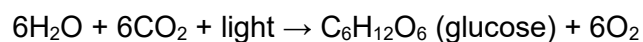
During the tools trial, the arranged practicum tools had demonstrated respiratory and photosynthesis of the plant. In tube A, the cell photosynthesis occurred. Microorganism which played an important role in fermented-glutinous rice making process was *Saccharomyces*; it changes glucose into alcohol. In fermented-glutinous rice making process had its own function. The first function was a twice washing step, which was to clean all the dirt and foreign particles contamination on the glutinous rice. Soaking step was for germination process of the next step. Steaming step was for cooking glutinous rice, killing pathogenic microbes and to obtain soft and mushy texture on the cooked rice. Yeast spreading step was to ferment the rice into *tape*. Packaging step was to accumulate anaerobic condition so that it could accelerate fermentation process which was guarded by amylolytic microbe and to keep the materials sterile. *Tape* (fermented glutinous rice) making process was done in several steps; washing glutinous rice, soaking, steaming until it was cooked, cooling and inoculating with inoculum, tight wrapping and letting the glutinous rice become fermented inside room temperature [5].

The result of anaerobe respiration from fermented glutinous rice which was carbon dioxide distributed into tube B through plastic pipe. In tube B, photosynthesis could be proved that it needed  $\text{CO}_2$  which had been extracted from cell respiration inside tube A. in tube B, 4-day sprouts were put inside it to be observed for 5 days straight. The 4-day sprouts were meant to generate the leaves to grow so that photosynthesis could be done well. Sprouts still could not do photosynthesis by themselves, so they do respiration to synthesize food inside endosperm [2]. Moreover, the main plant organ for photosynthesis process is the leaves. A plant can absorb the sun light using pigment which is called chlorophyll, the green coloring agent of a plant. Chlorophyll is inside on organelles which is called chloroplast, and the place where photosynthesis occurs is called stroma. Even though all of the green parts of plants contain chloroplast, the most energy is generated in the leaves.



**Picture 1.** STEM-based practicum tool of Cell Metabolism

For what happened in tube B proved that photosynthesis phenomenon was occurring. One of the processes of plant life is photosynthesis which is a biochemical process to produce used energy (nutrients), where carbon dioxide (CO<sub>2</sub>) and air (H<sub>2</sub>O) under the sun light effect converted into organic compounds containing of abundant amount of carbon energy. Photosynthesis is a process of carbon assimilation since the free carbon from CO<sub>2</sub> is fixated into glucose as an energy storage molecule. The following reaction is the way photosynthesis produces glucose:



Based on the reaction above, the raw materials for photosynthesis are carbon dioxide and water and the products are carbohydrates and oxygen. Photosynthesis only happens under the presence of light and chlorophyll.

In addition, tube B had been supplied with carbon dioxide obtained from the respiration produced by fermenting black glutinous rice, and then H<sub>2</sub>O was yielded from a wet base (cotton) for 5 days. This experimental kit was placed under a bright room so that the plants could still get sunlight.

In the tube A, where water droplets could be seen on the tube wall, proved that photosynthesis produced water vapor. Stated that transpiration, photosynthesis and respiration were commonly known as plant metabolic process. Transpiration can be defined as the process of losing water in the form of evaporation which is transported from plant tissues through the mouth of the leaf (stomata). Transpiration occurs for as long as the plant lifespan. The overall process of glucose metabolism yields side-product in the form of carbon dioxide (CO<sub>2</sub>) and water (H<sub>2</sub>O). Carbon dioxide is produced from citric acid cycle while water (H<sub>2</sub>O) is produced from the electron transport chain process. Through the metabolic process, energy is produced in the form of ATP and heat. Thus, the formation of ATP and heat is the core of the energy metabolism process  
STEM is stand for Science, Technology, Engineering, dan Mathematic. Science is me material that we used. On this research we used the metabolism cell material. The

technology from this research is the product from the fotosynthesis and cell respiration. Engineering from this research is to create the practicum tool for cell metabolism material. Mathematics on this research is to measures the growth of sprouts for 5 days and distributes it in the form of a diagram.

The survey on 52 Science teachers in Lampung Province which was done using Google form resulted the validation from the Science teachers relating to the development of stem-based practicum KIT in cell metabolism for Science learning of seventh-grade junior high school students. The data collected from the survey about the tools suitability with the material in practicum KIT showed that 51.9% of the subjects chose *appropriate*, 42.3% of the subjects chose *very feasible*, 5.8% of the subjects chose *enough*. At the point of the tools suitability with the basic competencies in Science learning which was cell metabolism showed that 50% of the subjects chose *suitable*, 44.2% of the subjects chose *very suitable*, and 5.8% of the subjects chose *quite suitable*. The next point, the tools suitability with the alternative energy concept showed that 61.5% of the subjects chose *suitable*, 30.8% of the subjects chose *very suitable*, and 7.7% of the subjects chose *quite suitable*. The next point, the tools suitability with the students' education level, 57.7% of the subjects chose *decent*, 38.5% of the subjects chose *very decent*, and 3.8% of the subjects chose quite decent. On the tools feasibility point showed that 48.1% of the subjects chose *very feasible* and *appropriate*, while 3.8% of the subjects chose *quite feasible*. The practicum KIT potential point in improving the students' learning outcomes showed that 57.7% of the subjects chose *very decent*, 36.5% of the subjects chose *decent*, and 5.8% of the subjects chose quite decent. The tools ability to promote the students' curiosity showed that 55.8% of the subjects chose *very decent*, 36.5% of the subjects chose decent, and 7.7% of the subjects chose *quite decent*. The tools feasibility to be stored showed that 48.1% of the subjects chose *feasible*, 44.2% of the subjects chose *very feasible*, 5.8% of the subjects chose *quite feasible*, and 1.9% of the subjects chose *not feasible*. The feasibility of the tools portability showed that 53.8% of the subjects chose *very portable*, 40.4% of the subjects chose *portable*, 3.8% of the subjects chose *quite portable*, and 1.9% of the subjects chose *not portable*. The feasibility for obtaining materials to make practicum KIT showed that 57.7% of the subjects chose *very feasible*, 40.4% of the subjects chose *feasible*, and 1.9% of the subjects chose *quite feasible*. The last point was the design simplicity of the tools showed that 53.8% of the subjects chose *very simple*, 40.4% of the subjects chose *simple*, and 5.8% of the subjects chose quite *simple*. In the suggestion section, a lot of subjects suggested to use rigid materials in order to make the tools sturdier.

#### **4. Conclusions**

The result of this practicum tool development was that it can prove cell metabolism phenomenon, namely respiration and photosynthesis events which stated that carbon dioxide resulting from anaerobic respiration was very influential in plants photosynthesis process. This could be seen from the result of 5 days observation; first, there was an increase in the plant height. Second, it had stable green leaves. And the last, it had plant leaves that were in fresh condition when receiving carbon dioxide supplies from respiration. This tool is also validated by users, namely science teachers. Based on the

results of the responses of 52 science teachers in Lampung Province, they stated that 50% of teachers considered this tool to be in accordance with basic competencies. The development of a STEM-based practicum tool in cell metabolism learning can help to prove cellular respiration phenomenon and photosynthesis and accordance with basic competencies.

### **Acknowledgement**

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# Evaluating the influence of accessibility on coastal development in Asahan Regency, North Sumatera Province, Indonesia

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## Abstract

Accessibility plays a crucial role in coastal development. However, the influence of accessibility on coastal development depends on regional characteristics. This research examined the effect of accessibility on coastal development in Asahan Regency, North Sumatera Province, Indonesia. Through this research, coastal community opinions were collected using structured questionnaires. A structural equation modeling (SEM) approach was employed to test a hypothesized model, which was constructed based on theory and previous studies. In addition, a new combination of existing indicators was used as a novelty of this research. The research result indicates that accessibility has not significantly influenced the coastal development of Asahan Regency. Practical implications of the research finding for policymakers are discussed.

**Keywords:** accessibility, coastal development, Indonesia.

## 1. Introduction

Transportation accessibility as an element of regional infrastructure is also very much needed by coastal communities, most of whom have a livelihood as fishermen and have high mobility in fishing and marketing activities of coastal resources. A study conducted in the Philippines concluded that increasing accessibility has positive effects on fishing communities, including increasing catches, the potential use of technology to increase production and productivity, investment opportunities to support production, and increasing market demand [1].

Transportation infrastructure is an essential success factor for the competitiveness of regional or state economic performance; losing the route or network as a whole means losing the productivity potential of a region or country [2]. In addition, a study by [3] shows that increasing transportation accessibility positively influences regional development, although not as a whole but depends on regional characteristics.

Many studies have explored the different aspects of accessibility and coastal development presented in articles and journals [1, 2, 3]. However, there has been no empirical analysis to look at the role of accessibility on coastal development from a coastal households' perspective. Thus, it is worthwhile to identify the relationship between accessibility and coastal development.

## 2. Methods

The type of research was explanatory research with a quantitative approach. The study was conducted from January to May 2021 in the coastal area of Asahan Regency, including four sub-districts, namely Tanjung Balai sub-district, Silau Laut sub-district, Sei Kepayang sub-district, and Sei Kepayang Timur sub-district. The location was selected by considering that the coastal communities of Asahan Regency are most affected by the existence of the Bagan Asahan Port.

The type of data used in this study was primary data. The data was collected from a questionnaire using a Likert Scale where the questions on the questionnaire required respondents' answers with a graded scale.

The population used in this study was all households in the coastal area of Asahan Regency, which includes four sub-districts. Based on Asahan in Figures 2020 released by the Central Bureau of Statistics of Asahan Regency, the number of households in the coastal area of Asahan Regency at the end of 2019 was 19,691 households [4]. Hence, the number of respondents was:

$$n = \frac{N}{1 + Ne^2}$$
$$n = \frac{19.691}{1 + 19.691(0.05)^2}$$
$$n = 392.04$$
$$n = 392 \text{ households}$$

Data analysis in this study started with a validity and reliability test. Then, the second analysis was descriptive analysis and con

Then, Confirmatory Factor Analysis was used to test whether the existing indicators could explain a variable. This analysis will be known the level of influence of an indicator in explaining a variable. Next, data analysis in this study used Structural Equation Modeling (SEM).

Based on the existing theories in accessibility and coastal development, the conceptual framework of this study is presented in Figure 1.

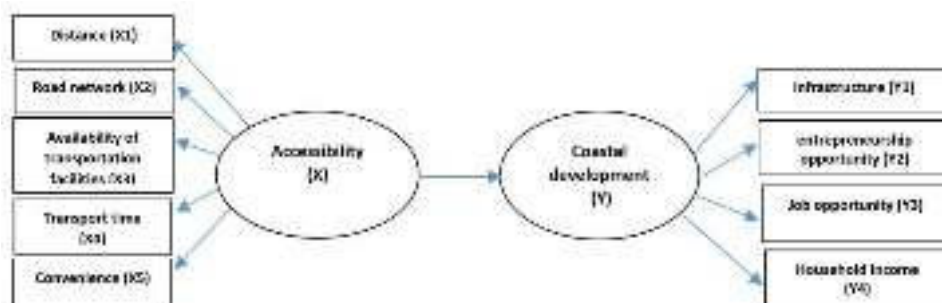


Figure 1. Conceptual framework (Source: Author's own work)



This study hypothesizes that accessibility (X) has a significant and positive effect on coastal development (Y).

### 3. Results and Discussion

#### ***Validity and Reliability Test***

The validity of the instrument was tested using the Pearson correlation method. The criteria used was if the calculated r-value is greater than the r table, it can be concluded that the indicator is valid. In contrast, if the computed r-value is lower than the r table, it can be supposed that the indicator is not valid. In the number of samples (n) 30, the value of the r table was 0.361.

The reliability test was carried out using the Cronbach Alpha method. If the value of the reliability coefficient obtained is greater than the critical point, which is 0.7, it is concluded that the variable is reliable. In contrast, if the reliability coefficient value obtained is lower than the critical point, which is 0.7, the variable is not reliable.

**Table 1.** Results of accessibility validity and reliability test

| <b>Indicators</b> | <b>Calculated r</b> | <b>Sig</b> | <b>r Table</b> | <b>Result</b> | <b>Cronbach's Alpha</b> | <b>Critical value</b> | <b>Result</b> |
|-------------------|---------------------|------------|----------------|---------------|-------------------------|-----------------------|---------------|
| X11.1             | 0.722               | 0.000      | 0.361          | Valid         | 0.801                   | 0.7                   | Reliable      |
| X11.2             | 0.591               | 0.001      | 0.361          | Valid         |                         |                       |               |
| X11.3             | 0.375               | 0.041      | 0.361          | Valid         |                         |                       |               |
| X12.1             | 0.364               | 0.048      | 0.361          | Valid         |                         |                       |               |
| X12.2             | 0.646               | 0.000      | 0.361          | Valid         |                         |                       |               |
| X12.3             | 0.670               | 0.000      | 0.361          | Valid         |                         |                       |               |
| X13.1             | 0.558               | 0.001      | 0.361          | Valid         |                         |                       |               |
| X13.2             | 0.477               | 0.008      | 0.361          | Valid         |                         |                       |               |
| X13.3             | 0.219               | 0.246      | 0.361          | Invalid       |                         |                       |               |
| X14.1             | 0.708               | 0.000      | 0.361          | Valid         |                         |                       |               |
| X14.2             | 0.558               | 0.001      | 0.361          | Valid         |                         |                       |               |
| X14.3             | 0.465               | 0.010      | 0.361          | Valid         |                         |                       |               |
| X15.1             | 0.446               | 0.014      | 0.361          | Valid         |                         |                       |               |
| X15.2             | 0.264               | 0.159      | 0.361          | Invalid       |                         |                       |               |
| X15.3             | 0.668               | 0.000      | 0.361          | Valid         |                         |                       |               |

Source: Author's own work

Based on table 1, there are two indicators of accessibility with a calculated r-value that is lower than the r table (0.361), namely X3.3, and X5.2 meaning that both indicators are not valid. While other indicators have a calculated r-value greater than the r table (0.361), it can be concluded that the other indicators are valid.

The Cronbach alpha value obtained is 0.801. Because the value is greater than 0.7, it is concluded that the X variable is reliable.

**Table 2.** Results of accessibility validity and reliability test (2<sup>nd</sup> test)

| Indicators | Calculated r | Sig   | r Table | Result  | Cronbach's Alpha | Critical value | Result   |
|------------|--------------|-------|---------|---------|------------------|----------------|----------|
| X11.1      | 0.675        | 0.000 | 0.361   | Valid   | 0.821            | 0.7            | Reliable |
| X11.2      | 0.581        | 0.001 | 0.361   | Valid   |                  |                |          |
| X11.3      | 0.432        | 0.017 | 0.361   | Valid   |                  |                |          |
| X12.1      | 0.337        | 0.068 | 0.361   | Invalid |                  |                |          |
| X12.2      | 0.670        | 0.000 | 0.361   | Valid   |                  |                |          |
| X12.3      | 0.645        | 0.000 | 0.361   | Valid   |                  |                |          |
| X13.1      | 0.625        | 0.000 | 0.361   | Valid   |                  |                |          |
| X13.2      | 0.464        | 0.010 | 0.361   | Valid   |                  |                |          |
| X14.1      | 0.738        | 0.000 | 0.361   | Valid   |                  |                |          |
| X14.2      | 0.566        | 0.001 | 0.361   | Valid   |                  |                |          |
| X14.3      | 0.478        | 0.008 | 0.361   | Valid   |                  |                |          |
| X15.1      | 0.501        | 0.005 | 0.361   | Valid   |                  |                |          |
| X15.3      | 0.632        | 0.000 | 0.361   | Valid   |                  |                |          |

Source: Author's own work

In the 2nd test, there is an indicator of accessibility with an r value lower than the r table (0.361), namely X2.1, meaning that the indicator is invalid. While other indicators have a calculated r-value greater than the r table (0.361), it can be concluded that the other indicators are valid.

The Cronbach alpha value obtained is 0.821. Because the value is more than 0.7, it is concluded that the X variable is reliable.

**Table 3.** Results of accessibility validity and reliability test (3<sup>rd</sup> test)

| Indicators | Calculated r | Sig   | r Table | Result | Cronbach's Alpha | Critical value | Result   |
|------------|--------------|-------|---------|--------|------------------|----------------|----------|
| X11.1      | 0.669        | 0.000 | 0.361   | Valid  | 0.825            | 0.7            | Reliable |
| X11.2      | 0.587        | 0.001 | 0.361   | Valid  |                  |                |          |
| X11.3      | <b>0.456</b> | 0.011 | 0.361   | Valid  |                  |                |          |
| X12.2      | 0.637        | 0.000 | 0.361   | Valid  |                  |                |          |
| X12.3      | 0.656        | 0.000 | 0.361   | Valid  |                  |                |          |
| X13.1      | 0.617        | 0.000 | 0.361   | Valid  |                  |                |          |
| X13.2      | 0.482        | 0.007 | 0.361   | Valid  |                  |                |          |
| X14.1      | <b>0.767</b> | 0.000 | 0.361   | Valid  |                  |                |          |
| X14.2      | 0.565        | 0.001 | 0.361   | Valid  |                  |                |          |
| X14.3      | 0.492        | 0.006 | 0.361   | Valid  |                  |                |          |
| X15.1      | 0.543        | 0.002 | 0.361   | Valid  |                  |                |          |
| X15.3      | 0.596        | 0.001 | 0.361   | Valid  |                  |                |          |

Source: Author's own work

After the 3rd test, all indicators of accessibility have a calculated r-value greater than the r table (0.361), then it is concluded that all indicators are valid.

The Cronbach alpha value obtained is 0.825. Because the value is more than 0.7, it is concluded that the X variable is reliable.

**Table 4.** Results of coastal development validity and reliability test

| Indicators | Calculated r | Sig   | r Table | Result  | Cronbach's Alpha | Critical value | Result   |
|------------|--------------|-------|---------|---------|------------------|----------------|----------|
| Y1.1       | 0.731        | 0.000 | 0.361   | Valid   | 0.782            | 0.7            | Reliable |
| Y1.2       | 0.330        | 0.075 | 0.361   | Invalid |                  |                |          |
| Y1.3       | 0.554        | 0.001 | 0.361   | Valid   |                  |                |          |
| Y2.1       | 0.400        | 0.028 | 0.361   | Valid   |                  |                |          |
| Y2.2       | 0.199        | 0.291 | 0.361   | Invalid |                  |                |          |
| Y2.3       | 0.554        | 0.001 | 0.361   | Valid   |                  |                |          |
| Y3.1       | 0.779        | 0.000 | 0.361   | Valid   |                  |                |          |
| Y3.2       | 0.691        | 0.000 | 0.361   | Valid   |                  |                |          |
| Y3.3       | 0.699        | 0.000 | 0.361   | Valid   |                  |                |          |
| Y4.1       | 0.446        | 0.013 | 0.361   | Valid   |                  |                |          |
| Y4.2       | 0.505        | 0.004 | 0.361   | Valid   |                  |                |          |
| Y4.3       | 0.649        | 0.000 | 0.361   | Valid   |                  |                |          |

Source: Author's own work

Based on table 4, there are two indicators of coastal development with a calculated r-value that is lower than the r table (0.361), namely Y1.2 and Y2.2, meaning that both indicators are not valid. While other indicators have a calculated r-value greater than the r table (0.361), it can be concluded that the other indicators are valid.

The Cronbach alpha value obtained is 0.782. Because the value is more than 0.7, it is concluded that the Y variable is reliable.

**Table 5.** Results of coastal development validity and reliability test (2<sup>nd</sup> test)

| Indicators | Calculated r | Sig   | r Table | Result | Cronbach's Alpha | Critical value | Result   |
|------------|--------------|-------|---------|--------|------------------|----------------|----------|
| Y1.1       | 0.788        | 0.000 | 0.361   | Valid  | 0.829            | 0.7            | Reliable |
| Y1.3       | 0.495        | 0.005 | 0.361   | Valid  |                  |                |          |
| Y2.1       | 0.490        | 0.006 | 0.361   | Valid  |                  |                |          |
| Y2.3       | 0.573        | 0.001 | 0.361   | Valid  |                  |                |          |
| Y3.1       | 0.829        | 0.000 | 0.361   | Valid  |                  |                |          |
| Y3.2       | 0.721        | 0.000 | 0.361   | Valid  |                  |                |          |
| Y3.3       | 0.773        | 0.000 | 0.361   | Valid  |                  |                |          |
| Y4.1       | 0.493        | 0.006 | 0.361   | Valid  |                  |                |          |
| Y4.2       | 0.479        | 0.007 | 0.361   | Valid  |                  |                |          |
| Y4.3       | 0.621        | 0.000 | 0.361   | Valid  |                  |                |          |

Source: Author's own work

After the 2nd test, all indicators of coastal development have a calculated r-value greater than the r table (0.361), then it is concluded all indicators are valid.

The Cronbach alpha value obtained is 0.829. Because the value is more than 0.7, it is concluded that the Y variable is reliable.

### **Descriptive Analysis**

Descriptive analysis was conducted to find out the description of the characteristics and answers of research respondents regarding accessibility and coastal development. The following standards measured respondents' answers to all variables.

**Table 6.** Average respondents' responses criteria

| Value     | Criteria  |
|-----------|-----------|
| 1.00-1.79 | Bad       |
| 1.80-2.59 | Poor      |
| 2.60-3.39 | Fair      |
| 3.40-4.19 | Good      |
| 4.20-5.00 | Very Good |

Source: Author's own work

Based on the descriptive analysis, the data can be presented as follows.

**Table 7.** Number and percentage of respondents' responses on accessibility

| Indicator<br>s            | Respondents' answers (%) |      |      |      |      | F   | Mean<br>Value | Criteria    |
|---------------------------|--------------------------|------|------|------|------|-----|---------------|-------------|
|                           | 1                        | 2    | 3    | 4    | 5    |     |               |             |
| X11.1                     | 6.6                      | 37.0 | 35.7 | 14.5 | 6.1  | 392 | 2.77          | Fair        |
| X11.2                     | 4.1                      | 53.3 | 26.5 | 15.3 | 0.8  | 392 | 2.55          | Poor        |
| X11.3                     | 4.3                      | 25.3 | 35.7 | 33.9 | 0.8  | 392 | 3.02          | Fair        |
| X12.1                     | 3.8                      | 24.7 | 39.0 | 30.4 | 2.0  | 392 | 3.02          | Fair        |
| X12.2                     | 3.3                      | 11.5 | 43.4 | 37.2 | 4.6  | 392 | 3.28          | Fair        |
| X13.1                     | 1.3                      | 18.9 | 43.1 | 32.4 | 4.3  | 392 | 3.20          | Fair        |
| X13.2                     | 9.4                      | 29.1 | 30.6 | 27.3 | 3.6  | 392 | 2.86          | Fair        |
| X14.1                     | 5.6                      | 24.5 | 53.6 | 13.8 | 2.6  | 392 | 2.83          | Fair        |
| X14.2                     | 5.4                      | 34.9 | 45.7 | 11.5 | 2.6  | 392 | 2.71          | Fair        |
| X14.3                     | 22.4                     | 28.8 | 31.4 | 15.1 | 2.3  | 392 | 2.46          | Poor        |
| X15.1                     | 3.3                      | 13.8 | 42.3 | 37.8 | 2.8  | 392 | 3.23          | Fair        |
| X15.2                     | 6.1                      | 10.2 | 38.5 | 32.9 | 12.2 | 392 | 3.35          | Fair        |
| <b>Overall mean value</b> |                          |      |      |      |      |     | <b>2.94</b>   | <b>Fair</b> |

Source: Author's own work

Based on table 2, it can be seen that the lowest mean value of accessibility is 1.91, namely X2.2, which is included in the poor criteria, while the highest mean value is 3.69, namely X3.1 and X3.2, which are included in the good criteria. Overall, the mean value of respondents' responses to variable X is 3.00, included in the fair criteria.

**Table 8.** Number and percentage of respondents' responses on coastal development

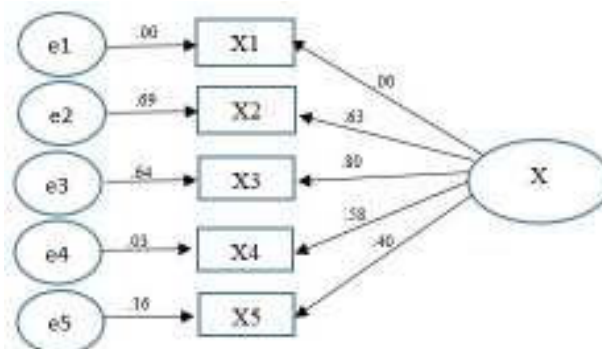
| Indicator <sup>s</sup>    | Respondents' responses (%) |      |      |      |      | F   | Mean Value  | Criteria    |
|---------------------------|----------------------------|------|------|------|------|-----|-------------|-------------|
|                           | 1                          | 2    | 3    | 4    | 5    |     |             |             |
| Y1.1                      | 7.9                        | 21.7 | 63.3 | 5.4  | 1.8  | 392 | 2.71        | Fair        |
| Y1.2                      | 17.6                       | 37.8 | 33.2 | 9.4  | 2.0  | 392 | 2.41        | Poor        |
| Y2.1                      | 3.3                        | 8.9  | 12.2 | 38.8 | 36.7 | 392 | 3.97        | Good        |
| Y2.3                      | 3.6                        | 10.5 | 34.9 | 43.1 | 7.9  | 392 | 3.41        | Good        |
| Y3.1                      | 2.8                        | 23.0 | 42.9 | 30.4 | 1.0  | 392 | 3.04        | Fair        |
| Y3.2                      | 1.5                        | 29.1 | 47.7 | 20.4 | 1.3  | 392 | 2.91        | Fair        |
| Y3.3                      | 3.1                        | 18.4 | 43.1 | 33.4 | 2.0  | 392 | 3.13        | Fair        |
| Y4.1                      | 6.4                        | 34.7 | 34.9 | 23.0 | 1.0  | 392 | 2.78        | Fair        |
| Y4.2                      | 6.6                        | 12.2 | 49.0 | 30.6 | 1.5  | 392 | 3.08        | Fair        |
| Y4.3                      | 8.4                        | 15.3 | 39.3 | 35.5 | 1.5  | 392 | 3.06        | Fair        |
| <b>Overall mean value</b> |                            |      |      |      |      |     | <b>3.05</b> | <b>Fair</b> |

Source: Author's own work

Based on table 8, the lowest mean value of coastal development is 2.41, namely Y1.2, which is included in the poor criteria. In contrast, the highest mean value is 3.97, namely Y2.1, which is included in the good criteria. Overall, the mean value of respondents' responses to variable Y is 3.05, included in the fair criteria.

### **Confirmatory Factor Analysis**

Confirmatory Factor Analysis was used to assess the instrument's validity and reliability and whether a variable is a good indicator (valid and reliable) or not. The following are the results of the confirmatory analysis test for each variable.



**Figure 2.** Confirmatory Factor Analysis model on accessibility

Source: Author's own work

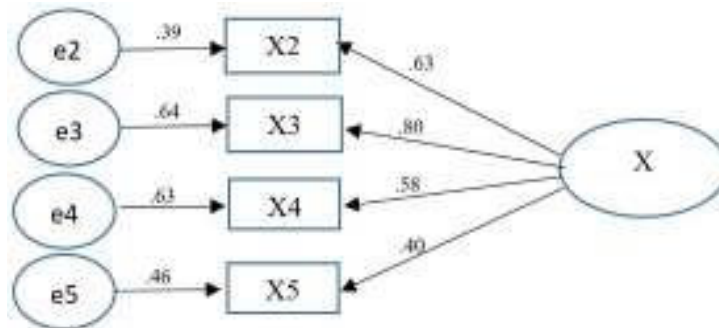
Based on the model in Figure 2, the confirmatory factor analysis results for accessibility (X) are presented in Table 9.

**Table 9.** Confirmatory Factor Analysis result on accessibility

|    |      |   | Estimate | S.E. | C.R.  | P    |
|----|------|---|----------|------|-------|------|
| X1 | <--- | X | -.002    | .133 | -.031 | .975 |
| X2 | <--- | X | .627     | .232 | 6.546 | ***  |
| X3 | <--- | X | .800     | .362 | 5.797 | ***  |
| X4 | <--- | X | .578     | .213 | 5.994 | ***  |
| X5 | <--- | X | .400     |      |       |      |

Source: Author's own work

Based on table 9, there is an invalid indicator because it has a loading factor value lower than 0.3, namely the X1 indicator. Because it is invalid, the X1 indicator is dropped and then be retested.



**Figure 3.** Confirmatory Factor Analysis model on accessibility (2<sup>nd</sup> test)

Source: Author's own work

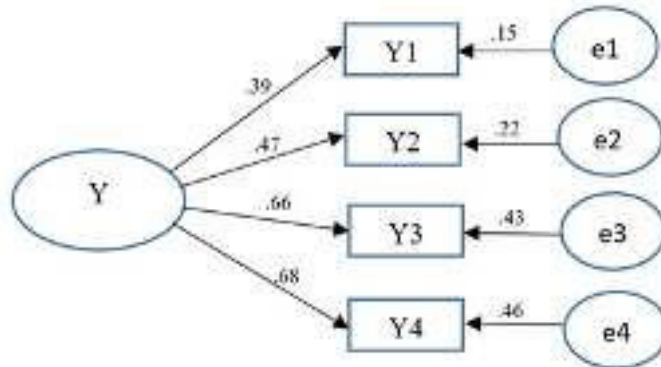
Based on the model in Figure 3, the confirmatory factor analysis results for accessibility (X) are presented in Table 10.

**Table 10.** Confirmatory Factor Analysis result on accessibility after dropping X1

|    |      |   | Estimate | S.E. | C.R.  | P   |
|----|------|---|----------|------|-------|-----|
| X2 | <--- | X | .627     | .231 | 6.562 | *** |
| X3 | <--- | X | .799     | .358 | 5.864 | *** |
| X4 | <--- | X | .578     | .213 | 5.996 | *** |
| X5 | <--- | X | .400     |      |       |     |

Source: Author's own work

After the second test, all indicators of accessibility have a loading factor value greater than 0.3, so it can be concluded that all indicators of accessibility are valid. Thus, all indicators are accepted and declared capable of measuring variables and included in the full model test.



**Figure 4.** Confirmatory Factor Analysis model on coastal development  
 Source: Author's own work

Based on the model in Figure 4, the confirmatory factor analysis results for coastal development (Y) are presented in Table 11.

**Table 11.** Confirmatory Factor Analysis result on coastal development

|    |      |   | <b>Estimate</b> | <b>S.E.</b> | <b>C.R.</b> | <b>P</b> |
|----|------|---|-----------------|-------------|-------------|----------|
| Y1 | <--- | Y | .392            |             |             |          |
| Y2 | <--- | Y | .468            | .368        | 3.897       | ***      |
| Y3 | <--- | Y | .657            | .253        | 6.129       | ***      |
| Y4 | <--- | Y | .676            | .451        | 4.125       | ***      |

Source: Author's own work

Based on table 11, all indicators of coastal development have a loading factor value greater than 0.3, so it can be concluded that all indicators in coastal development are valid. Thus, all indicators are accepted and declared capable of measuring variables and included in the full model test.

According to the result of previous analysis, it can be known that all variables and models are fit. It means that research can be proceeded to regression weight analysis to examine the hypothesis. The result of regression analysis can be seen in Table 12.

**Table 12.** Complete model regression analysis result

| <b>Relationship among variables</b> |      |   | <b>Estimate</b> | <b>S.E.</b> | <b>P</b> | <b>Result</b> |
|-------------------------------------|------|---|-----------------|-------------|----------|---------------|
| Y                                   | <--- | X | .495            | .287        | 084      | Insignificant |

The results of the analysis showed that accessibility had a positive and insignificant effect on Y. The significance value (P) indicated that the P-value > 0.05, namely P 0.084. The positive direction indicates a unidirectional relationship between X1 and Y, meaning that if X1 increases, Y increases. Then the hypothesis is rejected.

This insignificant support is indicated because there are pretty balanced answers or responses from respondents related to the questionnaire submitted about the road network, availability of transportation facilities, travel time, and convenience.

According to [5], to increase accessibility and encourage regional development, each region or country requires a quality and efficient transportation infrastructure network that serves mobility within the region and between regions and enables reduced transportation costs, increased business productivity, and regional economic development. Increasing accessibility from and to the coastal areas of Asahan Regency and requiring an increase in road infrastructure also requires the application of regulations and changes in community behavior to increase comfort for road users to and from the coastal areas of Asahan Regency.

#### **4. Conclusions**

In conclusion, it is proven that accessibility has not significantly influenced the development of the coastal area of Asahan Regency. This result implies that the accessibility of the Asahan coastal area has to be improved. Coordination amongst government levels is needed since the road networks are under various authorities of government levels.

#### **Acknowledgement**

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# Agroforestry Model at FMU Gedong Wani: Agroforestry Financial Analysis to Support the Post-Covid19 National Economic Recovery

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## Abstract

The Covid-19 pandemic has caused the global economy to decline. In the second quarter of 2020 Indonesia experienced a contraction of around 3%. Agroforestry farming system is a land management technique that utilizes land optimally by paying attention to environmental sustainability. This research was conducted at KPH Gedong Wani in March 2021. Data was collected using a purposive sampling method by interviewing forest farmers with Argo Sumber Rejeki. In addition, secondary data from the Sumber Rejeki Agro Forest Farmers Group (KTH). The results of the Gmelina and Amorphophallus muelleri BI (porang) agroforestry model research at FMU Gedong Wani are as follows, The results of the financial analysis of Gmelina is an NPV of Rp. 81.448.441, BCR of 2, IRR of 37%, and annual income of IDR. 7.454.957, (2) The results of the financial analysis of Amorphophallus muelleri BI (porang) is an NPV of IDR. 724.996.300, BCR of 9, IRR of 197%, and annual income IDR. 78.649.944. The percentage of income between Gmelina arborea Roxb and Amorphophallus muelleri BI (porang) in both trees is, presumably because porang produces every year, while the results of Gmelina are only enjoyed after harvesting.

**Keywords:** Agroforestry, Covid-19, Sustainability

## 1. Introduction

Agroforestry is a land management system that implements ecological and economic values intending to preserve biodiversity and agricultural production to meet the needs of people's lives. . Agroforestry cropping patterns are land-use techniques that combine forestry plants types with agriculture or animal husbandry [10]. The application of agroforestry plant composition aims to maintain the ecological function of the forest and increase farmers' income. The agroforestry pattern not only provides economic benefits for the community but also provides benefits from an ecological perspective while maintaining environmental conditions such as providing water sources, preventing erosion and landslides from trees on managed land [1], [6]. Agroforestry cropping patterns are land use techniques that combine woody species with food, medicinal, fruit, and plantation crops [7].

Agroforestry is mostly done by farmers in Indonesia because it is a land-use technique that is very suitable to be carried out on narrow and dry land (dry land). In addition to its continuous production of non-timber products (plantation/agriculture) as monthly/weekly products and wood products as annual products, it is also very good for environmental

sustainability [2]. Therefore, agroforestry cropping patterns are related to community food security and family income levels, especially people living in small islands [8], [9].

The potential of production forests that allow communities to legally and maximally utilize forest products through social forestry schemes can encourage people to improve their economic level in this era of the COVID-19 pandemic. The agroforestry scheme of gmelina and porang white teak is seen from the market potential and interest of farmers.

## 2. Methods

This research was conducted at KPH Gedong Wani in March 2021. Data collection was carried out by interviewing forest farmers of Argo Sumber Rejeki using purposive sampling method. In addition, data was also taken based on secondary data from the Agro Sumber Rejeki Forest Farmers Group (KTH).

Data analysis carried out is descriptive qualitative and quantitative. Economic analysis is carried out using financial analysis to determine NPV, IRR, and BCR. The financial analysis is to determine the feasibility of the community forest farming system operated by farmers. The formula used to calculate NPV (Net Present Value), IRR (Internal Rate of Return), and BCR (Benefit Cost Ratio) [3] is as follows:

$$a. NPV = \sum_{t=1}^n \frac{Bt - Ct}{(1+i)^t}$$

Notes:

Bt = Gross revenue in year t

Ct = Gross cost of farming in year t

n = Economic age

i = Discount rate

$$b. IRR = \frac{i' NPV'(i'' - i')}{NPV' - NPV''}$$

Notes:

i' = First trial value for discount rate

i'' = Second trial value for discount rate

NPV' = First trial value for NPV

NPV'' = Second trial value for NPV

$$c. BCR = \frac{(PV)B}{(PV)C}$$

Notes:

(PV) B = Present Value Benefit (present value of income)

(PV) C = Present Value Cost

## 3. Results and Discussion

The Gedong Wani UPTD KPHP area is located in 4 (four) Production Forest Area Registers (KHP), namely KHP Way Ketibung I Reg. 5; KHP Way Ketibung II Reg. 35; KHP Way Kibang Reg. 37 and KHP Gedong Wani Reg. 40. This area is included in the

Priority Watershed (DAS), namely the Way Sekampung Watershed which includes the Ketibung Sub-watershed, Kandis Sub-watershed, and Sekampung Hilir Sub-watershed. Administratively, the Gedong Wani UPTD KPHP area is located in 2 (two) areas, namely, South Lampung Regency and East Lampung Regency which consists of 11 Districts and 39 Villages, while geographically coordinates are located at 105° 17' 40" - 105° 32' 35 " East Longitude and 05° 10' 00" - 05° 32' 30" South Latitude.

Financial analysis was conducted to determine the feasibility of Gmelina and Porang agroforestry at KTH Agro Sumber Rejeki. Financing details are shown in Table 1.

**Table 1.** Agroforestry business costs

| Description                | IDR.       |
|----------------------------|------------|
| <b>1. Investment</b>       |            |
| a. gmelina seeds           | 625        |
| b. Porang seeds            | 242.600    |
| <b>2. Equipment</b>        | 1.650.000  |
| <b>3. Operational Cost</b> |            |
| <b>Labor Wages</b>         |            |
| a. Processing              | 4.124.200  |
| b. Planting                | 4.124.200  |
| c. Plant maintenance       | 4.124.200  |
| d. Fertilization           | 4.124.200  |
| e. Harvest                 | 1.213.000  |
| <b>Fertilizer</b>          | 13.100.400 |

The determination of the Gedong Wani KPHP area is based on the Decree of the Minister of Forestry Number SK. 427/Menhut-II/2011 dated 20 July 2011 concerning the determination of the Gedong Wani Model Production Area Management Unit (KPHP) (Unit XVI) which is located in South Lampung Regency and East Lampung Regency covering an area of ± 30,243 Ha, of which all are production forests. [2]

The total cost of managing gmelina is IDR. 33,927,129.2 and porang is IDR. 103,433,474.9 with a management cycle of 10 years [4]. These costs include land preparation, planting, maintenance, fertilization, and harvesting.

The results of the financial analysis can be said to be both feasible. In Gmelina's business, NPV is 81,448,441, BCR is 2, IRR is 37% with annual income of IDR. 7,454,957. In Porang business, NPV is IDR. 724,996,300, BCR is 9, IRR is 197% with annual income of IDR. 78,649,944. Financial analysis on cardamom and sengon stands is said to be feasible to obtain an NPV of IDR. 112,039,098.00, BCR of 2.32, IRR of 35%,. and annual income IDR. 18,916,524.00 [11].

**Table 2.** Financial analysis results

|         | Area (ha) | Net Operating Cost (IDR) | Net Profit (IDR) | Net Revenue (IDR) | IRR (%) | NPV (IDR)   | B/C | Annual Profit (IDR) |
|---------|-----------|--------------------------|------------------|-------------------|---------|-------------|-----|---------------------|
| Gmelina | 24,26     | 33.927.129               | 67.094.617       | 81.448.441        | 37%     | 82.508.379  | 2   | 7.454.957           |
| Porang  | 24,26     | 103.433.475              | 707.849.500      | 893.190.025       | 197%    | 724.996.300 | 9   | 78.649.944          |

Based on the results of the calculation, the NPV value of porang is IDR. 724,996,300, - indicating that it is greater than that of Gmelina of IDR. 82,508,379, -. The NPV value shows the economic benefits received. The IRR value is 37%, which means that for every rupiah invested during the life of the plant, it will provide a return of 37%, so it is financially feasible (profitable). This is supported by the results of research by [5] regarding the financial analysis of agroforestry cropping patterns with an NPV value of IDR. 35,851,937.83, - and an IRR of 47%.

#### 4. Conclusions

The results of the financial analysis of Gmelina is an NPV of IDR. 81.448.441, BCR of 2, IRR of 37%, and annual income of IDR. 7.454.957, (2) The results of the financial analysis of porang is an NPV of IDR. 724.996.300, BCR of 9, IRR of 197%, and annual income IDR. 78.649.944. The percentage of income between gmelina and porang in both tress is, presumably because porang produces every year, while the results of Gmelina are only enjoyed after harvesting.

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# **Sociodemographic Factors, Physical Area Characteristics and Health Service Associated Interventions with Malaria Cases in Pesawaran District, Lampung Province**

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## **Abstract**

Malaria is one of the infectious diseases that is still a health problem. The World Malaria Report 2021 states that globally, there are an estimated 241 million cases of malaria in the world throughout 2020. Malaria disease in 2020 in Indonesia was 241,181 cases, with 424 cases in Lampung Province and 301 cases in Pesawaran Regency. The occurrence of malaria cases is influenced by many factors, including sociodemography, physical area characteristics, and health service associated interventions. This study aims to determine the influence of sociodemographic, physical area characteristics, and health service associated interventions and to formulate recommendations for malaria control efforts based on prediction models in Pesawaran Regency. This study is an observational study with a cross-sectional design. A sample of 436 people with data collection techniques using secondary data sourced from e-sismal and Health Centers laboratory registers while primary data collection with a questionnaire guide to measure research variables. This study uses a causal relationship approach between variables (Y) and variables (X). The model chosen was a logistic regression with the response variable using a binary scale, namely malaria versus no malaria. Optimization of model parameters using statistical software. The results showed that the variables that had a significant positive effect on the incidence of malaria were the behavior stay outside at night, the distance of the vector breeding place 0-1,000 meters from the residence, the type of vector breeding place in the form of a lagoon, while the variables that had a significant negative effect were the use of mosquito repellent, the use of Long Lasting Insecticidal Nets (LLINs), Indoor Residual Spraying (IRS) and Mass Blood Surveys (MBS). Variables that have no significant effect on the incidence of malaria include age, sex, occupation, education, altitude, larviciding and removal of mosses.

**Keywords:** malaria, sociodemography, physical area characteristics, health service associated interventions.

## **1. Introduction**

Malaria is still a health problem that is the focus of activities for control. In terms of annual parasite incidence (API) of malaria in Lampung Province in the last 3 years, in 2018, it was 0.66 per 1,000 population, in 2019 it was 0.32 per 1,000 population, and in 2020 it was 0.04 per 1,000 population. Lampung Province malaria cases during that period

experienced a declining trend but were still often accompanied by some outbreak, endemic malaria in several districts in Lampung Province, such as South Lampung, Pesawaran, and West Coast Districts [1]. Pesawaran Regency is a malaria endemic area with an annual parasite incidence (API) in 2018 of 4.64 per 1,000 population, 2019 of 2.00 per 1,000 population, and 2020 of 0.67 per 1,000 population, classified as an area with moderate malaria transmission rates or medium case incidence (MCI).

Sociodemographic factors that are closely related to the incidence of malaria are age, gender, education, occupation, a habit of stay outside at night, and use of mosquito repellent [2]. The physical area characteristics that affect malaria cases in a place are very diverse. The malaria vector of the *Anopheles sundaicus* mosquito, for example, lives and breeds in coastal and coastal areas. In the lowlands, one of the malaria vector mosquitoes is *Anopheles aconitus*. The main breeding places are terraced rice fields and irrigation canals, rivers with slow water flow, or ponds that are slightly alkaline. The vector of the malaria mosquito, *Anopheles maculatus*, breeds in mountains or in small rivers, clear water, and springs that are directly exposed to sunlight [3]. The factor of health service associated interventions for malaria control programs in Indonesia is to carry out *plasmodium* discovery activities as early as possible with the Mass Blood Survey (MBS) through laboratory examination and perform malaria treatment according to standards. Another health service associated interventions is to control malaria vectors by removing mosses and larvaciding at vector breeding places so that *Anopheles* mosquito larvae cannot develop into adult mosquitoes [2].

Based on the description above, it is necessary to conduct a study to determine a predictive model for the incidence of malaria through research with variables related to sociodemography: age, gender, occupation, education, stay out site at night and using mosquito repellent with malaria, physical characteristics of the area: altitude (hypometry), distance of vector breeding sites and types of vector breeding sites with malaria, and health service associated interventions: larvaciding, moss removal, use of Long-Lasting Insecticide Nets (LLINS), Indoor Recidual Spray (IRS), and Mass Blood Survey (MBS) with malaria in Pesawaran Regency, Lampung Province.

## 2. Methods

This type of research is observational with a cross-sectional research design. This study uses a causal relationship approach between the dichotomous or binary response variable (Y) and the independent variable (X) in the form of interval or categorical data. The postulate of the model chosen is binary logistic regression with the response variable using a binary scale in the form of malaria versus not malaria. A score of 1 is given if a sample has malaria and if not, a score of zero is given. The two possible occurrences (1 versus 0) are theorized as a result of each independent variable which includes sociodemographic variables, physical area characteristics, and health service associated intervension variables. The predictor variables, symbols, units, and ways of scoring into the model are presented in Table 1 below:

**Table 1.** Predictor variables, symbols, units, and ways of scoring into the model

| No  | Malaria Incidence Predictor Variables  | Symbol in Model | Unit  | Data Scale | How to Score into the Model  |
|-----|--|-----------------|-------|------------|--|
| 1.  | Respondent's age   | [UMR]           | Years | Ratio      | =original data value   |
| 2.  | Respondent's gender  | [JKEL]          | -     | Binary     | =1 if male; 0=if female  |
| 3.  | Dummy_ respondent's occupation as fisherman/farmer                                     | [D1_NLYN/PTMB]  | -     | Category   | =If you're a fisherman or a farmer, you'll get a 1; otherwise, you'll get a 0.       |
| 4.  | Dummy_ the respondent's occupation was as a farmer, gardener, or miner.                | [D1_PTNI/BKBN]  | -     | Category   | =1 if farmer/gardener; 0=otherwise   |
| 5.  | Dummy_ the respondent's occupation as a trader/entrepreneur                            | [D1_PDGG/WRST]  | -     | Category   | =1 if trader/entrepreneur; =0 otherwise  |
| 6.  | Dummy_ respondent's occupation as military/police/government employes/employee/student | [D1_TPAKP]      | -     | Category   | =1 if military/police/government employes/employee/student; =0 otherwise             |
| 7.  | Dummy_ respondents graduated from junior high school                                   | [D2_SMP]        | -     | Category   | =1 Junior high school; =0 otherwise  |
| 8.  | Dummy_ respondents graduated from senior high school                                   | [D2_SMA]        | -     | Category   | =1 Senior high school; =0 otherwise  |
| 9.  | Dummy_ respondents passed college  | [D2_PT]         | -     | Category   | =1 college; =0 otherwise   |
| 10. | Stay outside at the night  | [KRMH]          | -     | Binary     | =1 if you are stay outside at the night; =0 if you're not stay outside at the night; |
| 11. | Use of mosquito repellent  | [MOAN]          | -     | Binary     | =1 if using mosquito repellent; =0 if not using mosquito repellent                   |
| 12. | Land elevation (hypometry)   | [KTD]           | Mdpl  | Ratio      | =original data value   |
| 13. | Dummy_ breeding places distance 0 to 1000 meters                                       | [D3_JTPV5]      | -     | Category   | =1 if within 1-1000 meters there is breeding places; 0 if others                     |
| 14. | Dummy_ breeding places distance 1001 to 2000 meters                                    | [D3_JTPV10]     | -     | Category   | =1 if within 1001-2000 meters there is breeding places; 0 if others                  |
| 15. | Dummy_ breeding places distance 2001 to 3000 meters                                    | [D3_JTPV20]     | -     | Category   | =1 if within 2001-3000 meters there is breeding Places; 0 if others                  |
| 16. | Dummy_ lagoon types  | [D4_LGN]        | -     | Category   | =1 if lagoon; =0 if others   |
| 17. | Dummy_ swamp types   | [D4_RWA]        | -     | Category   | =1 if swamp; =0 if others  |
| 18. | Dummy_ abandoned pond types  | [D4_TMBT]       | -     | Category   | =1 if abandoned pond; =0 if others   |
| 19. | Dummy_ rice field types  | [D4_SBTR]       | -     | Category   | =1 If the rice fields are terraced, =0; otherwise                                    |
| 20. | Dummy_ irrigation canal types  | [D4_SLIG]       | -     | Category   | =1 if irrigation canals; otherwise, =0   |
| 21. | Dummy_ type of pond/dig  | [D4_KLGL]       | -     | Category   | =1 if the pond/dig; =0 otherwise   |
| 22. | Dummy_larvaciding  | [D5_LVCD]       | -     | Category   | =1 If larvaciding is done, =0 if any other   |
| 23. | Dummy_ moss removal  | [D5_PLMT]       | -     | Category   | =1 if moss removal is done; Otherwise, =0  |
| 24. | Dummy_ use of long lasting insecticide nets/LLINs                                      | [D6_LLINs]      | -     | :Category  | =1 if using long lasting insecticide nets /LLINs=0 otherwise                         |
| 25. | Dummy_ indoor recidual spraying/IRS  | [D6_IRS]        | -     | Category   | =1 If you indoor recidual spraying/IRS; =0 Otherwise,                                |
| 26. | Mass blood survey/MBS  | [MBS]           | -     | Category   | =1 if you take mass blood survey /MBS; = 0 otherwise                                 |

### 3. Results and Discussion

#### Univariate Analysis Results

From the univariate analysis, data on the distribution of respondents was obtained based on 12 characteristics, namely: age group, gender, occupation, education, behavior stay outside at night, use of anti-mosquito drugs, elevation of the plains, distance from home to vector breeding places, types of vector breeding places within 0-3000 meters, intervention for vector breeding places, interventions for malaria vectors, and intervention for *plasmodium*.

**Table 2.** Distribution of research respondents based on characteristics

| No                     | Characteristics of Respondents      | N   | %      |
|------------------------|-------------------------------------|-----|--------|
| <b>Sociodemography</b> |                                     |     |        |
| 1.                     | Age group                           |     |        |
|                        | a. 1-15 years old                   | 3   | 0,69%  |
|                        | b. 16 – 65 years old                | 425 | 97,48% |
|                        | c. > 65 years old                   | 8   | 1,83%  |
| 2.                     | Gender                              |     |        |
|                        | a. Female                           | 296 | 67,89% |
|                        | b. Male                             | 140 | 32,11% |
| 3.                     | Profession                          |     |        |
|                        | a. housewife/not working            | 132 | 30,28% |
|                        | b. Fisherman/Farmers                | 119 | 27,30% |
|                        | c. Farmer/gardener/miner            | 79  | 18,11% |
|                        | d. Trader/entrepreneur              | 25  | 5,73%  |
|                        | e. TNI/POLRI/ASN/Employees/Students | 81  | 18,58% |



|     |   |  |     |  |  |  |        |  |
|-----|---|--|-----|--|--|--|--------|--|
| 4.  | Education   |  |     |  |  |  |        |  |
|     | a. SD   |  | 64  |  |  |  | 14,68% |  |
|     | b. junior high school                                   |  | 162 |  |  |  | 37,16% |  |
|     | c. senior High School                                   |  | 198 |  |  |  | 45,41% |  |
|     | d. College  |  | 12  |  |  |  | 2,75%  |  |
| 5.  | Behavior outside the house at night                     |  |     |  |  |  |        |  |
|     | a. Get out of the house at night                        |  | 220 |  |  |  | 50,46% |  |
|     | b. Don't leave the house at night                       |  | 216 |  |  |  | 49,54% |  |
| 6.  | Use of mosquito repellent                               |  |     |  |  |  |        |  |
|     | a. Do not use mosquito repellent                        |  | 227 |  |  |  | 52,06% |  |
|     | b. Using mosquito repellent                             |  | 209 |  |  |  | 47,94% |  |
|     | <b>Physical Area Characteristics</b>                    |  |     |  |  |  |        |  |
| 7.  | Land elevation (Hypometry)                              |  |     |  |  |  |        |  |
|     | a. 0,00 – 25,00 masl                                    |  | 403 |  |  |  | 92,43% |  |
|     | b. 25,01 – 50,00 masl                                   |  | 23  |  |  |  | 6,19%  |  |
|     | c. 50,01 – 100,00 masl                                  |  | 10  |  |  |  | 1,38%  |  |
| 8.  | Distance from house to breeding place vector            |  |     |  |  |  |        |  |
|     | a. 0 – 1.000 meter                                      |  | 155 |  |  |  | 35,55% |  |
|     | b. 1.001 – 2.000 meter                                  |  | 56  |  |  |  | 12,84% |  |
|     | c. 2.001 – 3.000 meter                                  |  | 22  |  |  |  | 5,05%  |  |
|     | d. > 3.000 meter  |  | 203 |  |  |  | 46,56% |  |
| 9.  | Types of vector breeding places within 0 – 3,000 meters |  |     |  |  |  |        |  |
|     | a. Lagoon   |  | 104 |  |  |  | 23,85% |  |
|     | b. Swamp  |  | 76  |  |  |  | 17,43% |  |
|     | c. Abandoned pond                                       |  | 54  |  |  |  | 12,39% |  |
|     | d. Rice terraces  |  | 10  |  |  |  | 2,29%  |  |
|     | e. Irrigation canal                                     |  | 2   |  |  |  | 0,46%  |  |
|     | f. Excavation pool                                      |  | 9   |  |  |  | 2,06%  |  |
|     | g. No vector breeding grounds                           |  | 181 |  |  |  | 41,51% |  |
|     | <b>Health Service Associated Interventions</b>          |  |     |  |  |  |        |  |
| 10. | Vector breeding place intervention                      |  |     |  |  |  |        |  |
|     | a. No intervention                                      |  | 298 |  |  |  | 68,34% |  |
|     | b. Larvaciding  |  | 76  |  |  |  | 17,43% |  |
|     | c. Moss Lift  |  | 62  |  |  |  | 14,23% |  |
| 11. | Malaria vector intervention                             |  |     |  |  |  |        |  |
|     | a. No intervention                                      |  | 232 |  |  |  | 53,21% |  |
|     | b. Long Lasting Insecticidal Nets (LLINs)               |  | 156 |  |  |  | 35,78% |  |
|     | c. Indoor Residual Spraying (IRS)                       |  | 48  |  |  |  | 11,01% |  |
| 12. | <i>Plasmodium</i> Intervention                          |  |     |  |  |  |        |  |
|     | a. No intervention                                      |  | 185 |  |  |  | 42,43% |  |
|     | b. Mass Blood Survey (MBS)                              |  | 251 |  |  |  | 57,57% |  |

### Analysis Results Binary Logistic Regression

**Table 3.** Results of optimization of research on the influence of sociodemography, physical characteristics of the area and health service associated interventions on malaria

| Predictor  | Simbol          | Coef.         | SE Coef   | Z     | P     | Odds Ratio | 95% Lower | CI Upper  |
|--|-----------------|---------------|-----------|-------|-------|------------|-----------|-----------|
| Constant   |                 | 114.306       | 192.032   | 0.60  | 0.552 |            |           |           |
| <b>Sociodemography</b>                                 |                 |               |           |       |       |            |           |           |
| Age (years)  | [UMR]           | α1 -0.0202340 | 0.0307743 | -0.66 | 0.511 | 0.98       | 0.92      | 1.04      |
| Gender (0=Female)                                      | [JKEL]          | α2 1.27568    | 0.978329  | 1.30  | 0.192 | 3.58       | 0.53      | 24.37     |
| Workplace (0=IRT/Not Working)                          |                 |               |           |       |       |            |           |           |
| Fishermen/Farmers                                      | [D1_NLYN/PTMB]  | α3 -0.527641  | 1.09366   | -0.48 | 0.629 | 0.59       | 0.07      | 5.03      |
| Farmer/Gardening/Labor/Mining                          | [D1_PTNI/BRKBN] | α4 -0.563427  | 1.20772   | -0.47 | 0.641 | 0.57       | 0.05      | 6.07      |
| Trader/Entrepreneur                                    | [D1_PDGG/WRST]  | α5 -0.788517  | 1.34504   | -0.59 | 0.558 | 0.45       | 0.03      | 6.35      |
| Military/Police/Government Employees/Employees/Student | [D1_TPAKP]      | α6 -1.14061   | 0.989117  | -1.15 | 0.249 | 0.32       | 0.05      | 2.22      |
| <b>Education</b>                                       |                 |               |           |       |       |            |           |           |
| Junior High School                                     | [D2_SMP]        | α7 0.627210   | 1.10794   | 0.57  | 0.571 | 1.87       | 0.21      | 16.42     |
| Senior High School                                     | [D2_SMA]        | α8 1.61759    | 1.19726   | 1.35  | 0.177 | 5.04       | 0.48      | 52.68     |
| College  | [D2_PT]         | α9 2.46045    | 195.779   | 1.26  | 0.209 | 11.71      | 0.25      | 543.29    |
| Stay Outside at Night (0=No)                           | [KRMH]          | α10 4.25364   | 0.901948  | 4.72  | 0.000 | 70.36      | 12.01     | 412.16    |
| Using Mosquito Repellent (0=No)                        | [MOAN]          | α11 -4.97580  | 107.085   | -4.65 | 0.000 | 0.01       | 0.00      | 0.06      |
| <b>Physical Area Characteristics</b>                   |                 |               |           |       |       |            |           |           |
| Plain Altitude (masl)                                  | [KTD]           | α12 0.0260722 | 0.0408866 | 0.64  | 0.524 | 1.03       | 0.95      | 1.11      |
| Breeding place distance (0=> 3.000 m)                  |                 |               |           |       |       |            |           |           |
| 0 – 1.000 m  | [D3_JTV5]       | α13 4.57420   | 135.840   | 3.37  | 0.001 | 96.95      | 6.77      | 1389.37   |
| 1.001 – 2.000 m  | [D3_JTV10]      | α14 0.883319  | 134.654   | 0.66  | 0.512 | 2.42       | 0.17      | 33.87     |
| 2.001 – 3.000 m  | [D3_JTV10]      | α15 2.11497   | 223.562   | 0.95  | 0.344 | 8.29       | 0.10      | 662.96    |
| Type of breeding places (0=no breeding places)         |                 |               |           |       |       |            |           |           |
| Lagoon   | [D4_LGN]        | α16 2.87183   | 1.44024   | 1.99  | 0.046 | 17.67      | 1.05      | 297.27    |
| swamp  | [D4_RWA]        | α17 -2.09404  | 1.31722   | -1.59 | 0.112 | 0.12       | 0.01      | 1.63      |
| Abandoned Pond   | [D4_TMBT]       | α18 -0.154395 | 116.592   | 0.13  | 0.895 | 1.17       | 0.12      | 11.47     |
| Rice Terraces  | [D4_SBTR]       | α19 -1.11470  | 235.406   | -0.47 | 0.636 | 0.33       | 0.00      | 33.09     |
| Irrigation canal                                       | [D4_SLIG]       | α20 3.06017   | 362.022   | 0.85  | 0.398 | 21.33      | 0.02      | 253736.88 |
| Digging Pool   | [D4_KLGL]       | α21 -1.28773  | 351.707   | -0.37 | 0.714 | 0.28       | 0.00      | 271.94    |

|   |            |     |          |          |       |       |      |      |      |
|---|------------|-----|----------|----------|-------|-------|------|------|------|
| Health service interventions                |            |     |          |          |       |       |      |      |      |
| Breeding places intervention (0=None)       |            |     |          |          |       |       |      |      |      |
| Larvaciding                                 | [D5_LVCD]  | α22 | -1.83076 | 120.223  | -1.52 | 0.128 | 0.16 | 0.02 | 1.69 |
| Moss removal                                | [D5_PLMT]  | α23 | -2.12563 | 110.126  | -1.93 | 0.054 | 0.12 | 0.01 | 1.03 |
| Vector Intervention (0=None)                |            |     |          |          |       |       |      |      |      |
| LLINs                                       | [D4_LLINs] | α24 | -2.70970 | 0.801491 | -3.38 | 0.001 | 0.07 | 0.01 | 0.32 |
| IRS   | [D1_IRS]   | α25 | -2.67014 | 0.948238 | -2.82 | 0.005 | 0.07 | 0.01 | 0.44 |
| <i>Plasmodium</i> Intervention (0=Not Done) |            |     |          |          |       |       |      |      |      |
| MBS   | [MBS]      | α26 | -3.22031 | 0.796065 | -4.05 | 0.000 | 0.04 | 0.01 | 0.19 |

Based on the results of the optimization of model parameters, it can be seen that the relationship between sociodemographic factors, physical characteristics of the region and health service efforts against malaria in Pesawaran District, Lampung Province can be formulated as follows:

$$\text{Ln} \frac{(p[\text{Malaria}=1])}{(1-p[\text{Malaria}=1])} = 1.14306 - 0.0202340 [\text{UMR}] + 1.27568 [\text{JKEL}] - 0.527641 [\text{D1\_NLYN/PTMB}] - 0.563427 [\text{D1\_PTNI/BRKBN}] - 0.788517 [\text{D1\_PDGG/WRST}] - 1.14061 [\text{D1\_TPAKP}] + 0.627210 [\text{D2\_SMP}] + 1.61759 [\text{D2\_SMA}] + 2.46045 [\text{D2\_PT}] + 4.25364 [\text{KRMH}] - 4.97580 [\text{MOAN}] + 0.0260722 [\text{KTD}] + 4.57420 [\text{D3\_JTV5}] + 0.883319 [\text{D3JTV10}] + 2.11497 [\text{D3\_JTV20}] + 2.87183 [\text{D4\_LGN}] - 2.09404 [\text{D4\_RWA}] + 0.154395 [\text{D4\_TMBT}] - 1.114470 [\text{D4\_SBTR}] + 3.06017 [\text{D4\_SLIG}] - 1.28773 [\text{D4\_KLG}] - 1.83076 [\text{D5\_LVCD}] - 2.12563 [\text{D5\_PLMT}] - 2.70970 [\text{D6\_LLINs}] - 2.67014 [\text{D6\_IRS}] - 3.22031 [\text{MBS}]$$

### **Results of the Goodness of Fit Test on the Model**

The results of the goodness of fit test in this study were of good value for the malaria incidence estimation model [YI] or the non-malaria incidence estimation model [YII] from the minitab output results showed that both could be assessed very well. The assessment is based on the fact that [YI] gives test results  $G = 511.535$  (%) Df 26,  $P = 0.000$ , as can be seen in Table 3, which means that if someone has malaria, it is predicted with the influence of the three independent variables, thus the predictor model for [YI] can be expressed as the formulation of the model above.

### **Sociodemography**

The results of this study also explain that α10 with Odd Ratio = 70.36 ( $P = 0.000$ ) which means that if other variables remain constant, the behavior of stay outside at night without using personal protective equipment such as gloves, shirts, and trousers, then the respondent's chances of being exposed malaria increased to 70.36 times compared to respondents who did not leave the house at night. The increased chance of getting malaria was very significant as shown by  $P=0.000$ . This is in line with research by Nababan, et al (2018) in Purworejo Regency, Central Java Province which concluded that the habit of stay out site at night has a relationship with the incidence of malaria with a  $P$ -value = 0.01 and an Odds Ratio (OR) = 3.6. Leaving the house at night without using personal protective equipment such as gloves, long pants, and long clothes facilitates contact between humans and *Anopheles* mosquitoes. *Anopheles* mosquitoes with

habitual behavior of biting humans (anthropophilic) and biting outside the house (exophilic) at 18.00 to 06.00 in the morning [4].

The results of statistical analysis show that the variable  $\alpha_{11}$  is negative with Odd Ratio = 0.01 ( $P = 0.000$ ) which means that, if other variables remain the same then respondents who use mosquito repellent have a decreased chance of contracting malaria to only 0.01 times compared to respondents who do not use mosquito repellent. This decrease in probability is significant, as indicated by the value of  $P=0.000$ . This is in line with research conducted by Budiyanto (2011) [5] in Ogan Komering Ulu Regency, South Sumatera Province which stated that there was a significant relationship between the use of mosquito repellent and malaria cases with Odd Ratio = 0.231 ( $P = 0.0001$ ). The behavior of the *Anopheles* mosquito which has a habit of biting at night between 18.00 and 06.00 in the morning which allows respondents who use mosquito repellent at night to have low contact with mosquitoes, thereby reducing malaria transmission through *Anopheles* mosquito bites.

#### **Physical Area Characteristics**

Physical area characteristic is variable distance of vector breeding places, based on the results of statistical tests conducted that the parameters  $\alpha_{13}$ ,  $\alpha_{14}$  and  $\alpha_{15}$  are positive with the Odd Ratio value of 96.95 respectively; 2.42 and 8.29 with  $P$  value = 0.001; 0.512 and 0.344. This shows that if the other variables remain constant, each additional distance between the respondent's residence and the vector breeding place means the probability of contracting malaria becomes 96.95, respectively; 2.42 and 8.29 times the original. However, this opportunity is very real if the respondent's place of residence is within < 1000 meters from a vector breeding place with a  $P$  value of 0.001. This does not happen for the respondent's residence which is within 1001 - 2000 meters and 2001 - 3000 meters with vector breeding places because the  $P$  values are 0.512 and 0.344 respectively. This is in accordance with the results of research by Kazwani and Martini (2006) [6] in East Lombok Regency, West Nusa Tenggara Province which stated that the distance between residence and vector breeding sites was associated with the incidence of malaria with Odd Ratio = 1.78 and  $P = 0.028$ . The distance of the respondent's house/residence <1,000 meters is relatively close to the vector breeding place, has a higher risk than the respondent whose house/place of residence is far from the vector breeding place. The close distance to the vector breeding sites causes them to be in a malarialogenic potential area or a potential area for malaria disease, which is influenced by two factors, namely receptivity and vulnerability. Receptivity is the presence of large numbers of malaria vectors and the presence of ecological factors that facilitate malaria transmission, while vulnerability is the presence of malaria sufferers or vectors who have been infected with malaria in a certain area [7]. Receptivity is also caused by the distance radius of vector breeding sites which is <1,000 meters from the house/residence which is still within the range of the normal flying ability of the *Anopheles* mosquito. *Anopheles* mosquitoes have the ability to fly as far as 1 to 1.5 km [8].

Furthermore, the results of the statistical tests carried out showed that  $\alpha_{16}$ ,  $\alpha_{17}$ ,  $\alpha_{18}$ ,  $\alpha_{19}$ ,  $\alpha_{20}$  and  $\alpha_{21}$  the Odd Ratio values were 17.67, respectively; 0.12; 1.17; 0.33; 21.33

and 0.28 with P value = 0.046; 0.112; 0.895; 0.636; 0.398 and 0.714. This indicates that of the six types of vector breeding sites in Pesawaran Regency in the form of lagoons and kobakan, swamps, abandoned ponds, terraced rice fields, irrigation canals and excavated ponds that have a significant causal relationship if the other variables remain are lagoons with an Odd Ratio of 17.67. and P value = 0.046. This is in line with the research by Sukiswo et al., (2014) [9] in Arongan Lambalek Subdistrict, West Aceh Regency which stated that an environment where there was standing water and bushes was associated with the incidence of malaria with Odd Ratio = 6.827 and P = 0.000. In this study, the distribution of respondents based on the type of vector breeding place in the form of lagoons was 23.85% or a total of 104 respondents, 72 respondents were exposed to malaria and 32 people were not affected by malaria. The lagoon has relatively not been a concern for broodstock interventions so far, as the results of the description analysis on the intervention variable for vector breeding sites with Larvaciding or moss removal, which is 68.34% there is no intervention on vector breeding sites.

### ***Health Service Associated Interventions***

Health service associated interventions are the variable use of Long Lasting Insecticidal Nets (LLINs) and Indoor Residual Spraying (IRS). 0.001 and 0.005. It can be concluded that the intervention of health care efforts against malaria vectors by using Long-Lasting Insecticidal Nets (LLINs) and Indoor Residual Spraying (IRS), if other variables remain constant, can reduce susceptibility to malaria by 0.07 and 0.07 times, respectively, compared to if there isn't intervention against malaria vectors is carried out. The decrease was significant, as indicated by the P values of 0.001 and 0.005, respectively. This is in line with a study by Sir., et al (2015) [10] in Abola District, Alor Regency, East Nusa Tenggara which stated that the use of insecticide-treated mosquito nets had an effect on the incidence of malaria with a P-value of 0.021. The use of Long Lasting Insecticidal Nets (LLINs) and Indoor Residual Spraying (IRS) has a similar way of working to control the malaria vector, namely the *Anopheles* mosquito. Long Lasting Insecticidal Nets (LLINs) are intended as a barrier or barrier so that people who wear them avoid being bitten by *Anopheles* mosquitoes.

The results of statistical tests on other health care effort factors, namely the Mass Blood Survey (MBS) variable, showed that 26 was negative, meaning that the chance of getting malaria decreased if other variables remained constant malaria decreased to 0.04 times the original, this decrease was significant because the P-value = 0.000. The results of this study are in line with the theory that the earlier Plasmodium is found in the community and malaria treatment is carried out according to standards, the transmission of malaria can be prevented so that malaria treatment can also function as prevention of malaria infection. The research of Putra et al., (2015) [11] in Labuhan Maringgai Subdistrict, East Lampung Regency, Lampung Province stated that there was a relationship between the variables of respondents who had participated in the malaria eradication program tended to be healthier by 3.71 times earlier than respondents who did not participate in the malaria eradication program.

### **Recommended Research Results**

Referring to the results of the study, recommendations can be given to the community and local government as policy makers to tackle malaria in Pesawaran Regency by conducting public policy analysis to suppress malaria in the community. The steps for analyzing public policy include: 1) Listing several predictor variables that have been shown to have a significant effect on the incidence of malaria; 2) Presenting several program options in accordance with the first step; and 3) List several possible sources of budget that allow the implementation of malaria control activities. Meanwhile, the public policy options with great potential to reduce the incidence of malaria in Pesawaran Regency can be seen in Table 4 below.

**Table 4.** Public policy options with a high probability of reducing the incidence of malaria

| No | Malaria Incidence Predictor Variables | Symbol in Model | Policy Domain | Parameter     | Program Form What Can Be Submitted  | Possible Sources of Funds |
|----|---------------------------------------|-----------------|---------------|---------------|---|---------------------------|
| 1. | Stay outside at Night                 | [KRMH]          | Yes           | $\alpha_{10}$ | [1] Counseling for recitation groups/other social groups  | APBD/DD/ADD               |
| 2. | Use of mosquito repellent             | [MOAN]          | Yes           | $\alpha_{11}$ | [1] Counseling for recitation groups/other social groups  | APBD/DD/ADD               |
| 3. | Dummy_ TPV distance 0-1.000 meters    | [D3_JTPV5]      | No            | $\alpha_{13}$ | [1] Establishment of the malaria prevention "10 Amal" [2] Reinforcement of Solaria (school of malaria)                | DD/ADD                    |
| 4. | Dummy_ Type of breeding places Lagoon | [D3_JTPV20]     | Yes           | $\alpha_{16}$ | [1] Production of source reduction [2] Distribution of larvae-eating fish [3] Larvaciding and integrated moss removal | APBN/APBD/DD              |
| 5. | Dummy_ LLINs Vector Interventions     | [D6_LLINS]      | Yes           | $\alpha_{24}$ | [1] Counseling on the use of LLINs [2] Distribution/re-dyeing of mosquito nets with insecticide                       | APBN/APBD/DD              |
| 6. | Dummy_ IRS Vector Intervention        | [D6_IRS]        | Yes           | $\alpha_{25}$ | [1] Periodic IRS [2] Training of village malaria cadres   | APBN/APBD/DD              |
| 7. | MBS                                   | [MBS]           | Yes           | $\alpha_{26}$ | [1] Periodic MBS[2] Training of malaria cadres for the manufacture of thick/thin blood preparations                   | APBN/APBD/DD              |

### **4. Conclusions**

Based on the description above, it can be concluded that the incidence of malaria in Pesawaran Regency, Lampung Province is influenced by sociodemographic factors: going out at night and using mosquito repellent; physical characteristics of the area; the distance of vector breeding sites 0-1000 meters; and the type of vector breeding place in the form of lagoons. Long-Lasting Insecticide Nets (LLINs), Indoor Recidual Spraying (IRS), and Mass Blood Surveys (MBS) are treatment and health care effort factors. From the results of the predictor model of this study, several programs can be recommended in an effort to control malaria in Pesawaran Regency, Lampung Province in the form of counseling to recitation groups or other social groups, the establishment of the Dasawisma malaria prevention and reinforcing Solaria (malaria schools), making connecting channels (source reduction), distribution of larvae-eating fish (lead heads), as well as education on the use of Long Lasting Insectide Nets (LLINs) and distribution or re-dyeing of Long Lasting Insectide Nets (LLINs). Furthermore, Indoor Recidual Spraying (IRS) is integrated with village malaria cadre training and periodic Mass Blood Survey (MBS) and village malaria cadre training for the manufacture of thick and thin blood preparations so that malaria cases in the community are found as early as possible so that malaria transmission can be prevented by treatment standard.

It is recommended to conduct research with a larger and diverse sample, it is necessary to conduct research in various other areas to refine the malaria predictor model, especially on variables that have a relatively significant relationship with the incidence of malaria and conduct further research with a wider area coverage.

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# ***Adok* and Traditional Wedding Attire For The Indigenous People of Lampung *Saibatin* Marga Way Lima**

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## **Abstract**

*Adok* and Traditional Wedding Attire For The Indigenous People of Lampung *Saibatin* Marga Way Lima. This research uses descriptive qualitative research methods with qualitative data analysis techniques. This study describes the Social stratification or *adok* in the Indigenous People of Lampung *Saibatin* Marga Way Lima. *Adok Saibatin* are *Suttan/Suntan/Sultan, Pengikhan, Dalam, Batin*. *Adok* the nobles are *Khaja, Khadin, Minak, Kimas, and Mas*. *Adok* ordinary people or *Khakhayahan* namely, *Mentekhi/Jaga, Cahaya/Pukhba, Jimpang/Layang, Bunga/Muda*. Traditional Wedding Attire in the traditional wedding of the Indigenous People of Lampung *Saibatin* Marga Way Lima, including *kikat picung*, a set of *siger/segokh* Crowns, *kekalah bangkang/kalabangkang, kekalah papan jajakh/penjaja, bebinting buduk/kemunduk, gelang kana, kaway bunting, celana, kaway maju, kakambon, hinjang tumpal, selempang, tekhapang, selop betutup*, accessories Additional items are *kumbang buwok, subang giwir, kekalah inuh, gelang khuwi, kipas perak, buwah manggus dan saputangan handak*. Furthermore, it explains the rules for wearing Lampung Traditional Wedding Attire in accordance with the title or *adok* system in the Indigenous People of Lampung *Saibatin* Marga Way Lima. The colors in the traditional wedding attire of the Lampung *Saibatin* Marga Way Lima also characterize certain *adok* stratification within the Way Lima indigenous people.

**Keywords:** *Adok*, Traditional Wedding Attire, Lampung Culture, Way Lima, *Saibatin*.

## **1. Introduction**

Each region has its own culture and that culture is actually maintained and nurtured even though the generations continue to change. Culture as an ethnic identity often fades quickly due to the abandonment of its heirs. Therefore, there are certain people who are trying hard to maintain in the hope that the culture will not disappear. Culture can be interpreted as something that is deliberately created by humans in the form of activities that are often carried out and are considered good. Culture is the whole of human ideas and works that must be familiarized with learning, along with the whole of the results of their culture and work [1]. Lampung culture is a way of life that is developed and shared by the people of Lampung and passed down from generation to generation [2].

Traditional marriage is one of the important events in the life of indigenous peoples, because marriage is not only about the bride and groom but also the parents of both parties, their brothers and sisters and even their respective extended families [3].

Traditional titles in Lampung society are called *Adok*, which is an honorary title to an adult and married person which is formalized through a traditional ceremony in front of traditional leaders and their relatives. The title is in Lampung custom as a counterweight (leader). According to Rustam *Adok*, it is a designation for the title of nobility in Lampung or in simple language, the blue blood of the Lampung people (either in Jurai *saibatin* / coastal or pepadun / peminggir) [4].

Traditional Wedding Attire is an inheritance that has been passed down from generation to generation by ancestors, for example at weddings. In Indonesia, there are various types of Traditional Wedding Attire and differences so that they can be applied in a science of technology and get designs on traditional Traditional Wedding Attire . To understand indigenous Indonesian traditional Traditional Wedding Attire , one must first understand some general terms that are often used to indicate the direction and position of indigenous Indonesian Traditional Wedding Attire [5].

Lampung Traditional Wedding Attire is one of the distinctive cultural heritages and has high artistic value. Lampung Traditional Wedding Attire has a difference between the Traditional Wedding Attire of Lampung pepadun and Traditional Wedding Attire of Lampung *saibatin*, the difference is that a siger in Lampung pepadun custom has 9 shoots or curves and men wear gold skullcaps. while in Lampung traditional *saibatin* has 7 shoots or indentations [6]. Lampung Traditional Wedding Attire is a cultural heritage of Lampung which is very distinctive and has high artistic value. This Traditional Wedding Attire is often used by the bride and groom as a symbol of the greatness of Lampung culture [7].

In Lampung society, especially the *Saibatin* clan Way Lima, there are rules for wearing traditional Lampung *Saibatin* wedding Traditional Wedding Attire. This Traditional Wedding Attire is usually adapted to the social structure or position in the community. *Adok* is a term of stratification in the indigenous people of Lampung *Saibatin*. According to Soerjono Soekanto, social stratification is the difference in population or society into classes in stages [1]. Each title has its own position, role and characteristics in society based on existing customary rules including Traditional Wedding Attire from the highest *adok* to the lowest *adok*. The use of Traditional Wedding Attire is no longer compatible with existing customary rules, due to ignorance of the rules and procedures for wearing Traditional Wedding Attire , and there are no written rules about it.

Some literature, such as the book entitled "Lampung Traditional Bridal Traditional Wedding Attire and Jewelry", which was published by the State Museum of Lampung Province, in this book is about Lampung Traditional Wedding Attire and jewelry, in outline aesthetic value only. Then the book entitled "Knowing the Customs of Literature and Language of Lampung *Saibatin* Way Lima" by Sabaruddin S A., published by Kemuakhian Way Lima; Jakarta, this book describes the general customs of the people of Lampung *Saibatin*, especially Way Lima. The author has not found a reference that discusses the procedures for wearing *Saibatin* Traditional Wedding Attire that are



adapted to *Adok*, especially for the Sibatin Marga Way Lima indigenous people. Therefore, in this study, we will discuss about *Adok* and Traditional Wedding Attire For The Indigenous People of Lampung *Saibatin* Marga Way Lima.

## **2. Methods**

This study uses a qualitative descriptive method, namely a description of social stratification/*adok*, Traditional Wedding Attire, and the rules for wearing traditional Lampung *Saibatin* Wedding Attire and their relationship with *adok*.

### ***Research Time and Place.***

The research focus on research locations in the Way Lima area, especially the Seputih jurai which is located in Way Khilau District, Kedondong District, Pesawaran Regency, and Pardasuka District, Pringsewu Regency, Lampung Province.

### ***Data, Instruments, and Data Collection Techniques.***

The data in this study include primary data obtained directly from the field through observation and in-depth interviews with informants. Then secondary data obtained from various literatures as well as those related to this research which serves to complement and support the primary data. The instrument in this study used an interview guide. The technique of determining informants in this research is snowball. In this study, 4 informants were selected with the criteria, namely traditional leaders, community members who have Traditional Wedding Attire and attributes of Lampung traditional weddings and people who know about the customs of the Way Lima clan. Data collection techniques are by means of in-depth interviews, observation, documentation, and literature study. Interviews were conducted by researchers by means of questions and answers conducted directly to the informants in accordance with the interview guidelines. The observation technique carried out by the researchers was to see and observe directly every form and detail of the traditional wedding Traditional Wedding Attire and attributes of the Lampung *Saibatin* clan Way Lima. The documentation technique carried out by the researcher is by taking photos directly of the Traditional Wedding Attire and attributes of Lampung *Saibatin*. In addition, the researchers also collected photos and videos from sources. Literature study was conducted by collecting additional data from various references in the form of books, internet and other information related to this research.

### ***Data analysis technique.***

After the data is collected, the data that has been obtained, both in the form of primary data and secondary data, is then analyzed qualitatively to produce conclusions. The technique used by the researcher in the analysis process is data reduction, that is, after the data is collected, data reduction is then made. Where after the researchers obtained the data, the data was then assessed for feasibility by choosing which ones were really needed in this study. In other words, this process is used for analysis that categorizes, directs and discards the unimportant, and organizes data, making it easier for researchers to draw conclusions. Data display (data display), namely the presentation of data is limited as a set of structured information that is adjusted and

classified to make it easier for researchers to master the data. In this study, the presentation of data is in the form of texts about the *adok* and Traditional Wedding Attire which has gone through the data reduction stage. Conclusion drawing, after the data has been collected sufficiently, then a temporary conclusion is drawn and after the data is completely complete, a final conclusion is drawn. Conclusions are clarified and verified during the research.

### 3. Results and Discussion

The Way Lima clan is one of the clans in Lampung that has the *Saibatin* culture and belongs to the Lampung *Saibatin* Calling Sub-tribe (East Semaka Bay). The Way Lima clan area stretches from Gunung Terang, Bulok District (Tanggamus), Pardasuka District (Pringsewu), Kedondong District, Way Khilau District, Way Lima District to Suka Marga Gedong Tataan District (Pesawaran).

#### ***The Title System or Adok Indigenous Peoples of Lampung Saibatin Marga Way Lima.***

The people of Lampung, especially *Saibatin*, also have a stratification system that has been passed down from generation to generation since ancient times. This system of social stratification is called *Adok*. *Adok* is a traditional Lampung title given to someone (depending on their position and function) in indigenous peoples in *Saibatin*. In the Lampung *Saibatin* indigenous community, *adok* is not given to someone immediately but must have (already established) an indigenous community unit called *Ke-Saibatinan*. The establishment of *Saibatin* must also look at the origin of the clan and lineage of the person who will be appointed as *Saibatin*. The person who will be appointed as *Saibatin* is the eldest straight male lineage in the local community, and other conditions are very strict. The levels of *adok* (customary title) in the Lampung *Saibatin* community are:

#### 1. Nobles (Pandia Pakusakha)

Table 1. *Adok* of High Noble (*Saibatin*):

| Male Title                  | Female Title      |
|-----------------------------|-------------------|
| <i>Suttan/Suntan/Sultan</i> | <i>Ratu Agung</i> |
| <i>Pengikhan</i>            | <i>Ratu</i>       |
| <i>Dalom</i>                | <i>Batin</i>      |
| <i>Batin</i>                | <i>Batin</i>      |

Tabel 2. *Adok* of Middle Noble:

| Male Title    | Female Title        |
|---------------|---------------------|
| <i>Khaja</i>  | <i>Khadin</i>       |
| <i>Khadin</i> | <i>Khadin/Minak</i> |
| <i>Minak</i>  | <i>Enton</i>        |

Tabel 3. *Adok* of Low Noble:

| Male Title   | Female Title   |
|--------------|----------------|
| <i>Kimás</i> | <i>Más</i>     |
| <i>Más</i>   | <i>Más Ayu</i> |

(Source: Author's own work)

## 2. Ordinary People (*Khakhayakhan*)

Tabel 4. *Adok* of Ordinary People (*Khakhayahan*)

| Male Title            | Female Title             |
|-----------------------|--------------------------|
| <i>Mentekhi/Jaga</i>  | <i>Adi/Ayi</i>           |
| <i>Cahaya/Pukhba</i>  | <i>Khayi/Sinji</i>       |
| <i>Jimpang/Layang</i> | <i>Pancalang/Malilia</i> |
| <i>Bunga/Muda</i>     | <i>Dayang/Bunga</i>      |

(Source: Author's own work)

### **Lampung Traditional Wedding Attire Saibatin Marga Way Lima.**

Based on the results of interviews and observations, the following are the elements contained in the Lampung *Saibatin* Marga Way Lima Traditional Wedding Attire :

#### **Main Traditional Wedding Attire :**

**Kikat Picung.** *kikat picung* is one of the typical *kikat* in Lampung. In the indigenous people of the Way Lima clan, it is very common to use this *kikat*. *Kikat* is a rectangular-shaped cloth which is usually dark red or purplish in color made of woven cloth and has distinctive motifs such as bamboo shoots and silver stars made of gold thread or silver thread made with the *songket* weaving technique (*songket*). This knot is formed in triangular folds and tied at the back and both ends pointing upwards. This *kikat* is a set of Traditional Wedding Attire that is worn as a men's headband.

#### **A set of Siger/Segokh Crowns consisting of:**

- **Kelabay Segokh.** *Kelabay* means mother and *segokh* means crown, so *kelabay segokh* means mother of the crown. *Kelabay segokh* is a slab with 7 grooves that form a fern or horn arch at the ends of both sides and is decorated with carvings of fern tendrils (nails). In the *segokh tuha* (old *siger*) in Way Lima, at the top 3 ends of the middle groove there is an indentation resembling a *sekala* flower (*jabung*, and at each end of the groove there is a hanger shaped like a fish called *giwir iwa*.
- **Bulung Sekala.** *Bulung* means leaf and *sekala* is a *honje/kecombrang* plant, *bulung sekala* is a *honje/kecombrang* leaf, this is because the leaf decoration is similar to a *honje/kecombrang* leaf, which in Lampung society is called a plant than *Sekala*. *Bulung Sekala* is a decoration that is placed on top of the *kelabay segokh*. In addition to the *kecombrang* leaves, the decorations on the feathers of this scale are the blooming *cempaka* flowers and the cape flowers that are still budding, starting to bloom or those that have fully bloomed, these two types of flowers are flowers that have a distinct aroma. fragrant.

- **Sesumping.** *Sesumping* is a decoration in the form of a leaf with decorative flowers tucked between the earlobe. The plant that is used as a decoration of the earlobe is taken from the shape of the leaves and flowers of the cape. A plant that has small flowers with a fragrant smell.
- **Suwal kikha.** *Suwal kikha* is a decorative comb that is attached behind the *Segokh* tucked between the bun. The shape and motif of the *suwal kikha* is taken from the curved shape of the young shoots of the sukha fern or forest fern (tree fern/wood fern) and the *sekala* beetle or *honje/kecombrang* flower in the middle. And on it there are 3 stalks of *pandan* leaf decoration and the top is decorated with *cempaka* flowers.
- **Suwal Bulan.** *Suwal* means comb and *bulan* means *moon*, because its shape resembles a crescent moon and is decorated with carved fern tendrils (nails). This comb is installed in a package with the *suwal kikha*, namely at the part between the head and the bun, it is used to prop *the suwal kikha* to stand firm.
- **Kekanduk.** *kekanduk* is a cloth that is attached to the forehead, serves as a base for the *siger* when it is paired, so that the taper blade on the *siger* does not directly hit the forehead, so it doesn't hurt. This *kekanduk* cloth is usually decorated with ornaments such as *mata iwa* (fish eyes), beetles / *cempaka* flowers, and *khanggai iwa* (fish hangers).
- **Polos.** *Polos* is a bun or hair extension worn by women, paired at the back of the head.

#### **Accessories or Jewelry:**

- **Kekalah Bangkang/Kalabangkang.** *Kekalah* means necklace and *bangkang* means empty, because this necklace is in the form of small, empty spheres.
- **Kekalah Papan jajakh/Penjaja.** *Kekalah* means a necklace and a *Papan jajakh* means a lined board. This necklace is in the form of 3 metal plates engraved with tall fern tendrils and decorated with *gundang iwa* (fish tail) strands. This necklace is worn by both men and women.
- **Bebinting Buduk / Kemunduk.** *bebinting* means belt and *buduk* or *kemunduk* refers to the convex circle. This belt is made of 100% metal and is carved with fern tendrils. Worn by both men and women.
- **Gelang Kana.** The *gelang kana* bracelet is a typical Lampung bracelet, the size of this bracelet is quite large, made of metal and carved with fern tendrils, worn by both men and women.
- **Kaway Bunting.** *Kaway* means dress and *bunting* means groom, so *kaway bunting* means groom's dress. This shirt is a kind of beskap shirt (cloak coat) or *teluk belanga belah (belah huwi)* shirt worn by men.
- **Celana.** *Celana*/the pants are worn by the groom, the shape of these pants is like basic pants.
- **Kaway Maju.** *kaway* means dress, and *Maju* means bride. This type of *kebaya* is a *kebaya Belah/Labuh*. This *kebaya* is usually decorated with bead embroidery in the form of sow flowers, tendrils, or animals.

- **Kakambon.** *kakambon* is a cloth wrapped around a woman's body (*kemban*). The fabrics used are usually plain white, yellow, red, or also white, yellow and red batik and *cempaka*.
- **Hinjang Tumpal.** *hinjang* means sarong and *tumpal* is a cloth head which is usually patterned with clashing bamboo shoots. This *tumpal* cloth is made with a songket weaving technique with a motif made of gold or silver thread. This sarong is worn by both men and women.
- **Selimpang.** *Selimpang* or A sling worn/slung across the left and right shoulders. The color adjusts to *Adok* and the color of the Traditional Wedding Attire worn by the husband. The types of slings include the *handak* sling, namely the white sash, the yellow sash, the *limakh* sling, and the *batik kampung* or *cempaka* sash.
- **Tekhapang.** *Tekhapang* is a kind of keris weapon, the blade of the keris is made of metal, the scabbard is made of wood or metal, the handle is usually in the form of animal carvings made of wood, horn, or ivory. This *tekhapang* is usually used as traditional male equipment.
- **Selop Betutup.** *Selop* means sandal and *betutup* means covered. *Selop Betutup* have a characteristic that there is a cover that covers the toes and the back of the foot.

#### **Additional accessories:**

- **Kumbang Buwok.** *Kumbang* means flower and *buwok* means hair, so the *kumbang buwok* is a flower that is used to decorate hair or a bun. This flower is usually a *melokh* or jasmine flower.
- **Subang Giwir.** *Subang* means earring and *giwir* means hanger. These earrings have a stud / hanger called *cempaka dikanik iwa* which means *cempaka* flowers are eaten by fish.
- **Kekalah Inuh.** *Kekalah inuh* is a necklace made of metal made into a diamond shape with fern tendrils engraved.
- **Kekalah Pehintis.** *Kekalah Pehintis* is a necklace made of metal with circular carvings in the shape of a flower.
- **Gelang Khuwi.** *Khuwi* means thorn, so bracelet *khuwi* means bracelet of thorns, this is because this bracelet is in the form of pointed domes that resemble thorns.
- **Kipas Perak.** *Kipas Perak* or The silver fan is one of the accessories in the Traditional Wedding Attire of *Lampung Saibatin Way Lima* which is brought by women.
- **Buwah Manggus and Saputangan Handak.** *Buwah manggus* means mangosteen fruit, this refers to a round metal accessory that resembles a mangosteen fruit, this *buah manggus* functions like a wallet/bag that can be opened and there is a key to open it. In the past, the mangosteen fruit was used as a practical container for *kinangan* or betel. Then the *saputangan handak* is a white handkerchief as an additional accessory.

### **Rules for the use of traditional Lampung *Saibatin* Wedding Attire Marga Way Lima**

The traditional wedding attire of Lampung *Saibatin* Marga Way Lima is not just an ordinary traditional attire because there are rules in the procedure for its use. In the rules, there are special and certain Traditional Wedding Attire that not be worn by certain social stratifications or *adok* in society. This is why there is a relationship between Traditional Wedding Attire and *adok*, because in the appearance of the Traditional Wedding Attire we can guess the *adok* is from the wearer. The following are the rules for wearing traditional wedding attire that are in accordance with social stratification or *adok* in the people of *Lampung Saibatin* Marga Way Lima:

**Traditional Wedding Attire for *Saibatins*.** The person referred to as *Saibatin* is a person who is domiciled as a traditional leader in a *Kesaibatinan* area, be it *Saibatin Bandakh/Marga*, *Punggawa*, or *Pekon*. These *Saibatins* usually have *Adok Suttan/Suntan*, *Pengikhan*, *Dalom*, and *Batin*. They are classified as high nobility in the social stratification structure of the *Saibatin* indigenous people. In their traditional Traditional Wedding Attire , the *Saibatins* wear Traditional Wedding Attire that are dominated by all-white colors, both their Traditional Wedding Attire and their sash. The accessories used are quite a lot, such as the *gelang kana* bracelet and the *kekalah bangkang* necklaces, wearing 7 pairs. What distinguishes between *Saibatin Bandakh*, *Dalom* and *Batin* is the use of the sash. Here are the procedures and the rules for the make-up:

***Saibatin* Bandakh *Adok Suttan/Suntan* or *Pengikhan* Traditional Wedding Attire .** *Saibatin Bandakh* is the Highest *Saibatin* in the *Saibatin* level in the Way Lima clan area. Its use is all white with a white left-right sash. *Saibatin Bandakh* is usually dressed as *Suttan/Suntan* or *Pengikhan*, with the following traditional attire:



**Picture 1.** *Saibatin Bandakh* Traditional Wedding Attire  
(source: Author's own work).

***Saibatin Adok Dalom's* Traditional Wedding Attire .** The hallmark of the *Saibatin's* Traditional Wedding Attire is that they are all white, and for *Adok Dalom*, he wears a white right sash and a yellow left sash. The appearance of the *Saibatin* Traditional Wedding Attire with *Dalom* is as follows:



**Picture 2.** *Saibatin adok Dalam* Traditional Wedding Attire  
(Author's own work)

***Saibatin* Traditional Wedding Attire *Adok Batin*.** The hallmark of the *Saibatin's* Traditional Wedding Attire is that they are all white, and for *adok Batin* they wear a white right sash and a *limar* sash on their left. The display of *Saibatin* Traditional Wedding Attire with *Batin* is as follows:



**Picture 3.** *Saibatin Adok Batin's* Traditional Wedding Attire  
(source: Author's own work)

**Traditional Wedding Attire For *Adok Khaja*.** *Adok Khaja* is one level below *Saibatin*. With his Traditional Wedding Attire which are dominated by yellow, both his Traditional Wedding Attire and his left and right sashes. There are 6 pairs of *gelang kana* bracelets and 6 *kekalah bangkang* necklaces, with the following display:



**Picture 4.** Traditional Wedding Attire *adok Khaja*  
(source: Author's own work).

**Traditional Wedding Attire for Adok Khadin.** *Adok Khadin* is *adok* one level below *Khaja*. His Traditional Wedding Attire are dominated by red, but the right side of the sash is yellow and the left is using *limar* cloth or *batik kampung* cloth which is characterized by a reddish color. The use of 5 pairs of *gelang kana* bracelets and 5 *Kekalah Bangkang* necklaces, with the Traditional Wedding Attire as follows:



**Picture 5.** *Adok Khadin's* traditional bridal attire  
(source: Author's own work).

**Traditional Wedding Attire for Minak, Kimas, and Mas adok.** *Adok Minak, Kimas, and Mas* with its Traditional Wedding Attire which is dominated by red, and the sash is dominated by red, both left and right, this sash usually uses *limakh* or foam cloth as well as *batik kampung*, which is dominated by red. The use of 4 pairs of *gelang kana* bracelets and 4 *Kekalah Bangkang* necklaces, with the following traditional Traditional Wedding Attire:



**Picture 6.** Traditional bridal attire of *adok Minak, Kimas, and Mas*  
(source: Author's own work).

**Traditional Wedding Attire for Khekhayahan.** *Khekhayahan* is an ordinary indigenous people whose *adok* is outside the *adok* nobility. *Adok khekhayahan* is under *adok Mas*. Traditional Wedding Attire for *adok Khekhayahan* is dominated by black but can also wear red, only the most important feature is that the sash is worn only one piece on the right shoulder, while the left does not wear a sash. The sling cloth can be made of *limar* cloth and it can also be *batik kampung* cloth which is dominated by red. The Traditional Wedding Attire for ordinary people/*khakhayahan* are as follows:





**Picture 7.** *Khakhayahan* Traditional Bridal Traditional Wedding Attire  
(source: Author's own work).

#### 4. Conclusion

Based on the discussion, the conclusions are:

- a. *The level of Adok that applies to the Indigenous People of Lampung Saibatin Marga Way Lima is Adok Saibatin are Suttan/Suntan/Sultan, Pengikhan, Dalom, Batin. Adok the nobles are Khaja, Khadin, Minak, Kimas, and Mas. Adok ordinary people or Khakhayahan namely, Mentekhi/Jaga, Cahaya/Pukhba, Jimpang/Layang, Bunga/Muda.*
- b. Traditional Wedding Attire in the traditional wedding of the Indigenous People of Lampung Saibatin Marga Way Lima, including *kikat picung*, a set of *siger/segokh* Crowns, *kekalah bangkang/kalabangkang*, *kekalah papan jajah/penjaja*, *bebintang buduk/kemunduk*, *gelang kana*, *kaway bunting*, *celana*, *kaway maju*, *kakambon*, *hinjang tumpal*, *selempang*, *tekhapang*, *selop betutup*, accessories Additional items are *kumbang buwok*, *subang giwir*, *kekalah inuh*, *gelang khuwi*, *kipas perak*, *buah manggus dan saputangan handak*.
- c. Traditional wedding attire, Lampung Saibatin the Way Lima clan has a relationship with the *adok* level, especially in the rules and procedures for wearing it.

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# Character Value of Syair Song Lampung Pesisir Single Guitar

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## Abstract

This study aims to find out what character values are contained in the Lampung Pesisir single guitar song. The method used in this research is descriptive method with a qualitative approach. This study uses data collection techniques Observation, Documentation, Literature, and Interviews. The data analysis technique used is the Qualitative Data Analysis Technique. Based on observations and research on the Characters of Lampung Pesisir Single Guitar Song Poetry, the writer can conclude that the Lampung Pesisir single guitar song poems mostly have character values in them, the character values that really dominate those poems are honest character values, tolerance, and love peace. That means the poems of a single Lampung Pesisir guitar have educational values that are very important to instill the values of character in today's young generation.

**Keywords:** character, value, single lampung guitar

## 1. Introduction

The wealth of traditional arts in Indonesia is very much and varied, therefore it is very unfortunate if these arts become extinct. Therefore, it is fitting for our society to know the existence of traditional arts as a characteristic of the region, and to maintain its sustainability, so as not to be influenced by foreign cultures that will damage the existing culture in society. Lately, many young people do not know the development of typical arts from the area where they come from, as well as the philosophical meaning of the traditional arts of the community. This is based on the lack of knowledge and information about traditional arts in the area. This is also influenced by the lack of research sources related to the problems of traditional arts. Traditional art is a product of high value culture, and culture emerges from the habits of a society, good art can also determine the sustainability of a cultural value in its society.

Koentjaraningrat (1987, 85) stated that cultural values are the highest and most abstract behavior of customs, therefore cultural values consist of conceptions of everything that is considered valuable and important by a society, so that these beliefs can serve as a guide in live the life.[1] The Lampung area is an area that has quite a variety of traditional arts, including the Bedana dance, Cangget Agung dance, Sigekh Pengunten dance, Sekura, Tapis embroidery, Gamolan Pekhing music, Single Guitar (Petting Tunggal), flute/serdam, ghunjih and kulintang. These arts are spread in various areas in the Lampung region. In Lampung Province, one type of traditional music that still survives today is the Single Guitar/single petting.

This art presents elements of vocals and instruments, his guitar playing skills, and his song lyrics are mostly in the form of rhymes. One of the solo petting artists in Lampung who still preserves and plays this art is Edi Pulampas (55 years old), who is also a resource person in this study. According to him, this art has long developed in the community, he even learned this art from his father (interview January 20, 2018).

The song that sings poems contains advice, expressions of love at the time of ngiban/nganjang or ngababang/pampering a partner. The solo petting art uses Lampung language poetry, both the 'api' dialect and the 'nyow' dialect. In this study, the only petting art that was observed was the use of Lampung language poetry with the dialect of fire. Namely the dialect of the language used by people in the West Lampung, West Coast, Tanggamus, Pesawaran and South Lampung regions. The form of poetry in this single petting is called segata and the musical instrument used in the solo petting is a guitar.

Nowadays, solo petting art performances are rarely found, due to the increasing number of modern arts that are chosen by the community as their entertainment choices. Edi Pulampas, who is one of the artists who is still actively playing solo petting in the Talang Padang area, Tanggamus, stated that his performances are very rare, even people who consider his art in wedding celebration parties, or events such as village parties and the like have very rare.

Currently, the existence of a single petting art in Lampung society is enough to worry about its existence. Edi Pulampas, said that the public's response to this art was indeed not encouraging, due to the large number of modern arts that are currently favored by the people of Lampung. Another condition is that there are various ethnic groups in Lampung, and each of them has a unique art from their area of origin that they enjoy (interview 20 January 2019).

Given the situation, slowly the art of single petting is rarely performed. In order to overcome this, it is necessary to have efforts from various parties to maintain the existence of this single petting art so that it does not disappear in the community. Given the existence of valuable values that can be conveyed through the songs contained in it. Therefore, so that the art of single petting does not become extinct, various conservation efforts are needed, one of the inheritance efforts that can be done is through learning in the community. Because society is a place for generations of cultural heirs to gain knowledge and culture, thus this solo petting art is expected to be able to maintain its existence in the community.

Because the function of society is to maintain, develop, and realize the cultural values that are owned by the community itself. In addition, in the single guitar there are also poems which contain character values. But what characters are contained in this Lampung single guitar? This will be the focus of the author in this research.

Based on the background of the problem, the formulation of the problem in this study is what character values are contained in the Lampung Pesisir single guitar verse?

## **2. Methods**

The method used in this research is descriptive method. Descriptive method is a description as accurately as possible about a particular individual, symptom or group, a method used to solve the problem at hand, providing a clear picture of the situation and trying to describe it objectively with a view to revealing existing phenomena. The purpose of this method is to describe systematically, factually and accurately about certain facts and characteristics (Husin Sayuti, 1989:33). Based on the above objectives, this descriptive method is used to describe the character values contained in the poems on a single guitar. Data collection techniques were carried out by means of field observations, interviews with informants, documentation of research results, literature studies. The data analysis technique used in this research is qualitative data analysis technique.[2]

## **3. Results and Discussion**

### ***Lampung Province Overview***

Lampung Province was formed based on Law Number 14 of 1964 concerning the Establishment of Lampung Level I Regions dated March 18, 1964. Geographically, Lampung Province is located at a position of 103°40" (BT) East Longitude to 105°50" (BT) East Longitude and 3°45" (LS) South Latitude to 6°45" (LS) South Latitude. Lampung Province covers a land area of 35,288.35 km (Lampung in figures, BPS 2012) including 132 surrounding islands and bordering seas within 12 nautical miles from the coastline towards the open sea.

The area of the sea waters of Lampung Province is estimated to be approximately 24,820 km (Lampung coastal resource atlas, 1999). The coastline of Lampung Province is approximately 1,105 km, which forms 4 (four) coastal areas, namely the West Coast (210 km), Semangka Bay (200 km), Lampung Bay and Sunda Strait (160 km), and the East Coast (270 km). ). The administrative boundaries of the Lampung Province are:

- a) North side with South Sumatra and Bengkulu Provinces
- b) South side with the Sunda Strait
- c) East side with Java sea
- d) West side with the Indonesian Ocean.

Lampung Province with the capital city of Bandar Lampung, which is a combination of the Twin Cities of Tanjungkarang and Telukbetung, has a relatively large area and holds marine potential. The main ports are called Panjang and Bakauheni and fishing ports such as Fish Market (Telukbetung), Tarahan and Kalianda in Lampung Bay. While in Semangka Bay is Kota Agung and the Java Sea there are also fishing ports such as Labuhan Maringgai and Ketapang. Besides that, Menggala City can also be visited by fishing boats along the Way Tulang Bawang river, while for the Indonesian Ocean there is Krui Harbor.

The main airport is Radin Inten II which is the new name of Branti 28 Km from the capital via the State road to Kotabumi and the Air Force's airport is in Menggala called Astra Ksetra.

### **Value Concept**

According to Danandjaja, value is the understanding that a person has of something more important, what is better and what is not, what is right and what is not.

According to Mulyana, value is a belief and reference to determine choices.

According to Gordon Allport, value is a belief that can make a person take action based on his choice.

From some of the concepts above, it can be concluded that value is something valuable that we can get through awards or by using materials.

### **Character Concept**

According to Koesoema (2010: 3), character is a human anthropological structure, where humans live their freedom and live their limitations. In this case, character is not just an action, but is a result and a process. For this reason, a person is expected to be more aware of his freedom, so that he can be responsible for his actions, either for himself personally or for development with other people and his life.[5]

According to Kusuma, what is meant by character is the nature, style, or characteristic of a person that is formed or created and obtained from the surrounding environment.

From some of the definitions above, it can be concluded that character is a real trait that is shown by an individual without being made up. The character possessed by each person is essentially formed through learning processes that can be considered quite long and quite long. Human character is not created or brought from birth.

However, a person's character is formed as a result of being created or shaped by the people around us and formed by the surrounding environment.

The point is that character is formed not from birth. This character can be formed through various learning processes obtained from several places, such as at school, home, office, and in the environment around the person's residence. The parties who play an important role in the process of forming one's character are teachers, parents, family and peers.

A person's character will generally be in line with that person's behavior.

For example, if a person often does good activities or activities such as being helpful, polite in speaking, or respecting older people or others, then the most likely character that will be formed in that person is a good character.

Unlike the case with someone who has bad behavior on a daily basis such as stealing, criticizing, slandering, lying, saying dirty words, or other bad behavior, then the most likely character possessed by that person is a bad character.

The 18 values in character education that have been formulated by the Curriculum Center of the Research and Development Agency, Ministry of National Education are:

1. Religious

Obedient attitudes and behavior in carrying out the teachings of their religion, being tolerant of other religions, and living in harmony with followers of other religions.

2. Honest

Behavior based on efforts to make himself a person who can always be trusted in words, actions and work.

3. Tolerance

Attitudes and actions that respect differences in religion, ethnicity, ethnicity, opinions, attitudes, and actions of others who are different from themselves.

4. Discipline

Actions that demonstrate orderly behavior and comply with various rules and regulations.

5. Hard Work

Actions that show work behavior that is more than what is usually done.

6. Creative

Thinking and doing something to produce a new way or result from something you already have.

7. Independent

My attitude and behavior is not easy to depend on others to complete tasks.

8. Democratic

A way of thinking, behaving, and acting that evaluates the rights and obligations of himself and others equally.

9. Curiosity

Attitudes and actions that are always trying to find out more deeply and widely from something that is learned, seen and heard.

10. National Spirit

A way of thinking, acting and having insight that places the interests of the nation and state above the interests of themselves and their groups.

11. Love the Motherland

A way of thinking, acting and having insight that places the interests of the nation and state above the interests of themselves and their groups.

12. Rewarding Achievements

Attitudes and actions that encourage him to produce something useful for society, and recognize, and respect the success of others.

13. Friendly/Communicative

Attitudes and actions that are able to socialize with those around them.

14. Peaceful Love

Attitudes and actions that are able to tolerate each other, and can avoid disputes.

15. Likes to Read

The habit of taking time to read various readings that provide wisdom for him.

16. Care for the Environment

Attitudes and actions that always try to prevent damage to the surrounding natural environment, and develop efforts to repair the natural damage that occurs.

17. Social Care

Attitudes and actions that always want to help other people and communities in need.

18. Responsibility

The attitude and behavior of a person to carry out his duties and obligations, which he should do, towards himself, society, the environment (nature, social and culture), the state and God Almighty.

Of the 18 values above, which character values are possible in the single guitar verse.

### **Single Guitar/Single Petting Lampung Concept**

Single Guitar / Single Petting is one of the traditional arts originating from Lampung. The single guitar is usually used or performed at parties or traditional ceremonies in Lampung. In these traditional events usually involve the muli (girls) and mekhanai (bachelors). Single guitar is used to accompany the songs or songs sung by the muli and mekhanai alternately (sahut-sahatan). Single guitars are usually found and favored by the people of Lampung who have the Sai Batin or people who use the Api language dialect.

According to Hasan (1999), single/single petting guitar is a type of musical instrument that has a sound source coming from plucked strings.

Meanwhile, according to (Edi Pulampas, 2019) Single guitar is also a guitar that is played by only one person where that person plays his own musical instrument as well as he who sings the song with a high soul.

According to Erwinardo (2019), Guitar Tunggal is traditional Lampung music where only one singer plays the guitar. But there is also one that is played by a singer and a guitar player. It is called Single Guitar because in singing the song it is only accompanied by one guitar, not accompanied by drums, violins, tambourines or other accompaniment musical instruments.

### **Description of Research Results**

The study used interview techniques as the main tool used to collect data in this study. On that occasion the researcher interviewed 4 informants by means of structured interviews, namely interviews using guidelines in the form of questions that had been prepared in advance plus unstructured interviews in order to get deeper information, and unstructured interviews at the time of preliminary research while the results can be described as follows:

### **The History of the Coastal Lampung Solo Guitar**

In the 16th century the Arabs came to Lampung through the Kingdom of Banten along with the spread of Islam in Lampung. When spreading Islam in Lampung, the figure who

spread Islam brought and used gambus musical instruments for the benefit of da'wah. The gambus musical instrument used at the time of the spread of religion has a larger size than the typical gambus lunik musical instrument from Lampung. The gambus musical instrument used at the time of the spread of Islam in Lampung.

The people of Lampung, especially the saibatin people (people with the Api dialect), have since made a similar musical instrument, with a smaller size, which in the Lampung language is called gambus lunik. Since then the lunik gambus musical instrument has grown and developed so that it becomes a traditional musical instrument in the Lampung region. After the development of the lunik gambus musical instrument until around the 1960s this gambus musical instrument began to be abandoned due to the entry of a new musical instrument in Lampung, namely the conventional guitar. Conventional guitars are considered to be more attractive to young people for Lampung traditional music, which they are also expected to be the next generation of Lampung's single guitar. The creation of the Lampung Coastal Single Guitar was initiated by Lampung artists namely Hila Hambala, Edi Pulampas, et al in 1980. The Lampung Single Guitar was created because of the anxiety of the Lampung artists at that time, because the traditional music of Lampung Gambus Tunggal was less attractive to children young people, and young people at that time preferred conventional guitar instruments to Gambus Tunggal. This is what becomes the trigger for the emergence of a single guitar in Lampung, a type of music that is almost the same as a single gambus but uses a conventional guitar instrument.

Cultural acculturation between Lampung's single gambus and conventional guitars was what started the creation of the Lampung Pesisir single guitar. The beginning of the appearance of the Lampung single guitar was very extraordinary received by the people of Lampung because Lampung's single guitar music was considered different and interesting, and gave a new color to the music world of the Lampung region at that time. Therefore, classical Lampung single guitar music is considered as one of Lampung's traditional music, because most young people from Lampung, especially Lampung Coastal, like to play this Lampung classical guitar (interviews with Mr. Hila Hambala and Edi Pulampas, 2-9 October 2019) .

#### **The Value of the Character of the Single Guitar Poetry of Coastal Lampung**

Besides being known for the solemn voice of the single guitar and the voice of the singer, the Lampung Pesisir Single Guitar is also a traditional art in which each of its verse contains character values that are instilled by the songwriter. In this study, the author has selected 23 songs from 10 Lampung solo guitar artists and the sample songs were selected based on the songs that developed in Lampung society.

#### **4. Discussion**

Single Classical Guitar in Coastal Lampung is part of a culture that has a deep meaning for the people of Lampung. As for the purpose of this Single Guitar culture, it is a gathering place for the people of Lampung, besides that this culture is also carried out



with the aim of preserving the culture that has become the heritage and characteristic of the Lampung Coastal community.

Based on the results of research with several sources on the Lampung Pesisir single guitar, this solo guitar art tradition is an art in which the lyrics of the song have meaning and character values in it.

The character values that have been set by the National Education Office include religious, honest, tolerance, discipline, hard work, creative, independent, democratic, social care, curiosity, national spirit, love for the homeland, respect for achievement, friendly/communicative, love peace, love to read, care for the environment, and responsibility.

Based on the research results, Lampung Pesisir single guitar verse mostly has character values in it. However, from the character values that have been set by the National Education Office, not all indicators of the character values are included in the Lampung Pesisir single guitar verse. The indicators of character values contained in the Lampung Pesisir single guitar verse include:

1. Religious, found in the song:  
*anak ngukha, labuhanmu lain sai, lapah semanda, dan khasan mak jadi.*
2. Honest, found in the song : *anak ngukha, labuhanmu lain sai, pulipang, lapah semanda, jaoh jak hulun tuha, hakhuk jak lunik, benni midang, kumbang kupi, tetop ni imbun, di ikhak-ikhak, cinta mak togok, sesolan, tikhham jaoh, kilu babang, sungkan pujama, sakik ku diku, bitiyian dikhi, balin pilih, andah-andahmu, tiambin, khasan mak jadi, lapah semanda 2, dan manduh way di kecandang*
3. Tolerance, found in the song : *anak ngukha, labuhanmu lain sai, pulipang, lapah semanda, jaoh jak hulun tuha, benni midang, kumbang kupi, tetop ni imbun, di ikhak-ikhak, cinta mak togok, sesolan, kilu babang, sungkan pujama, sakik ku diku, bitiyian dikhi, balin pilih, andah-andahmu, tiambin, khasan mak jadi, lapah semanda 2, dan manduh way di kecandang*
4. Discipline, found in the song : *kumbang kupi, dan khasan mak jadi.*
5. Hard Work, found in the song : *anak ngukha, labuhanmu lain sai, pulipang, jaoh jak hulun tuha, benni midang, tetop ni imbun, di ikhak-ikhak, tikhham jaoh, sakik ku diku, bitiyian dikhi, balin pilih, andah-andahmu, dankhasan mak jadi.*
6. Creative, found in the song: *anak ngukha, labuhanmu lain sai, dan pulipang.*
7. Independent, found in the song: *anak ngukha, labuhanmu lain sai, pulipang, lapah semanda, jaoh jak hulun tuha, hakhuk jak lunik, benni midang, dan khasan mak jadi.*
8. Social Care, found in the song : *anak ngukha, pulipang, kilu babang, dan lapah semanda 2*
9. Curiosity, found in the song : *anak ngukha, labuhanmu lain sai, jaoh jak ulun tuha, kumbang kupi, sesolan, dan khasan mak jadi.*
10. Friendly/Comunicative, found in the song : *anak ngukha, pulipang, hakhuk jak lunik, benni midang, dan sakik ku diku.*
11. Love Peace, found in the song : *anak ngukha, labuhanmu lain sai, pulipang, lapah semanda, benni midang, tetop ni imbun, di ikhak-ikhak, cinta mak togok, sesolan, kilu babang, sungkan pujama, sakik ku diku, bitiyian dikhi, balin pilih, andah-*

*andahmu, tiambin, khasan mak jadi, lapah semanda 2, dan manduh way di kecandang*

12. Responsibility, found in the song : *anak ngukha, labuhanmu lain sai, pulipang, lapah semanda, dan khasan mak jadi.*

For example, in the lyrics of the song Anak Ngukha created by Edi Pulampas, the first stanza reads:

*Tepik lamban tepik jenganan  
Adek nakan wi.. kaka khek abang  
Nyak yu lapah nyepok haluan  
Sangun ki mawat wi.. ki kham busonan*

In the poem above, the character values contained in it are honest, social care, peace-loving, curiosity.

In the second verse of the song, Anak Ngukha, created by Edi Pulampas, reads:

*Pujejamaan kuti lah sungkan  
Khabai kantu wi..kuti mak senang  
Sipa ku kanik sekhta pakaian  
Kutti mak khila wi..khek ni tamadan*

In the poem above, the character values contained in it are love of peace, tolerance, friendship, care for the environment, honesty (interview with Mr. Edi Pulampas, October 2, 2019).

Another example is in Hila Hambala's lyrics to the song Lapah Semanda in the second verse which reads:

*Jambatan batu khaja  
82 dibangun  
Tekhjadi nyak ji semanda  
Tihanyuk dilalakun wi puakhi  
Tekhjadi nyak semanda  
Tihanyuk dilalakun*

In the poem above, the character values contained in it are Honesty, responsibility, tolerance, love of peace. While in Iwan Sagita's Tikham Jaoh song, all the song verses only have honest character values in it (interview with Hila Hambala, 7 October 2019).

## **5. Conclusions**

Based on the results of research and discussion, it can be concluded that the character values contained in the Lampung Coastal single guitar lyrics can be concluded that the Lampung Pesisir single guitar songs mostly have character values in them. honest,

tolerant, and peace-loving character. It means that the lyrics of Lampung Pesisir single guitar songs have educational value which is very important to instill character values in today's young generation.

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