OPEN INNOVATION FOR SUSTAINABLE TRANSFORMATION OF LOCAL RESOURCE AND COMMUNITY

International Conference on Innovation and Technology 2019

Institute of Research and Community Service Universitas Brawijaya (LPPM-UB)
Preface

International Conference on Innovation and Technology (ICIT) (http://icit.ub.ac.id) was the first international conference organised by the Institute of Research and Community Service, Universitas Brawijaya (LPPM-UB). It was held on 23-24th October 2019 at Ijen Suites & Resort, Malang-Indonesia.

ICIT 2019 is aimed to provide platform for exchange of experiences, innovation and technological changes/advances among academia, scientists, professionals, and/or business in global environment; to initiate collaboration in research and technology with local, national and international stakeholders; and to disseminate research results and its application to communities or industries. The conference was attended by 150 participants from Singapore, Malaysia, Australia, South Korea and Indonesia, with 92 presenters divided in five plenary talks. The conference topics include engineering, sustainable agriculture and agricultural engineering, basic science, information system and technology, green cities, green industries, management and business, social economic and community development, education, as well as health, medicine, and public health. Two platform of publications for the selected papers are the IOP Conference Series: Earth and Environmental Science (IOP: EES) and the Journal of Innovation and Applied Technology (JIAT).

We would like to express our gratitude to the authors for their paper contributions and the scientific committee for their valuable inputs. We would also like to appreciate the steering and organising committees for their supports and helps in organising this event. Finally, we would like to acknowledge LPPM–UB and Universitas Brawijaya for the financial support.

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THE IMPLEMENTATION OF EDMODO BASED LEARNING IN AUDIT COURSES

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ABSTRACT

IT has an important role in education. The increase of interest in the use of e-learning into teaching and learning become a crucial part. Edmodo is one of the learning media platforms that can be accessed for free. Edmodo is known as “The Facebook of Education”. This study aims to explore the implementation of Edmodo based learning in the Auditing course and to know the preferences of student using Edmodo. The research method used quantitative and qualitative to analyze the student’s perception of the implementation of Edmodo based learning. Data was collected by using questionnaires, interviews, and evaluation of the student’s task. The results of the study indicate that students can easily understand the features available in Edmodo because they are similar to Facebook, students feel they can easily communicate with lecturers and friends and easily access teaching materials sent by lecturers. The results also show that they enjoy using this platform because they can discuss their tasks using this media.

KEYWORDS
Audititing course, E-learning, Edmodo

INTRODUCTION

IT developments require lecturers to change their old paradigms in teaching. The use of IT has become an inseparable part of the teaching and learning process in higher education [1]. Students from this era are a different generation from the previous one because they were born in an era of technological change. This generation is known as “digital native” [2]. They spend their time using computers, the internet, smartphones and others. Therefore, they will be very easy to adapt to the use of IT in teaching and learning. This is supported by research conducted by [1] which found empirical evidence that the use of IT in Management Accounting courses can improve student learning outcomes. Conversely, [3] claims that IT integration in accounting subjects such as financial accounting, management accounting, and auditing is still very limited.

One digital platform that can be used in learning is edmodo-based e-learning. Edmodo is one of the social networking platforms used specifically in learning. Edmodo is known as Facebook for education because its appearance and features on Edmodo are almost the same as those on Facebook. This will greatly facilitate students to use it in online classes. Edmodo is claimed to be a social learning platform that makes students enjoy taking online classes [4] and can improve student's performance [5]. The results of previous studies prove that the use of Edmodo-based learning media can also increase student honesty and student confidence [6] also provide empirical evidence that Edmodo can improve student participation because students can participate in online class such as discussing with friends so that Edmodo can improve the closeness of relations between students and lecturers. This is supported by the research of [4] which provides empirical evidence that students are more interested in using Edmodo-based learning media because they can discuss in online forums. Based on this background, this study aims to determine the implementation and preferences of students using Edmodo for audit courses.

MATERIALS AND METHODS
This research uses quantitative and qualitative analysis. Quantitative analysis is used to determine the level of student preference when using Edmodo. Data collection was done using a questionnaire with a 4-point Likert scale consisting of strongly agree, agree, disagree and disagree. The research respondents were 130 students majoring in accounting. The sampling method uses purposive sampling. Students who became the research sample were students who had used Edmodo and were pursuing an Audit course. Students are asked to give opinions about their preferences using Edmodo including resource sharing, activities on Edmodo, features on Edmodo and evaluations. Then, the data are analyzed and grouped according to RASE (Resource, Activity, Support, Evaluation) to find out the highest student preferences. Whereas qualitative analysis was carried out to deepen research findings by conducting in-depth interviews with 25 informants.

RESULTS AND DISCUSSION

Edmodo Implementation in Audit Courses

First of all, students are introduced to Edmodo-based learning media. Students are instructed to open the edmodo.com website and are asked to create an account on Edmodo for the class they are taking by entering the class code that has been created by the lecturer. Students are very enthusiastic about creating an account on Edmodo because the appearance of Edmodo is similar to Facebook. Students can easily understand the features in Edmodo. Following is the display of one of the student accounts.

After students have an account at Edmodo, the next step is to introduce more in-depth features and ways to use Edmodo. First, students were given an announcement regarding the course syllabus that was followed and students were asked to download the syllabus from Edmodo. If there are questions or problems related to the syllabus, students can click "replay" on the Edmodo wall. The following is an Edmodo wall display when the lecturer sends a syllabus in the form of a docx file. and the response of students who "like".

Figure 1. Example Of Student Account On Edmodo
Edmodo is very effective when lecturers want to provide assignments for students where the lecturer can save assignment files in the "library" and this media also makes it easier for students to submit assignments. Assignments can be given in the assignment menu and lecturers can set the duration of students to do the assignment. In addition, students can also discuss with each other, provide comments and questions through the wall because it's the same as on Facebook. All student activities will be transparently monitored by the lecturer as follows.

Edmodo also has a QUIZ feature that can be used by lecturers to make quizzes, midterm and final exam. The form of questions can be multiple choice, short answers, true false, match or essay questions. By using this feature, lecturers do not need to calculate the scores generated by students because Edmodo has automatically generated these scores. However, this only applies to multiple choice questions, true false, concise and matching answers. Students are very happy to use this media when midterm or midterm because they can find the correct answers after completing the quiz and immediately know their grades. Following are the QUIZ that have been conducted by lecturers.
After the lecturer makes the questions, the lecturer posts the quiz so that it can be accessed by students. From the following picture it appears that there are 32 students who have already worked on the quiz and the number of questions is 33 questions. In this feature, lecturers can provide restrictions and duration of the quiz so that Edmodo will close automatically if the duration of working on the quiz exceeds what has been determined by the lecturer. Questions can also be randomized by the system automatically.
Student Preferences Using Edmodo as a Resource Sharing

To measure the level of student preferences about Edmodo as a resource sharing forum, there are 5 indicators used namely ease of identifying teaching materials, ease of accessing material / teaching materials from lecturers, the existence of unlimited digital library features that are useful for storing data, the preview feature, and the presence of "Filter by post search option". The five indicators are measured on a Likert scale namely Strongly Agree (4), Agree (3), Less Agree (2) and Disagree (1). Table 1 below shows how high the preference of students to use Edmodo as a resource for resource sharing based on the five indicators.

Table 1 shows the preferences of students using Edmodo as a resource sharing with lecturers, students and between students. The results of data analysis from the questionnaire showed that students agreed to use the resources sharing function in Edmodo such as digital libraries, teaching materials and others easily and quickly. Students also emphasized that the ease of accessing material / material from lecturers that can be downloaded from Edmodo is the main reason students use Edmodo.

<table>
<thead>
<tr>
<th>Students Preferences</th>
<th>Mean</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of identifying teaching materials</td>
<td>2.90</td>
<td>Agree</td>
</tr>
<tr>
<td>Ease of accessing teaching materials from lecturer</td>
<td>3.20</td>
<td>Agree</td>
</tr>
<tr>
<td>There are unlimited digital library features that are useful for storing data</td>
<td>3.13</td>
<td>Agree</td>
</tr>
<tr>
<td>The existence of “Filter by post search option”</td>
<td>2.63</td>
<td>Agree</td>
</tr>
<tr>
<td>Preview</td>
<td>3.10</td>
<td>Agree</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2.99</strong></td>
<td><strong>Agree</strong></td>
</tr>
</tbody>
</table>

Table 2. Preferences of students using Edmodo related activities on the Edmodo platform

To measure the level of student preferences regarding Edmodo related activities on this platform, there are 5 indicators used namely the discussion / forum feature to communicate with lecturers, the discussion / forum feature to communicate with my friends, ease of accessing video files, slides and the others sent by lecturers, easy access to video files, slides and others sent by friends, and the existence of online quiz features. The five indicators are measured on a Likert scale namely Strongly Agree (4), Agree (3), Less Agree (2) and Disagree (1). Table 2 below shows how high the preferences of students using Edmodo related to activities on the Edmodo platform based on the five indicators.

Table 2 shows the preferences of students regarding their activities on Edmodo. From the 5 indicators used, the preference of students to use Edmodo is because of its ease of accessing files in the form of docx, videos, slides and others sent by lecturers. Discussion forums have the lowest mean value because students more often use whatsup (WA) with their lecturers and friends. They revealed that they were not always online and also did not access Edmodo every time, so they rarely communicated using these features.

<table>
<thead>
<tr>
<th>Student preference</th>
<th>Mean</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is a discussion or forum feature to communicate with lecturer</td>
<td>2.86</td>
<td>Agree</td>
</tr>
<tr>
<td>There is a discussion or forum feature to communicate with friends</td>
<td>2.90</td>
<td>Agree</td>
</tr>
<tr>
<td>Ease of accessing video files, slides and others sent by lecturers</td>
<td>3.43</td>
<td>Agree</td>
</tr>
<tr>
<td>Ease of accessing video files, slides and others sent by lecturers</td>
<td>3.36</td>
<td>Agree</td>
</tr>
<tr>
<td>Online quiz feature</td>
<td>3.06</td>
<td>Agree</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3.12</strong></td>
<td><strong>Agree</strong></td>
</tr>
</tbody>
</table>
Student Preferences Using Edmodo related to "support"

To measure the level of student preferences regarding Edmodo related support provided by the Edmodo platform, there are 4 indicators used namely online help desk, communication between lecturers and students is very fast, there is an appointment feature, communication between students is very fast. The four indicators are measured on a Likert scale namely Strongly Agree (4), Agree (3), Less Agree (2) and Disagree (1). Table 3 below shows how high the preferences of students using Edmodo related to support on the Edmodo platform based on the four indicators.

Table 3. Student preferences for using Edmodo related to support on the Edmodo platform

<table>
<thead>
<tr>
<th>Student preference</th>
<th>Mean</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>The existence of online help desk</td>
<td>2.76</td>
<td>Agree</td>
</tr>
<tr>
<td>Communication between lecturers and students is very fast</td>
<td>2.63</td>
<td>Agree</td>
</tr>
<tr>
<td>There is an appointment feature</td>
<td>2.20</td>
<td>Agree</td>
</tr>
<tr>
<td>Communication between students is very fast</td>
<td>2.70</td>
<td>Agree</td>
</tr>
<tr>
<td>Total</td>
<td>2.57</td>
<td>Agree</td>
</tr>
</tbody>
</table>

Table 4 shows that students really like Edmodo because of the online helpdesk feature that can ask at any time the obstacles encountered in using Edmodo. In addition, communication between students who are fast response also encourages students to use Edmodo media in learning. However, the appointment feature has the lowest mean which means that students rarely make appointments with lecturers through Edmodo because they prefer the use of WA when making appointments with lecturers and they assume that lecturers respond faster via WA compared to using Edmodo.

Student Preferences Using Edmodo related to Evaluation with Edmodo

To measure the level of student preferences regarding Edmodo related to the support provided by the Edmodo platform, there are 4 indicators used, namely the presence of an assignment feature that can be used by lecturers and students to send assignments, the assignment feature allows students to respond to assignments sent by other students, icons used by lecturers as feedback to motivate students, and the presence of "badges" features provided by lecturers that can motivate students. The four indicators are measured on a Likert scale namely Strongly Agree (4), Agree (3), Less Agree (2) and Disagree (1). The following table 4 shows how high the preferences of students using Edmodo related to the evaluation tools on the Edmodo platform based on the four indicators.

Table 4. Student preferences for using Edmodo related to evaluations on the Edmodo platform

<table>
<thead>
<tr>
<th>Student preference</th>
<th>Mean</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>The presence Assignment features that can be used by students to submit assignments</td>
<td>2.87</td>
<td>Agree</td>
</tr>
<tr>
<td>The presence of an assignment feature allows students to respond to assignments sent by other students</td>
<td>2.77</td>
<td>Agree</td>
</tr>
<tr>
<td>The icons are used by lecturers as feedback to motivate students</td>
<td>3.00</td>
<td>Agree</td>
</tr>
<tr>
<td>The icons are used by lecturers as feedback to motivate students</td>
<td>2.87</td>
<td>Agree</td>
</tr>
<tr>
<td>Total</td>
<td>2.87</td>
<td>Agree</td>
</tr>
</tbody>
</table>

Table 4 shows that students like Edmodo because lecturers often use icons that can motivate them. In addition, the presence of assignments also makes it easy for them to send assignments given by the lecturer. Besides that, the negative side of the ease of sending this assignment is that other students can easily do plagiarism / copying the assignments sent by other students.
REFERENCES


MOUNT BROMO ERUPTION DISASTER PREPAREDNESS WITH ANDROID MOBILE BASED APPLICATION

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ABSTRACT

In the last 10 years, Mount Bromo has erupted three times; 2010, 2015 and 2019. However, it is unique that the Tengger people are reluctant to evacuate even though Mount Bromo is erupting and releasing volcanic material such as stones and dust. Mount Bromo itself is a mountain made by caldera with an area about 10 square kilometers. This makes Mount Bromo relatively safe while an eruption occurs because volcanic material with a large size and weight will fall around the caldera, the only dust that is blown by the wind will be continued as far as miles from the Bromo caldera which depends on the wind direction. Using the smartphone application as the Mount Bromo information facilities are one of an effort so that people and tourists can activate if an eruption occurs. There is important information about features made in the application such as distribution shelters, evacuation routes, health centers, photos, videos, and other important information. Assessment results to the application interface, the information conveyed, and also the features offered show that the application is very useful and gives a new perspective in conveying accurate information to the public and also tourists. The community satisfaction level is also quite good with the services provided by the Bromo preparedness application. Great expectations from the public and also respondents can see Mount Bromo further through CCTV cameras that are directly connected to the Android application.

KEYWORDS

Bromo Preparedness, Eruption, Evacuation, Shelter, Android Application

INTRODUCTION

Mount Bromo is favorite destination tourism for the local tourist and foreign tourist. “Bromo Alert” Applications created and launched, to become one of the references to the public related to the important information in the Mount Bromo area. Bromo Alert Applications is an application based on Android. This application is only available on the Google Play Store and will not be found on Apple’s App Store. In the 10 years past, Mount Bromo in East Java often occurs eruption, starting from 2010, 2015 to 2019. The application is one of the efforts for the public to know the Mount Bromo current condition, and how to prepare against the Mount Bromo eruption hazard. Figure 1 is an application interface with the smartphone’s view.
MATERIALS AND METHODS

There are two important parts in conducting this research, namely: (1) making an android application and (2) product feasibility testing. Explanation of android application with the name Bromo Alert will be described in the explanation below, as well as methods of product assessment feasibility is described more detail in sub-chapter below.

Android Application

Applications Bromo Alert has several features, namely, the weblog features at Home, Shelter, Vlog, and also CCTV. In launching this application, all the information and field findings results are the result of research that is conducted by a team of researchers from the Department of Regional and Urban Planning, Universitas Brawijaya, Malang. So the most major information and news that is presented in the application is the result of the research. A description of the features in the application as follows.

Home

This feature is the information related to Mount Bromo such as the history and eruption events of Mount Bromo, how eruptions occur, favorite tourism destination (major spot of Penanjakan to see the sunrise, Whispering Sand, Teletubbies Hill, Mount Batok, and so on). These features appear in the format of a weblog which the material will be displayed in such a form, the news will appear in the layer of smartphones based on the latest manuscripts was posted last time.

This feature is one of an important feature of this application. Is a collection of shelter distribution with attributes such as the shelters distribution, public infrastructure distribution, and the nearest residential area. The shelter distribution map and also the evacuation route can be accessed by scanning the available QR Code at each location. Examples of the use of QR code and an evacuation map can be seen in Figure 2 and Figure 3 below. By scanning the QR Code that exists at the shelter points specified in the potential location such as hall village, lodging, open space, mosques, schools, health centers, and temples, so public can know the shelter distribution that already displayed in lane evacuation map [1].
In the shelter feature also provided information about the shelter, such as: building name, building location, floors number, capacity, and it is located in the zone of KRB (Disaster Prone Area). On the shelter features are also providing direction facilities, where the application customers can easily reach the shelter with click button direction and the user will be guided by the map-based application to reach the shelter location along with a description of travel time that is required. Figure 3a and 3b are figures related to shelter information, while Figure 3c shows the travel time that required to reach the shelter by using google maps technology. In Figure 3c is mode direction figure if about to head to the shelter from current locations point. With google maps facilities the meeting of the two points will be immediately known how the travel distance from the location point is toward the shelter point or to the public service point. Direction services provided in the shelter feature and the feature is
inherent in the application and can be used well as long as they are internet signal at the location.

**Vlog**

In the following feature, the information that will be obtained by the user is a video that has been uploaded by vloggers of Mount Bromo tourist. From this vlog, the tourist will receive information in a different form, especially for the foreign tourist. Deliberately displayed in the form of a vlog, due to the tendency of generation Y and Z who are more active in using smartphones. The intensity of the community in using smartphones, not only in the form of news, blogs, or social media but also access videos on the YouTube page.

**CCTV**

This feature is a means for the public to know the current and updated condition, especially the view that instantly shows the latest Mount Bromo condition in LIVE. In the activities implementation plan, the cameras will be scattered at some point which is flanked directly to the Mount Bromo. By knowing the current condition of observed Mount Bromo, expected that the public will be more beware and avoid hoax news who often associate the condition after the eruption of Mount Bromo with another issue. If the Mount Bromo eruption happened, people just have to look at the CCTV that can be viewed through applications Bromo Alert, so that the public can be spared from hoax news exaggerated by people who do not take responsibility.
**Assessment and Analysis**

To assess the android application feasibility, the team did some assessment methods they are Importance Performance Analysis (IPA) and GAP Analysis.

**Importance Performance Analysis (IPA)**

Since Matrilla and James researching IPA methods in 1977, IPA framework has been popular among the researchers in the study of service quality. [2] Simple tools such as Importance-Performance Analysis are very simple in applications to evaluate service quality. In this analysis, examining not only analyze the performance attributes, but also the importance of items such as determinant factors in satisfaction for the respondent [3]. IPA method has proven to be a tool that applies common that just to interpret the results in the wide use between the researchers in various fields and many research subjects. IPA is a way to promote the effective development strategy because the method is to facilitate the attributes interpretation and improve usability in decision-making and also determine the strategy [4].

There is a significant relationship between service quality and service user satisfaction which has an influence on decisions for the continued use of services. When someone decides to choose, that person believes and look for the best service quality which was promised by the services provider. Customers were satisfied with the service quality that he got, would recommend to others to use the service so it can gain the service experience satisfaction that is equally or even better [5].

The assessment level result of important service attributes in IPA methods is plotted a vertical axis (y) and the assessment level result of performance attributes is plotted a horizontal axis (x). The value of the service level and interest divides the grid into the four quadrants; Q1 (Keep up the Good Work), Q2 (Concentrate Here), Q3 (Low Priority), and Q4 (Possible Overkill). Although IPA method has been regarded as an effective technique, many researchers propose several approaches and conceptions are modified, based on two implicit assumptions about traditional IPA methods. [6] In this study, sub-attributes were collected in three variables groups; (1) visual aspects of the application, (2) responses from users, and (3) main features quality of the application. There were around 110 respondents in the study to test the feasibility of the Bromo Alert application with 5 levels of assessment; 1 for the worst value and 5 for the best.

**GAP Analysis**

The GAP Analysis is used to determine service levels differences of all used variables in research. With the GAP analysis, it could be to target the required attributes improvement, attributes, and variables that require more attention and also know the application weaknesses based on the user’s opinion. GAP analysis is expected to produce a recommendation that is appropriate for the application of Bromo Alert service improvement. To assess the feasibility of application of Bromo Alert, the GAP analysis can be used to identify the attributes which have the most important aspect based on the interest value compared with the application performance value.

**RESULTS AND DISCUSSION**

The attributes used for IPA assessment are (1) application interface; user-friendly, eye-catching, color, icon, and application name, (2) feedback from users; comment, and notification, (3) main features of application; uniqueness, importance level, and simple. Table 1. is the result of the calculation based on the respondent's opinion. From Table 1, it can be seen that respondent provide feedback based on their experience using the application of Bromo Alert.
Table 1. The Result of Importance- Performance Analysis

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Attribute</th>
<th>Coordinate of Attribute</th>
<th>GAP</th>
<th>Perf-Imp</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>$X = \frac{\sum X}{K}$</td>
<td>$Y = \frac{\sum Y}{K}$</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>A.1</td>
<td>Interface of App</td>
<td>4.31</td>
<td>3.94</td>
<td>0.37</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>User friendly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>A.2</td>
<td>Eye catching</td>
<td>4.60</td>
<td>3.99</td>
<td>0.61</td>
</tr>
<tr>
<td>3</td>
<td>A.3</td>
<td>Nice colors</td>
<td>4.34</td>
<td>4.33</td>
<td>0.01</td>
</tr>
<tr>
<td>4</td>
<td>A.4</td>
<td>Icon of App</td>
<td>4.69</td>
<td>4.37</td>
<td>0.32</td>
</tr>
<tr>
<td>5</td>
<td>A.5</td>
<td>Name of App</td>
<td>4.37</td>
<td>4.18</td>
<td>0.19</td>
</tr>
<tr>
<td>B</td>
<td>B.1</td>
<td>Feed Back Features</td>
<td>2.99</td>
<td>3.78</td>
<td>(0.79)</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Comments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>B.2</td>
<td>Notification</td>
<td>2.38</td>
<td>3.42</td>
<td>(1.04)</td>
</tr>
<tr>
<td>C</td>
<td>C.1</td>
<td>Uniqueness</td>
<td>2.46</td>
<td>4.47</td>
<td>(2.02)</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>C.2</td>
<td>Importance</td>
<td>2.29</td>
<td>4.41</td>
<td>(2.12)</td>
</tr>
<tr>
<td>10</td>
<td>C.3</td>
<td>Simple and easy</td>
<td>3.41</td>
<td>4.66</td>
<td>(2.25)</td>
</tr>
</tbody>
</table>

The following explanations describe each IPA quadrant following the results in Table 1 above:

1. "Keep Up The Good Work" Quadrant (I)
   According to respondents, the application display color is very good, with the application name that is easy-knowing, as well as the application icon selection.

2. "Concentrate Here" Quadrant (II)
   While the application uniqueness, interest and also the application simplicity needs to be increased again. It is seen from the user’s satisfaction level are quite low, with a mean only on the value of 2.25 up to 3.41. By thus, need to increase the attribute applications performance.

3. "Low Priority" Quadrant (III)
   Comment and notification attributes are not a service priority of the application. Can be seen in Table 1 above where application public users were sufficient to service these and also not consider that service is important in the application.

4. "Possible Overkill" Quadrant (IV)
   In this quadrant, there are two attributes: user-friendly and eye-catching. Based on the results of the questionnaire, this attribute is not very significant. This attribute is quite important for the users and has been offset well by the excellent service of application of Bromo Alert.

While GAP with quite significant value based on the questionnaire results, there is main features attribute of the application such as uniqueness attribute, importance levels, and application simplicity. The value difference was pretty big and require little services improvement effort. The GAP value difference that occurs on the attributes of this until 2.16 on importance level attribute and 2.02 at the uniqueness attribute, it shows that users feel less satisfied with these attributes. By knowing the GAP was pretty much on the interest level and the service level given by the application, then the services increase concentration can be focused on the attributes mentioned above. While other attribute inclined already provide better services even exceed the application user expectation level.

CONCLUSION

Based on the assessment results using IPA and GAP Analysis methods, it can be seen how the application users’ opinions based on the attributes and variables used as assessment material on the application of Bromo Alert. Visually, the user application was very satisfied with the whole application's appearance. This is shown from the visual display attributes position that is in quadrant I and IV. While the attributes that require a lot of improvement are in the main function’s attributes such as the application importance level, the ease, and simplicity of application use, and application uniqueness. Users want the attributes performance can be increased again because for them the attributes are the main features that should be able to serve for
the user application.

Android-base application with the name Bromo Alert is an information digital means related to tourism area Mount Bromo as well as efforts to improve the community capacity and tourist in terms of preparedness Bromo eruption disaster. We think it is important because the Mount Bromo area is one of the main destination’s tourists in East Java with high-level visits. Application is expected to be able to provide education to the user application, this would only be an impact on the increasing awareness and society preparedness when Mount Bromo eruption. Others preventive effort can learn and read through the application of Bromo Alert as a reference for the user application from the public and also the tourist.

ACKNOWLEDGMENT

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REFERENCES


THE INFLUENCE OF WARM COMPRESS AND PROGRESSIVE MUSCLE RELAXATION THERAPY IN DECREASING JOINT PAIN TO ELDERLY AT POSYANDU LANSIA RW 04 KELURAHAN BANGSAL KOTA KEDIRI

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ABSTRACT
Aging is a natural process that cannot be avoided and running continuously. The Elderly experience a decrease in the musculoskeletal system. Changes in the musculoskeletal system are characterized by pain and stiffness in one or more joints. Pain management does not always have to use drugs, but there are some nursing measures that can be given to relieve pain such as relaxation therapy, for example TROP (Progressive Muscle Relaxation Therapy) and can also provide cutaneous stimulation in the form of warm compress. The research design used was Pre Experiment pre-post test design. The study population was all elderly who experienced joint pain. The samples were 36 respondents, which were divided into two intervention groups. Sampling method used purposive sampling technique. Data collected by using Numerical Rating Scale (NRS). Data were analyzed using Wilcoxon signed ranks test with α = 0.05. The results of the Wilcoxon signed ranks test were performed in the warm compress intervention group and TROP p = 0.000, which shows that both interventions affected joint pain reduction. Statistical test results also show that the TROP intervention is more effective in reducing pain, this is evidenced from the TROP Z value < warm compresses Z value and 18 respondents in the warm compress intervention group experienced a decrease in pain scale on average 1.45 and in the TROP intervention group experienced decrease in pain scale on average 1.61. The conclusion of this study is TROP and warm compresses can be used to reduce joint pain scale in the elderly, although statistically shows that TROP intervention is more effective in reducing pain.

KEYWORDS  
Warm compress, Muscle relaxation, Therapy

INTRODUCTION
Aging is a natural process that cannot be avoided, running continuously and continuously [1]. Elderly people experience a decrease in the musculoskeletal system. Changes in the musculoskeletal system are characterized by pain and stiffness in one or more joints, usually on the hands, wrists, legs, knees, upper and lower spines, pelvis, and shoulders [2]. Joint pain in the elderly classified as chronic pain because it is permanent. Chronic pain in the elderly can cause the elderly to be very dependent on others, loss of self-confidence, and disturbed patterns of daily activities. Nowadays many elderly who experience joint pain do not know much about non-pharmacological management of pain. Actions to relieve joint pain are not only pharmacologically but also non-pharmacologically such as relaxation techniques, such as progressive muscle relaxation therapy. Progressive muscle relaxation technique is a relaxation therapy given to the client by tensing certain muscles and then relaxation. Progressive relaxation is one way of relaxation techniques combining deep breathing exercises and a series of series of contractions and certain muscle relaxation [3]. Progressive muscle relaxation techniques focus on muscle activity by identifying tense muscles and then reducing tension by using relaxation techniques.
to get a relaxed feeling [4]. Besides TROP, there are some nursing actions that can be given to relieve pain, for example by giving a Warm Compress. Warm compresses are very useful as a means of muscle relaxation. Warm water can flex the body, restore muscle stiffness and heat vapor resulting in enlarged blood vessels, open the pores of the skin and encourage perspiration and relax muscles and limbs so as to relieve joint and muscle pain [5].

Sufferers of joint pain worldwide have reached 355 million. It is estimated that this number continues to increase until 2025 with an indication of more than 25% will experience paralysis. The World Health Organization (WHO) reports that 20% of the world’s population has joint pain. Where 5-10% are those aged 5-20 years and 20% those who are 55 years old (Wiyono, 2010). Lecturers and students of STIKES Kediri Baptist Hospital carried out community service at the Posyandu Elderly, when given inspection services at the Posyandu Elderly RW 04 Bangsal Village, Kediri City in 2017 found that the majority of the elderly complained of joint pain and did not know how to handle it.

The reduced function of various elderly organs becomes susceptible to diseases that are acute or chronic. There is a tendency for degenerative diseases, metabolic diseases, psychosocial disorders, and infectious diseases to increase [6]. Although there is no therapy that can stop the degenerative process, certain preventive measures can be taken to slow down the process if it is tried early enough. Here the role of nurses in overcoming joint pain in the elderly is very important, namely by providing health education to reduce joint pain and also teaching the elderly to do progressive muscle relaxation therapy independently by demonstration. Other efforts to overcome joint pain in the elderly can be done with non-pharmacological measures such as physical exercise and warm compresses. Progressive muscle relaxation is a relaxation therapy by tightening and relaxing the muscles in one part of the body at a time to provide a feeling of physical relaxation. The progressive tightening and relaxation of these muscle groups is performed successively [7]. In this relaxation exercise individual's attention is directed to distinguish the feelings experienced when muscle groups are relaxed and compared when muscles are tense. One of the goals of TROP is to reduce muscle tension, anxiety, neck and back pain. Warm compresses are very useful as a means of muscle relaxation. Warm water can flex the body, restore muscle stiffness and heat vapor resulting in enlarged blood vessels, open the pores of the skin and encourage perspiration and relax muscles and limbs so as to relieve joint and muscle pain [5]. The specific purpose of this study was to analyze the differences in the effectiveness of warm compresses and progressive muscle relaxation therapy in Reducing Joint Pain in the Elderly at Posyandu Lansia RW 04, Bangsal Village, Kediri City.

MATERIALS AND METHODS

The study was conducted at Posyandu Lansia RW 04, Bangsal Village, Kediri City. Pre experimental research design through two group pretest and posttest design approaches. The study population was all elderly in Posyandu Lansia RW 04 Kelurahan Bangsal Kota Kediri who experienced joint pain. The sampling technique uses purposive sampling with a total of 36 respondents, then divided into 2 groups who will get warm compress therapy or progressive muscle relaxation therapy. This research through a research ethics test before data collection. After the ethical test, the researcher submits a research permit to the research location and waits for the permit answer. The researcher conducted apperception with the research members in the process of collecting data. Furthermore, researchers carry out the process of data retrieval. Data collection process, the researcher introduces himself to prospective respondents and conducts an assessment of respondents to measure the scale of joint pain experienced by respondents. The researcher provides an explanation to the respondent regarding the research carried out
including: Definition, objectives, procedures / implementation, time, benefits, and rights of the respondent and provides an explanation that the respondent may resign if the respondent feels uncomfortable. The researcher asks the respondent's approval to become a research respondent as evidenced by the signing of the informed consent.

This research was conducted by measuring the joint pain scale in the elderly by using the Numerical Rating Scale (NRS) before and after therapy. The researcher carries out the process of stabilizing data and providing interventions according to the procedure of action.

Before giving an intervention, the respondent measured the joint pain scale first. Group 1 with researchers 1 and group 2 with researchers 2. Data collection was carried out for 2 weeks and the time required for each intervention for 20 minutes in the warm compress intervention group and twice a week for 2 weeks for the TROP intervention group. Furthermore, after therapy is completed, the elderly joint pain scale is measured again.

**RESULTS AND DISCUSSION**

**Results of Measurement of Elderly Joint Pain Scale**

Table 1 and 2 show that before warm compress therapy or progressive muscle relaxation therapy 100% of the elderly experience joint pain ranging from pain scale 4 to 7 and after therapy there is a decrease in joint pain scale, on a scale of 2 to 6.

The cause of joint pain is unknown. But there are several factors that influence namely: genetic, environmental, hormonal, and immunological. The impact of this situation can threaten the lives of sufferers or just cause a disturbance of comfort. Problems caused by joint pain are not only in the form of obvious limitations on mobility and activities of daily living as well as unclear systemic effects, but can cause organ failure and death or cause problems such as pain, fatigue, changes in self-image, as well as sleep disorders [8].

From the data obtained by researchers in the elderly before given the intervention obtained results of 6 respondents (16.7%) elderly experiencing joint pain on a scale of 7 (severe pain category). Elderly people experience a decrease in the musculoskeletal system. Changes in the musculoskeletal system are characterized by pain and stiffness in one or more joints, usually in the hands, wrists, legs, knees, upper and lower spines, pelvis, and shoulders [2].

<table>
<thead>
<tr>
<th>Scale of Joint Pain</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount</td>
<td>Percentage (%)</td>
<td>Amount</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>16.7</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>33.3</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>33.3</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>16.7</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale of Joint Pain</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount</td>
<td>Percentage (%)</td>
<td>Amount</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>44.4</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>27.8</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>16.7</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>100</td>
</tr>
</tbody>
</table>
According to researchers, joint pain experienced by the most dominant respondents is moderate pain as many as 30 respondents, this is caused by more than 50% of elderly aged 60-74 years. Elderly aged 60-74 years the protective layer of the joint begins to thin out and bone fluid begins to thicken, causing the body to become stiff and sore when moved. Therefore, respondents who have lived long, especially over 60 years, have a higher risk of developing joint pain. In addition, it can also be caused by hereditary factors from parents, wrong eating patterns, activities that are too strenuous especially those that use a lot of support on the joints excessively.

Analysis Test Results
a. Data Normality Test
Aims to find out whether the sample from the population obtained is normally distributed or not. By looking at the number of samples in this study, 36 samples, the saphiro wilk test is used as a data normality test, because the test is more accurate for samples with less than 50. The results of the saphiro wilk test can be seen in the Table 3.

From Table 3 shows that the distribution normality test results obtained data in the Warm Compress Treatment group before the intervention obtained $p = 0.043$ ($p < 0.05$) which means that the data distribution is not normal and after the intervention obtained $p = 0.002$ ($p < 0.05$) which means that the data is not normally distributed. In the TROP treatment group before the intervention $p = 0.024$ ($p < 0.05$) which means the data is not normally distributed, after the intervention $p = 0.123$ ($p > 0.05$) which means the data is normally distributed. From the results of the normality test, the research hypothesis test was established, among others (1) Hypothesis I test, which is the comparison before and after the intervention of the Warm Compress treatment group using the Wilcoxon sign rank test. (2) Hypothesis II test is a comparison before and after the intervention of the TROP treatment group using the Wilcoxon sign rank test.

Based on table 4 the Wilcoxon Signed Rank Test statistic above the Z value of -3.601 with the significant level specified being $\alpha = 0.05$ and the value of $p = 0.000$, then the results of the data group value are $p < 0.05$ which means H1 is accepted, then it can be concluded that there is an effect of warm compress action on joint pain in the elderly.

Warm compresses are actions that aim to meet the needs of comfort, reduce or relieve pain, prevent muscle spasms, and provide warmth to the parts of the body that need them [3]. Warm compresses are very useful as a means of muscle relaxation. Warm water can flex the body, restore muscle stiffness and heat vapor resulting in enlarged blood vessels, open the pores of the skin and encourage perspiration and relax muscles and limbs so as to relieve joint and muscle pain [5].
Table 3. Shapiro Wilk Normality Test Results in Posyandu Elderly RW 04 Kelurahan Bangsal Kota Kediri in June-July 2019 (n = 36)

<table>
<thead>
<tr>
<th>Data Group</th>
<th>Shapiro-Wilk Test p-value</th>
<th>Distribution Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before the Warm Compress Group Intervention</td>
<td>0.043</td>
<td>Abnormal</td>
</tr>
<tr>
<td>After the Warm Compress Group Intervention</td>
<td>0.002</td>
<td>Abnormal</td>
</tr>
<tr>
<td>Before TROP Group Intervention</td>
<td>0.024</td>
<td>Abnormal</td>
</tr>
<tr>
<td>After TROP Group Intervention</td>
<td>0.123</td>
<td>Normal</td>
</tr>
</tbody>
</table>

Table 4. Wilcoxon Statistical Test Results Signed Rank Test Effect of Warm Compresses on Joint Pain in the Elderly at Elderly Posyandu RW 04 Kelurahan Bangsal Kota Kediri in June-July 2019 (n = 18)

<table>
<thead>
<tr>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post – Pre Intervention Warm Compress</td>
<td>Negative Ranks 16&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8.50</td>
</tr>
<tr>
<td></td>
<td>Positive Ranks 0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>Ties 2&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total 18</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post - Pre</th>
<th>Z</th>
<th>Asymp. Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-3.801&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.000</td>
</tr>
</tbody>
</table>

From the results of the study after being given a warm compress, the joint pain scale was measured again using the Numerical Rating Scale in the elderly in Posyandu Elderly RW 04 Bangsal Urban Village of Kediri found 16 respondents (88.9%) of the elderly experienced a decrease in the joint pain scale. This is in line with Peni's theory [54] that one of the non-pharmacological therapies that can overcome insomnia is laughter therapy. Laughter stimulates the release of the endorphin hormone, also known as morphine, to facilitate blood circulation, making the body more comfortable, relaxed, and easier to sleep. Warm water can flex the body, restore muscle stiffness and heat vapor resulting in enlarged blood vessels, open the pores of the skin and encourage perspiration and relax muscles and limbs so as to relieve joint and muscle pain. Based on research that has been done by researchers when giving warm compress treatment to the elderly in areas that experience joint pain makes the elderly feel relaxed and increase comfort.

As many as 16 respondents (100%) expressed the benefits of warm compresses and would do warm compresses at home if they felt joint pain. There is a decrease in the scale of joint pain in the elderly before and after the administration of warm compresses, because the administration of warm compresses gives a relaxed sensation to stiff muscles so that the joint pain scale decreases after warm compresses. Pain management does not always have to use drugs, by using warm compresses it can also reduce the scale of joint pain felt by the elderly.

Based on table 5 the Wilcoxon Signed Rank Test statistic above the Z value of -3.817 with the significant level specified being α = 0.05 and the value of p = 0.004, the results of the data set are p <0.05 which means H1 is accepted, it can be concluded that there is an effect of progressive muscle relaxation therapy on joint pain in the elderly.

Progressive muscle relaxation technique is a relaxation therapy given to the client by tensing certain muscles and then relaxation. Progressive relaxation is a way of relaxation techniques combining deep breathing exercises and a series of contractions and certain muscle relaxation [39]. The results of this study indicate that there are significant differences between the scale of elderly joint pain before and after progressive muscle relaxation therapy. After progressive muscle relaxation therapy, there was a decrease in joint pain scale in all respondents, namely 18 people experienced a decrease in joint pain scale (100%).
Pain is a problem for patients in all age groups, especially the elderly, one of which is caused by the aging process in the musculoskeletal system. In the elderly who experience pain, it is necessary to conduct an aggressive assessment, diagnosis and management. However, elderly individuals have a high risk of experiencing situations that make them feel pain [9]. Because older people have lived longer, they are more likely to experience pathological conditions that accompany pain. Once an elderly client suffers from pain, he can experience serious functional status disorders.

The results of research on the effect of progressive muscle relaxant therapy on changes in the joint pain scale in the elderly show that there is a significant decrease in joint pain before and after progressive muscle relaxation therapy is carried out for approximately 20 minutes, twice a week for two weeks. This is evident from the decrease in the scale of joint pain in the elderly, that is after being given the intervention of progressive muscle relaxation therapy exercises there is a decrease in the pain scale in all the elderly.

This decrease in the elderly joint pain scale occurs because of the effects of progressive muscle relaxation therapy. Progressive muscle relaxation is a relaxation therapy by tightening and relaxing the muscles in one part of the body at a time to provide a feeling of physical relaxation. The progressive tightening and relaxation of these muscle groups is performed successively [72]. In this relaxation exercise individual's attention is directed to distinguish the feelings experienced when muscle groups are relaxed and compared when muscles are tense. One of the goals of TROP is to reduce muscle tension, anxiety, neck and back pain. Progressive muscle relaxation technique is a relaxation therapy given to the client by tensing certain muscles and then relaxation. Progressive relaxation is a way of relaxation techniques combining deep breathing exercises and a series of contractions and certain muscle relaxation [10]. Progressive muscle relaxation techniques focus on muscle activity by identifying tense muscles and then reducing tension by using relaxation techniques to get a relaxed feeling [42].

**CONCLUSION**

a. There is the effect of warm compresses on elderly joint pain in Posyandu Lansia RW 04 Kelurahan Bangsal Kota Kediri
b. There is an effect of progressive muscle relaxation therapy (TROP) on elderly joint pain in Posyandu Lansia RW 04 Kelurahan Bangsal Kota Kediri
c. There is a difference in the effect of warm compresses and progressive muscle relaxation therapy on elderly joint pain on elderly joint pain in Posyandu Lansia RW 04 Kelurahan Bangsal Kota Kediri. Statistical test results also showed that the TROP intervention was more effective in reducing pain, this was evidenced by 18 respondents in the warm compress intervention group having decreased the pain scale by an average of 1.45 and in the TROP intervention group having a pain scale decreasing by an average of 1.61.

| Table 5. Wilcoxon Statistical Test Results Signed Rank Test The Effect of Progressive Muscle Relaxation Therapy on Joint Pain in the Elderly in the Posyandu Elderly RW 04 Bangsal Village, Kediri City in June-July 2019 (n = 18) |
|-----------------|--------|------------------|
| N               | Mean Rank | Sum of Ranks |
| Post–Pre TROP Intervention N & Negative Ranks | 18a | 9.50 | 171.00 |
| Positive Ranks | 0b | .00 | .00 |
| Ties            | 0c | 18 |
| Total           | 18 |
| Z               | -3.817a |
| Asymp. Sig. (2-tailed) | .000 |

Asymp. Sig. (2-tailed)
conclusion of this study is TROP and warm compresses can be used to reduce joint pain scale in the elderly, although statistically shows that TROP intervention is more effective in reducing pain.

ACKNOWLEDGEMENT

Our gratitude is conveyed Ministry of Research and Technology and Higher Education through the Region VII Higher Education Service Institution. We were given the opportunity to get a beginner lecturer research grant, and we also thank the leadership of the STIKES Baptist Hospital, Kediri Baptist Hospital, who provided support to us, and we did not forget to say to the respondents (elderly) and cadres in the Posyandu Lansia RW 04 Kelurahan Bangsal Kota Kediri

References


Herodes. 2010. Teknik Relaksasi Progresif Terhadap Insomnia Pada Lansia


TRAINING EDUCATION AND COUNSELING FOR CATFISH CULTIVATION WITH TARPAULIN MEDIA TECHNOLOGY AND GOOD METHODS OF FISH FARMING AND POST HARVEST MARKETING STRATEGY

Kariyoto
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Malang Indonesia

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ABSTRACT
Catfish cultivation has a very promising prospect, because they are tasty and nutritious. Catfish contain high nutritional value and good for growth and health. So many people like them. Compared with other animal products, catfish are rich of Leucine and Lysine, that are needed for children's growth and maintain nitrogen balance, also for growth and formation of muscle protein. Balesono Village community group, formed a Catfish Cultivation Group abbreviated as “POKDAKAN” Balesono on March 9th, 2010, with full awareness and professional equality, aimed to increasing the capacity and welfare of its members through catfish farming. Methods of implementing doctorate services: Education and Training of Catfish Cultivation with Tarpaulin Media Technology, Counseling Catfish Cultivation with Good Methods of Fish Culture, Education and Training of post-harvest catfish marketing business strategies. The overall series of activities devoted to the community of fish culture groups in the form of catfish cultivation techniques using tarpaulin media, it can be concluded that this activity can be carried out well thanks to the active role of group members as partners in this program. This activity consisted of training and mentoring education in the form of counseling on catfish cultivation with tarpaulin media and post-harvest catfish marketing strategies. Catfish cultivation with tarpaulin media technology is able to be a real learning tool for group members in the implementation of community service programs.

KEYWORDS
Training education and counseling, Catfish cultivation, Tarpaulin media, Marketing strategy

INTRODUCTION
Situation analysis
Balesono village agriculture and fish farming condition. The area of fisheries in Balesono Village is ± 2.5 Ha, the area is used for catfish and gourami cultivation. Catfish farming in Balesono village is supported by the village topography which is a lowland area. Do to the low topography of catfish, the mortality is also low. There are 50 farmers in Balesono village joining the fish cultivation group (POKDAKAN). Catfish farming in Balesono village is still traditional, because they have not had yet utilized the developing cultivation technology. This is due to the absence of socialization of new technologies for fish farming.

Promising Prospects
Catfish farming currently has very broad and promising prospects. Because catfish not only has delicious taste, but also the nutritional content is high enough, various groups of the public like them. Catfish is needed by children to help their body development, because catfish contain quite a lot of protein between 16-24%, besides that they also contains between 0.2-2.2% fat, carbohydrates, mineral salts, and vitamins. Catfish, besides being very well...
consumed by people who suffer from high blood pressure, because fish meat does not contain cholesterol. This cholesterol is saturated fat, causing disease or recurrence of high blood pressure. Catfish have been successfully cultivated since decades ago, ranging from hatchery to enlargement, so it has been regarded as local culture. However, lately catfish farming has faced many obstacles because it does not follow the trend of aquaculture development so that catfish production has decreased.

**Empty Land and Creative Economy**

Balesono Village, Ngunut Subdistrict, Tulungagung Regency 150 km West from Malang City. This village is a populated area, mostly farmers and farm laborers. plain land is still largely untapped around the house to increase their income and creative economy. Existing community is a potential to be developed, health services for health workers, doctors exist even though it is not significant with the population. Access to basic and secondary education is quite good. Social solidarity still exists including mutual cooperation, the sense of security of the population is very much safeguarded by the presence of villagers building maintenance of the neighborhood camp post. Majority settlements have a source of water that is suitable for drinking and for pool water, electricity, sanitation, although it is simple. Economic resilience, diversity of community production such as agriculture, and fish farming groups (POKDAKAN) catfish, gourami and ornamental fish. There are no trade service centers such as permanent markets, hotel restaurants, inns, post offices, bank access, credit access or cooperatives. The openness of the area for public transportation is twice a day, the quality of asphalt roads is good. Ecological resilience, good environmental quality, no pollution of water, soil and air and rivers are still natural. Potential disaster-prone does not exist, both floods and landslides.

**Professional Similarity**

Balesono Village POKDAKAN group is a group established based on the similarity of the profession as fish farmers who organize themselves in groups to achieve common goals. Members in groups find it easier to share information, knowledge and strengthen each other institutionally. The POKDAKAN group is a fish farming community. The Balesono village POKDAKAN group is divided into three places: Sanan Wetan consists of 10 members, Balekambang 20 members, Krajan Sanan 20 members. The fields that will be undertaken together are: (1) Utilization of vacant land for fish culture using tarpaulin media; (2) fish cultivation that meets the standards of good fish farming practices (CBIB); (3) Marketing strategy of the results of post-harvest fish farming.

**Catfish Excellence**

The superiority of catfish compared to other animal products is rich in Leucine and Lysine. Leucine (C6H13NO2) is an essential amino acid that is very necessary for children's growth and maintaining nitrogen balance. Leucine is also useful for the overhaul and formation of muscle protein [1]. Lysine is one of the 9 essential amino acids needed for tissue growth and repair. Lysine is an amino acid that is very important and is needed in the growth and development of children. This is due to the fact that amino acids are very useful for the growth and development of the child's bones, help absorption of calcium and maintain the body's nitrogen balance, maintaining the child's growing period so that it is not too fatty. Lysine is also needed to produce antibodies, hormones, enzymes, and collagen formation, in addition to tissue repair. Lysine is no less important, it can protect children from the herpes virus [1]. Catfish in addition to savory meat turns out to have a lot of nutritional meat content. The following nutritional value of 100 grams of catfish, the part of fish that can be eaten according to FAO (1972): contains high protein and bone strengthening substances (calcium) which are good for toddlers' food. Besides catfish also contain other minerals that are important for health.
MATERIALS AND METHODS

Qualitative Descriptive Approach

Methods and problem solving using a qualitative descriptive approach with a case study approach by describing the problems and phenomena recorded by researchers at the location of the doctoral service. The research design was adjusted to the existing problems. The design of this study is possible to capture the widest possible information from a variety of different perspectives. The problems that occur in the field are explored in depth and structured so that they can provide policy recommendations in accordance with the real needs of the community.

The problem solving method with qualitative research has become an important concern and model in the social field and its application such as economics, social, culture, education and management. Qualitative methods have some distinctive features, namely emphasis on the natural environment, inductive, flexible direct experience, the depth of the process, capturing the overall meaning, active participation of participants and interpretation. Creswell said that the qualitative paradigm is a constructivist, postpositivist, or post modern approach [2]. The followings are strategic target communities and educational and training activities which will be explained descriptively qualitatively.

a. Strategic Target Communities

The target in this activity is the catfish farmers group Balesono POKDAKAN group Kec. Ngunut Tulungagung which is expected to be able to increase the knowledge capacity and ability of members in managing catfish cultivation. In order to maximize the success of this community service program, the role and members of the POKDAKAN group will be divided in this activity.

b. Education and training

Community service in the form of education and training activities on tarpaulin media technology and post-harvest marketing strategies for catfish farming is aimed to all group members. All of these POKDAKAN groups were set as targets because this group is a figure of young people who are creative and are very open in accepting input in improving the cultivation business that is carried out. This group is expected to become an agent of change and disseminate tarpaulin media technology for other members of the community.

Problem Solving Framework

Tulungagung District Government since 2010 through the Department of Fisheries and Maritime Affairs has slowly begun to target the development of the freshwater aquaculture sector. Development of the freshwater aquaculture sector, our team together with the government to increase family income, primarily the use of vacant land using tarpaulin ponds as a medium, and methods of good fish farming (CBIB) and post-harvest marketing strategies. Catfish farming business using tarpaulin ponds has long been known by the community, the use of tarpaulin is preferred because it is more economical in terms of cost, easier feed control and a more practical fish harvesting process. Many farmers complain that their harvest is not optimal so that the benefits they get are not proportional to the energy expended. This incident will make the farmers, especially beginner cultivators discouraged, so they do not try to continue their cultivation business. The main obstacle of novice cultivators is the lack of insight and skills in catfish cultivation techniques, especially in maximizing the yield of their production, whereas catfish cultivation in tarpaulin ponds will provide optimal results if the procedures and methods of cultivation are properly applied.

Framework for solving problems in the implementation of community service programs in the POKDAKAN Group as catfish farmers groups in Table 1. Framework for Problem Solving.
Method of Activity Implementation

Methods of implementing community service activity POKDAKAN is carried out in the form of:

1. Catfish Cultivation Education and Training with tarpaulin media.
2. Counseling and training of good fish culture methods and their application.
3. Education and Training marketing strategy for postharvest catfish.

The implementation of Catfish Cultivation activities using the tarpaulin media vacant land use follows the pattern of thought scheme as shown in Figure 1.

### Table 1. Problem Solving Framework

<table>
<thead>
<tr>
<th>No</th>
<th>Problem</th>
<th>Root of The Problem</th>
<th>Solution Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lots of vacant land around community homes.</td>
<td>Lack of knowledge about land use empty</td>
<td>Knowledge transfer the use of vacant land to increase the creative and productive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for catfish farming</td>
<td>economy for the welfare of the community.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Technology transfer of tarpaulin media technology as a medium for catfish</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>farming.</td>
</tr>
<tr>
<td>2</td>
<td>There is no standard method for good fish</td>
<td>Lack of cultivation knowledge based on</td>
<td>Knowledge transfer How to Fish a good and a good standard of fish culture, safety</td>
</tr>
<tr>
<td></td>
<td>farming</td>
<td>Good Fish Farming Methods</td>
<td>and hygieni.</td>
</tr>
<tr>
<td>3</td>
<td>Obstacles to Post Harvest Marketing</td>
<td>Lack of understanding about the importance</td>
<td>Knowledge transfer about a good post-harvest marketing strategy.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>marketing strategy the good one.</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. The Implementation of Catfish Cultivation Activities

RESULTS AND DISCUSSION

The results of activities in the implementation of community service programs in the Group POKDAKAN as a group of catfish cultivators is contained in the Activity Results Table 2.
Table 2. Activity Results Table

<table>
<thead>
<tr>
<th>No</th>
<th>Target</th>
<th>Time</th>
<th>Forms of Activity</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Knowledge transfer utilization of vacant land pawned creative and productive economic land</td>
<td>July, 6th 2017</td>
<td>Education and training uses vacant land to be used as a fish farming pond with a creative and productive economic</td>
<td>Implementation well educated evaluation results of at least 75% of the material can be understood Utilization of vacant land for fish farming ponds</td>
</tr>
<tr>
<td>2</td>
<td>Transfer of knowledge about tarpaulin media that can become catfish ponds</td>
<td>July, 13th 2017</td>
<td>Fish Culture Education and Training Catfish with Tarpaulin Media</td>
<td>Implementation Education and Exercise well Evaluation results of at least 75% of the material can be understood Tarpaulin media can be used more efficient and effective pool media</td>
</tr>
<tr>
<td>3</td>
<td>Transfer of knowledge about Methods of Good Fish Cultivation</td>
<td>August, 3rd 2017</td>
<td>Education and training on good fish farming by applying a model</td>
<td>Implementation Education and Exercise well Evaluation results of at least 75% of the material can be understood Producing high quality aquaculture</td>
</tr>
<tr>
<td>4</td>
<td>Knowled Transfer Strategy for post-harvest marketing of catfish farming</td>
<td>August, 10th 2017</td>
<td>Market fish: Traditional markets, middlemen, collectors</td>
<td>Realized The ability to market aquaculture Get more profit.</td>
</tr>
</tbody>
</table>

Increase Knowledge of PAKDAKAN Tarpaulin Media

The education and training program was held for 4 days, July 6th and 13th, August 3rd and 10th 2017, located at Balesono Village Head's Office. The training was filled with the provision of material about the use of empty for creative and productive economic activities as a place for catfish aquaculture ponds, followed by surveys to vacant land belonging to the POKDAKAN group to be determined as the best choice of tarpaulin media utilization practices.

This training activity was carried out well and due to good participation of partners who were very enthusiastic in accepting the material both in theory and in practice. The POKDAKAN group as partners with young enthusiasm and a good entrepreneurial spirit are able to become discussion partners to share knowledge about catfish cultivation, not only do as participants but also they can provide ideas and inspiration that can be developed in improving cultivation efforts. The results of the evaluation of learning in the form of pretest and posttest given in the counseling and training shows that 90% of the material provided can be understood, understood and practiced by partners in this community service program. In the method of tarpaulin cultivation, it is able to reduce the use of water as a medium of cultivation, this can be seen from one cycle of aquaculture replacement which is only done 3 times. Substitution of water that is done at the time of the cultivation cycle is done not because the water is not good but rather an attempt to see the development of catfish every 30 days. Tarpaulin ponds are now increasingly popular for fish farming. Besides catfish, other types of freshwater fish such as Gurami and Patin can also be optimally cultivated in tarpaulin ponds. Many people have successfully applied fish farming in this tarpaulin pond. In addition to being more practical, easy to apply in limited land and relatively lower manufacturing costs compared to wall ponds, fish culture in tarpaulin ponds also has advantages over fish farming in wall ponds or ground ponds.

Increased Knowledge of Technology Advantages of the Tarpaulin Pool

The advantages of tarpaulin ponds for fish farming such as catfish and gurami include [3].

a. Tarpaulin ponds can be applied to less water areas

For those of you who live on the coast which is in fact sandy soil and less able to hold water (porous), tarpaulin ponds are the right
choice for fish farming. Fish farming in ground pools in coastal areas or other areas where porous land will encounter problems because water will continue to decrease because it directly seeps into the ground. This tarpaulin pool is a great solution if you want to try a fish farming business.

b. The Water Temperature in the Tarpaulin Pool is More Stable

The experience of carp farmers in Kulon Progo proves that tarpaulin ponds are able to withstand fluctuations in pond temperatures that usually occur during seasonal changes. The secret lies in the base of the husk stocked before the tarp is installed. In the dry season, the husk are doused with water so they rot quickly. This husk decomposition process then produces heat which is ultimately able to maintain water temperatures in the ideal range for catfish or gourami cultivation.

c. Tarps Pond Fish Does Not Smell the Land

In contrast to aquaculture in soil ponds which are usually harvested fish still smelled of mud, fish cultivated in tarpaulin ponds did not smell of mud at all. Fish that do not smell of sludge are preferred by consumers.

d. Easier Fish Harvesting

Because the size is generally not too large, harvesting fish in tarpaulin ponds is relatively easier to do. In addition, the base of the tarpaulin pond is usually only a little mud or even none at all, so harvesting fish in the tarpaulin pond is easier to do.

e. Faster Tarpaulin Pond Processing

The process of cleaning and drying a tarpaulin pool before it is used is obviously faster than a ground pond. The process of cleaning and drying is usually done by fish farmers to break the chain of germs. Ground ponds generally require 2-7 days for the drying process. Tarpaulin ponds only need a few hours or at the latest 1-2 days for the drying process.

f. Stocking Density of Fish Seed Higher

In fish farming in ponds, it is generally rare to clean fish droppings and left over food that has accumulated at the bottom of the pond. The accumulation of fish food waste and feces will then produce ammonia and hydrogen sulfide which are toxic to fish. The fish are then reluctant to swim at the bottom of the pond. As a result, the space for fish to be limited.

Another case if fish farming is done in tarpaulin ponds. Fish droppings and left over food that has accumulated at the bottom of the pond are more easily cleaned by suction (shift pond). Space for fish becomes wider because fish can swim at the bottom of the pond without fear of poisoning ammonia.

g. Pests & Diseases Rare Found

Pests that prey on fish, especially seeds are rarely found in tarpaulin ponds. Besides that, fish that are cultivated in tarpaulin ponds are relatively rarely attacked by disease [4].

CONCLUSION

In the whole series of community service activities in the Pokdakan Group in the form of utilization of vacant land, and catfish cultivation techniques using tarpaulin media and post-harvest catfish marketing strategies it can be concluded that this activity can be carried out well and due to the active participation of group members as partners in this program. This activity consists of counseling and training as well as assistance in the form of utilization of vacant land for catfish cultivation by utilizing tarpaulin media and post-harvest catfish cooking strategies. Utilization of empty land for catfish cultivation with tarpaulin media technology is able to be a real learning tool for group members in the implementation of community service programs.

This activity though can meet all the indicators to be achieved in implementation of the program, but it was felt that it was not yet able to reach the wider community because it was still focused on Pokdakan group members
only. It is expected that in the future the catfish cultivation program with tarpaulin can be applied to all catfish farmers who still have vacant land so they are able to improve the quality and quantity of yields.

REFERENCES


DISSEMINATION OF GREENHOUSE DRYERS TO IMPROVE THE EFFICIENCY OF POTATO CHIP PRODUCTION PROCESS

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ABSTRACT

Batu City is a potential agricultural area for the development of horticultural-based agroindustry among other potatoes and potato chips which are one of the objectives in the Batu City for the next 5 years to give priority to development in the SMEs agriculture and tourism business as a function of community empowerment. Rama SME is a potato chip producer partner in the village of Bulukerto, Batu City. There are several problems such as the technological limitations in the manual process of drying the potato chips and also the productivity efficiency, which only reaching 50% of consumer demand. The drying process relies on sunlight for 10-12 hours during the dry season and 2-3 days during the rainy season. The purpose of the application of this appropriate technology is to improve the efficiency of the drying process of potato chips by disseminating Greenhouse Dryers so that the products are more engineered. The results achieved increased efficiency and productivity in the use of labor (time spent working for the drying process will decrease initially from 75% to 30%), production capacity and product supply can be achieved according to consumer demand and energy efficiency because it combines the heat from the sun and energy which is regulated by a control system so that it will be more efficient in the usage of energy, minimal production costs and optimal drying time.

KEYWORDS

Greenhouse dryers, Efficiency, Potato chips

INTRODUCTION

The development of agriculture-based industry (agro-industry) is strategic enough to be made as a priority by the government, in an effort to meet basic needs, expanding employment opportunities, empowering domestic production, earning foreign exchange, developing other economic sectors and improving the economy of rural communities. The structure of agro-industry in Indonesia is dominated by home industries with a share of around 90% of the total agro-industry. Increased agro-industrial productivity has been shown to have a positive impact on macroeconomic performance, employment, redistribution of income, and poverty reduction in rural areas [1].

The diversity and superiority of Indonesia's agro-climate is a potential to face international trade competition. Horticulture is an agricultural sub-sector that has the potential to be developed, considering that horticultural commodities have high economic value. Potatoes are one of the horticultural products that have a high carbohydrate content compared to rice, corn and wheat [2]. The consumption of potatoes in the country shows a rapid development, marked by an increase in consumption. However, an increase in
consumption that is not aligned with production causes an increase in the volume of potato imports in Indonesia. The average growth in import volume in Indonesia is 7.69% per year [3]. In Indonesia, the need for consumption of potatoes is estimated to 2-3 times in the next 5-10 years due to, among others, increasingly widespread utilization of potato production for food diversification, both as an ingredient of vegetables, semi-finished products and finished products (snacks).

One effort to increase the added value of potato commodities is processing potatoes into potato chips. Until now, the potato chip industry in Batu City has been very well developed with a number of 50 SMEs with a very large variety of potato chips ranging from taste, price, shape and packaging. The development of the potato chip industry in Indonesia also shows a significant development along with the increasing demand for raw materials for the potato chip industry [4]. Batu City is a potential agricultural area for the development of horticultural-based agro-industry. The development of potato and potato chip production is one of the goals specified in the Batu City Medium Term Development Plan for the next 5 years to give priority to development in the business sectors of SMEs, agriculture and tourism in the hope of maximizing the function of community empowerment [5]. Batu City is one of the potato producers with a large productivity in East Java with a productivity of 11-20 tons per hectare. The area is the center of potato production which consists of several villages in Bumiagi sub-district namely Sumberbrantas and Tulungrejo, with productivity reaching up to 5-10 tons per month. Potato productivity from Sumberbrantas village farmers reaches 21,633 tons per year [6].

Batu City is Batu Agro Tourism City with the growth of small-scale and micro-scale businesses that produce food processing products which is quite fast in East Java. At present, there have been several business developments in the production of potato chips in the range of 50 units in the Batu City area, which have become the pioneers of processed potato chips in East Java. Rama SME is a producer partner which processes potato chips with a large enough production capacity in the village of Bulukerto. Rama SME has a production capacity of 210 kg of potato chips per day with 9 workers, a minimum sales turnover of 3.5 million per day = 70.5 million per month and a 25% profit. So far, the constraints in developing this potato chip business include technology limitations in the drying process that are still manual so that they cannot meet the maximum production capacity (reaching 50%) in accordance with consumer demand. The target consumer of Rama SME reaches 500 kg per day so that there is a need for technology transfer which is very helpful to be able to reach the production capacity, especially related to the drying process. Currently in the process of drying by relying on sunlight for 10-12 hours. Drying process during the rainy season becomes 2-3 times the normal time to 3 days assisted using a room oven with the Liquefied Petroleum Gas (LPG) energy and a blower, but the results are less than optimal because a lot of heat flow is lost so that the drying process cannot take place quickly and efficiently. Such problems even cause some products to grow mushrooms which makes them not marketable.

Referring to the problems faced in the technology of potato chip production in Rama SME, the existence of “Appropriate Technology Application” is an opportunity to be able to provide solutions to improve and strengthen production performance that has more quality and sustainability. Expected solutions include the greenhouse cabinet dryer for a capacity of 200-300 kg per process to increase efficiency and productivity. The purpose of activities to the community include strengthening the potential of potato chips as a superior product of Batu Agrotourism City and improving the efficiency and performance of potato chip SMEs by facilitating equipment technology in the production process (drying process) so that the products are more competitive.

**MATERIAL AND METHOD**
The approach used in this activity is the integration of participatory rural appraisal and participatory technology development. Participatory rural appraisal that emphasizes direct community involvement as subjects and objects as well as overall activities ranging from planning, implementing and evaluating program activities. Participatory technology development is an approach-oriented towards increasing the participation of craftsmen/UKM directly in activities and utilizing “Appropriate Technology” based on science, technology and local cultural wisdom.

The method of carrying out activities includes technical coordination involving SMEs, a team of assistants and related agencies (SME Cooperative Service and Trade Industry, Batu City) which are strengthened by a comparison to Balai Medica in Batu City related to the use of the greenhouse cabinet dryer. Dissemination of the greenhouse cabinet dryer equipment is carried out on the third floor of Rama SME with a consideration in order to be able to absorb heat energy optimally and efficiently use energy from LPG during the rainy season.

RESULT AND DISCUSSION

In Indonesia, farmers and traders of corn seeds generally do the drying by drying. In the dry season or in areas affected by flooding, drying will encounter many obstacles. In agriculture, drying refers to removal of water up to the water content of the material in such a way that a decrease in quality due to fungus, enzyme activity (respiration and heating), and insects will not occur or can be ignored [7]). The problem that arises from the drying method is the drying energy source which only depends on the weather (solar heat). Drying under open sunlight is a simple way to dry agricultural products using solar radiation for food preservation carried out since the ancient times [8]. The working principle of solar drying is that the product is located on land that is directly exposed to solar radiation [9]. Solar radiation that falls on the surface is partly reflected and partly reflected and partly absorbed. However, drying using sunlight has weaknesses, namely the product is easily contaminated by dirt, dust, insects and other microorganisms [10]. The drying process also runs less efficiently in terms of time and equipment used.

In Indonesia, several small industries which dry their products on a commercial scale, mostly use the cabinet tray dryers that are heated using liquefied petroleum gas (LPG) burner. In some cases, drying begins with drying by the sun and continuing with cabinet tray dryer using an LPG stove. In recent years, LPG prices have increased substantially, thereby increasing drying costs [11]. Therefore, it is necessary to introduce mechanical drying equipment. Dryers must be equipped with additional heaters to ensure continuous drying operations during the rainy season [12].

Drying is one of the oldest food preservation methods because microorganisms that cause food poisoning and damage are unable to grow and multiply in the absence of free water and many enzymes that stimulate unwanted changes in chemical composition cannot function without water [13]. In addition, weight reduction and the storage stability of the dried product will reduce storage and distribution costs. As drying techniques that produce good quality and suitable products have been developed, more commercially dried products may be developed [14]. Dissemination of the greenhouse cabinet dryer for the production of potato chips by the design in figure 1.
Figure 1. Cabinet Type Room Design of Greenhouse Dryers

Specifications:
• Glass Drying House Area (length x width x height): (5.5 x 4.5 x 2.3) m³
• Material Specifications:
  Iron frame : 4 x 4 cm
  Roof cover : polycarbonate, total area of 80 m²
  Drying rack (100 x 60 x 180) cm³ : 8 pieces
  Elbow plate : 4 cm
  Temperature Control / Thermocontrol : 1 piece
  Exhaust : 4 pieces, 12 inch
  Space Heater : 1 piece with LPG heater

Figure 2. Greenhouse Dissemination Cabinet Results

The results of the dissemination of the use of the Greenhouse Cabinet Dryer are shown in Figure 2. Conditions that occurred before the use of cabinet shelves for capacity expansion of the process of drying potato chips, have been proven to successfully reduce the time and labor burden with the achievements shown in Table 1.
Table 1. Outputs Produced

<table>
<thead>
<tr>
<th>Transfer of Technology</th>
<th>Outputs Produced by Drying using the Greenhouse Dissemination Cabinet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before</strong></td>
<td><strong>After</strong></td>
</tr>
</tbody>
</table>
| Greenhouse Cabinet     | ● labor productivity is not maximized yet therefore impacting the production capacity and inventory can not be fulfilled optimally (only 50-70%)  
                        | ● Drying time is up to 10-12 hours during the dry season with consistent heat and or 2-3 days of the rainy season combined with the use of a room oven and LPG (the waste of energy) so that it increases production costs but the results are less than the maximum  
                        | ● increased efficiency and productivity in the use of labor (stream of work time for the drying process will decrease from 75% to 30%)  
                        | ● production capacity and product inventory can be achieved according to consumer’s demand  
                        | ● more efficient in energy because it combines the heat of the sun and LPG energy regulated by a control system so that it will be more energy efficient, minimum production costs and optimal drying time |

Increasing the drying process efficiency of potato chips is one of the efforts to improve the efficiency of whole tapioca production. Energy efficiency during drying is obviously very important, where energy consumption is a major component of drying costs. Basically energy efficiency is the ratio of the minimum energy needed for drying compared to the energy actually used. However, the measured efficiency values can vary because of a high complexity between foodstuffs, water and drying media (which usually is the air). Each of these components are appropriate for the appropriate circumstances. Therefore, measurement parameters can be selected that suit a particular process. Efficiency calculations are very useful when estimating the performance of a drying machine, developing processes, and in making comparisons between several classes of drying machines that might be alternatives to certain drying operations [13]. Heat must be supplied to separate water from food. The minimum amount of heat to remove water is needed, that is to supply the latent heat of water evaporation, so that one measurement of efficiency is the ratio of the minimum energy to the energy actually provided for the process.

CONCLUSION

Dissemination usage of the greenhouse cabinet dryer has been proven capable to increase both the efficiency and productivity of the labor (decreased work time), optimal production capacity and maximum product inventory that can be achieved according to consumer’s demand. Rama SME can improve the performance of both the quality and quantity of its products towards export marketing.

REFERENCES


MICROMORPHOLOGY COMPARISON ON THE INFLORESCENCE DEVELOPMENT OF SIX SPECIES ASTERACEAE

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ABSTRACT
Asteraceae, also known as the Sunflower Family, is one of the largest and successful flowering plant species beside Orchids and Legume families. This family is often considered taxonomically difficult, mainly because of its vast numbers and cosmopolitan distribution. This family also displays floral diversity in tribes, hence the study was conducted to compare the stages of Asteraceae inflorescences (capitulum) and fruit structures of six species (Blumea lacera, Cyanthillium cinereum, Mikania micrantha, Emilia sonchifolia, Bidens pilosa, and Porophyllum ruderale) that belong to Inuleae, Vernonieae, Eupatoriae, Senecioneae, Coreopsidiae, and Tageteeae respectively. The inflorescences and fruit were observed using Dinolite devices and Dinocapture 2.0 applications. The results indicate that there are variations in the flower development stage, with a range of stages, 10-19. The flowering stage divided into four, namely pre-anthesis (the inflorescence is still in the bud form and green); beginning of anthesis (the buds start to open, and the corolla begins to appear); anthesis (marked with a fully open corolla); and senescence (characterized by a change in the corolla into brown and dry out). The six species observed have achene (cypsela) fruit with a size range of 3.8 - 18.3 mm with distribution accessories. All the five species studied have fruit accessories in the form of pappus, except for Bidens pilosa. The fruit pappus in five species have different sizes in the range of 2.8 – 10.3 mm - the most extended fruit pappus belong to Porophyllum ruderale.

KEYWORDS
Asteraceae, Flowering stage, Fruit accessories, Inflorescences, Pappus

INTRODUCTION
Asteraceae is one of the families with the largest number reaching 2300 species and more than 1500 genera [1]. Asteraceae is thought to originate from South America [1]. Asteraceae generally have petals that are arranged at the base which develops in a circle surrounded by bractea, anthers that fuse to form rings, and cypsela which are equipped with pappus [2]. The uniqueness of the Asteraceae is the flower (floret) will develop into a fruit that has petals that are modified into pappus as a means of spreading the seeds [3]. Asteraceae are grouped into several tribes, including Coreopsidiae, Inuleae, Vernonieae, Senecioneae, Eupatoriae, and Tageteeae [1]. Coreopsidiae is an annual or perennial plant that is generally a bush. This tribe consists of 30 genera and 550 species [8]. In this tribe, cypsela can be homomorphic or heteromorphic. The cypsela structure can be equipped with horns or wings [8]. Cypselas are flat or rectangular in shape, sometimes narrow at the edges [2]. The involucre is cylindrical to hemisphere [2]. Bracts consists of two or more, and the outer parts are green, linear to lanceolate, accompanied by striated lines from dark green to brownish-black [2]. The bottom of the flower (receptaculum) is
brownish yellow, while the corolla is yellow or white [2]. The corolla disk section consists of 4-5 lobes and anthers brown to black. One species of this tribe is *Bidens Pilosa* that have heterogamous capitulum [12] consisting of ray florets and tubular florets [10]. Ray florets surround the tubular florets [10]. The ray florets are composed of a yellow corolla that blends with the cypsela located at the bottom [10]. The tubular florets are located in the middle accompanied by an anther is brown that protrude out and serrated pistil at the margin [10]. Ray Florets will open on the first day, and disk florets will open on the next four days. Ray florets sterile while disc floret fertile [12].

Inuleae has oval-shaped cypsela with a yellowish-brown color, striped and long hairy [4]. Pappus is monomorphic uniseriate and pale white to yellowish in color [4] Carpopodium is circular or U or V if not fully developed into segments [4]. One species of the tribe Inuleae is *Blumea lacera*. B. *lacera* is heterogamous, has two flowers, namely green ribbon flowers resembling fine hairs and yellow tubular flowers [13]. The marginal flowers are numerous, filiform-tubular corolla, and are composed of 3 short lobes [13]. The bisexual disc flower, has infundibuliform-tubular corolla, is composed of 5 lobes, and a sagittatus-shaped anthers [13]. Cypsela from disk florets and ray florets have the same shape [13].

Vernonieae can be said to be the most primitive tribe and consists of 118 genera and more than 1000 species [5]. This tribe is cymosa, homogamous [14], is composed of spiny pollen, and long, acute style branches [5]. The Cypsela is brownish-yellow, depending on the level of maturity [5]. Some species of vernoniae have twin hairs on the cypsela wall [5]. At the top of cypsela, there is pappus, while at the bottom, there is carpopodium [5]. One species of the tribe Vernonieae is *Cyanthillium cinereum* that has bright purple, pink or white tubular florets.

Senecioneae is one of the biggest tribe that included 150 genera and 3000 species [6]. Generally, Senecioneae has 4-5 corolla disc [7]. *Emilia sonchifolia* is one species belong to tribe Senecioneae that has tubular inflorescence with a pale pink homogamous corolla, brown anther, and white stylus that enclosed by a small hairy pappus.

Eupatorieae are generally herbs, subshrubs, or small trees. The base of the flower (receptaculum) is cone-shaped, with or without hair. Corollas are white to reddish, blue or lavender. Pappus in this tribe is generally uniseriate, hairy, and scaly [2]. *Mikania micrantha* is a species of the tribe Eupatorieae. The inflorescence of *M. micrantha* is corymbose panicle with sub cymose branches [15] and homogamous [15]. Flowers are small, tubular, white or cream, and flavorful [15]. The involucral part of bractea is four, oval to obovate, and green [15].

Tageteae are generally shrubs; bractea consists of 1-5 series, the bottom of the flower (receptaculum) is not wrapped, reddish-yellow or white corolla, and cord-shaped with 2-3 lobes [2]. Yellow tubular flowers consist of 5-6 lobes [2]. The apical anther is scleerified, without spurs (ecalcarate) and tail (ECaudate) [2]. On the cypsela wall, there are striated or ribbed lines. The pappus structure is generally scaly and some hairy but very rare [2]. *Porophyllum ruderale* is a species of tribe Tageteae [10]. P. *ruderale* flowers are hump-shaped covered with long flower petals with a striped surface [10]. Flowers are complemented by brownish stamens which stick out, uniseriate bractea, and homogamous [16]. The study was conducted to compare the characteristics of species from the Asteraceae family in 6 tribes, including the stages of development and morphology of cypsela.

**MATERIAL AND METHOD**

The study was conducted using six tribes of the Asteraceae family taken from the Universitas Indonesia Campus. The tribes used in the research are Coreopsideae, Inuleae, Vernonieae, Senecioneae, Eupatorieae, and Tageteae. Meanwhile, the species used to represent each tribe are *Bidens pilosa, Blumea lacera, Cyanthillium cinereum, Emilia*
sonchifolia, Mikania micrantha, and Porophyllum ruderale. The samples of each species were collected by purposive sampling technique. The samples taken were covered pre-anthesis, beginning of anthesis, anthesis, and senescence stages. The samples were then put into a bag that has been filled with water. Samples were sorted by development phase and observed using a Dinolite digital microscope and Dino capture 2.0 software. The fruits of each species were used to compare morphological characters that distinguish between tribes.

RESULT AND DISCUSSION

The inflorescence of the Asteraceae is one of the largest and most numerous in flowering plants, especially the complex structure called the capitulum [9]. The capitulum is composed of buds that are compressed to form a solitary flower [9]. The bud is the main part that gives shape to the symmetry of the crown [9]. Corolla forms are divided into several types, namely actinomorphic tubular florets, zygomorphic ray florets, zygomorphic ligulate florets, zygomorphic bilabiate florets, and asymmetric pseudobilabiate [9]. The shape of the capitulum depends on the shape of the florets [9]. One example is the heterogeneous capitulum which has a flat shape, flowers differentiating into ray florists and tubular florists [9]. Therefore, the capitulum to look like a single flower and is called pseudanthium [9]. Of the six species, 2 of them have a heterogamous capitulum shape, which is Bidens pilosa [12] and Blumea lacera [13].

Research on the stages of flower development uses six species from the six tribes of the asteraceae family. Species observed include Bidens pilosa, Blumea lacera, Cyanthillium cinereum, Emilia sonchifolia, Mikania micrantha, and Porophyllum ruderale, that member of Coreopsideae, Inuleae, Vernonieae, Senecioneae, Eupatorieae, and Tageteae tribes respectively. Stages of flower development of the six species observed were around 10-19 stages. Stages of flower development are divided into four stages, namely pre-anthesis, beginning of anthesis, anthesis, and senescence [11]. At the pre-anthesis stage, the flowering is still closed and green [11]. Beginning of anthesis is marked by the bud opening and the corolla starting to form [11]. Anthesis is characterized by the complete opening of the corolla [11]. Senescence is characterized by a change in the color of the corolla to brown and the corolla begins to dry and fall [11].

Based on observation, Bidens pilosa has 18 stages of flower development (Figure 1). The stages of development of B. pilosa are grouped into four stages, namely, the pre-anthesis stage (stages 1-5), beginning of anthesis (stages 6-9), anthesis (stages 10-14), and senescence (stages 15-18). At stage 1, the lid is seen closed. At stage 2-3, petals begin to open, and at stage 4 petals open entirely. The leaves of the petals shift to the base of the flower at stage 5, and the flower bud enlarges. At stage 6-7, the buds of ray floret begin to open, and the inside looks green tubular florets. Ray floret starts to open in stage 8-10 fully, and tubular floret starts to turn yellow. At stage 11-14, ray floret, and tubular floret in the inner part fully open (bloom).

Based on observations, flower developmental of Blumea lacera has 11 stages (Figure 2), which are grouped into four stages, namely, the pre-anthesis stage (stages 1-3), beginning of anthesis (stages 5-7), anthesis (stage 8), and senescence (stages 9-11). At stage 1-3, buds are still closed with an increase in size. At stage 4-7, buds started to open, and tubular florets, which has shaped like yellow sheets begin to appear and followed by an increase in size that is getting longer. At stage 8, the head of the pistil begins to stick out and split into two. Flowers begin to dry out and begin to form pappus that has many hairs, thin and easily separated at stage 9-11.

Flower development in Cyanthillium cinereum has 16 stages (Figure 3), that grouped into four stages, namely, pre-anthesis (stages 1-4), beginning of anthesis (stages 5-8), anthesis (stages 9-11), and senescence (stages 12-16). At stages 1-3, buds are still closed, only differ in size between stage 1, 2, and 3. Flower buds
started to open in stage 4, but the petals at stage 4, the bud starts to open, but the flower petals are still invisible. At stages 5-8, flower petals begin to appear, the length of the florets increased, the color of the petals changed to purple. At stages 9-11, the petals grow longer, and protruding of stylum also become longer.

*Emilia sonchifolia* has 11 stages of flower development (Figure 4), which are grouped into four stages, namely pre-anthesis (stages 1-3), beginning of anthesis (stage 4), anthesis (stages 5-7), and senescence (stages 8-11 ). At stages 1-3, the flower buds are still closed, the difference between stage 1,2, and 3 only in size of bud. At stage 4, the flower buds open, and the inner florets start to emerge. At stage 5-7, the flower buds open, and the tubular florets elongate. At stage 8-9, the petals begin to dry out and begin to fall, the involucre bracts split, and the pappus came out at stage 9. At stage 10, The involucre bract is fully split, the pappus is pop out, and some begin to fall from receptaculum. At stage 11, all pappus has been released from the receptaculum.

Based on observations, *Mikania micrantha* has 10 stages of flower development (Figure 5) that are grouped into four stages, namely pre-anthesis (stages 1-5), beginning of anthesis (stage 6), anthesis (stage 7), and senescence (stages 8-10). At stage 1-2, flower buds still closed, and at stage 3-5, flower buds begin to open, and the bud increased in size. At stage 6, the heads of tubular florets begin to appear. At stage 7, the tubular florets fully bloom and the white pistil pop out. At stage 8, pistils and part of the receptaculum begin to turn brown. At stage 9-10, the receptaculum split, and the pappus started to fall

Based on observations, *Porophyllum ruderale* has 15 stages of flower development (Figure 6) which are grouped into four stages, namely pre-anthesis (stages 1-4), beginning of anthesis (stages 5-7), anthesis (stages 8-10), and senescence (stages 11-15). In stages 1-4, the flower buds are still closed, the size of the bud getting more prominent over time. In stages 5-7, the tubular flower starts sticking out and getting longer. At stages 8-10, the stamens come out of the tubular flower and are visible. At stage 11, the flower petals begin to break, and a part of the pappus begins to appear. At stage 12, the involucre bract split wider, and the pappus becomes visible. At stage 13-14, the bracts fully split, the achene with its pappus spread. At stage 15, all achene and pappus have fallen, and the remains part is bracts.

Based on observations of cypsela of the six species, only *Bidens pilosa* does not have pappus (Figure 7). *B. pilosa* has dimorphic cypsela which is divided into two forms, namely long and short cypsela [17]. Long achene has characteristics equipped with ornament in the form of tegument, while short achene with verrucose ornament of the tegument [17]. The cypsela surface contains ribs (fur lines) and furrow (groove lines) [8]. Groove lines are larger than rib lines [8]. At the top of cypsela there is stylopodium which is embedded in the nectary [8]. The lower part of cypsela contains symmetrical carpopodium shaped like a ring [8].

Cypsela of *B. lacera* is small, oval, blunt, ribbed, hairy, and at the bottom is equipped with a ring [13]. Pappus has many hairs, setaceous, thin and smooth ciliated [13]. Cypsela of *C. cinereum* is oval-shaped, pointed, with rib-shaped ornamentation but not conspicuous, and white-haired pappus [10]. Cypsela of *E. sonchifolia* has a hard texture, elongated, slightly hairy, and black [10]. Cypsela of *M. micrantha* is black, oval shaped, and with white pappus [10]. Cypsela of *P. ruderale* is sleek, elongated, brownish, grooved surface, and white furry pappus [10]. Based on observations, the longest size of cypsela and pappus is owned by *P. ruderale*, while the shortest is owned by *B. lacera*. Meanwhile, the longest pappus size is owned by *P. ruderale*, while the shortest pappus is owned by *M. micrantha*.
Figure 1. Flower Development of Bidens pilosa

Figure 2. Flower Development of Blumea lacera

Figure 3. Flower Development of Cyanthillium cinereum

Figure 4. Flower Development of Emilia sonchifolia

Figure 5. Flower Development of Mikania micrantha
**CONCLUSION**

*Bidens pilosa* have the most flower development stages, while *Mikania micrantha* has the fewest flower development stages. All species have cypsela with pappus, except *Bidens pilosa*. Cypsela *Bidens pilosa* is equipped with horns. The longest cypsela and pappus are owned by *Porophyllum ruderale*, while the shortest is owned by *Blumea lacera*. Meanwhile, the longest pappus size is owned by *Porophyllum ruderale*, while the shortest is owned by *Mikania micrantha*. Cypsela can be used as a distinguishing character between tribes.

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**REFERENCES**


ABSTRACT
Empowerment plays an important role in increasing the ability and independence of the community. Sumberwangi Village is located in the forest area of UB Forest, which is an area of research and development center for education. The existence of UB Forest area has disturbed the economy of Sumberwangi community because it cannot optimize the potential of its resources. Batik is used as an alternative to strengthen the economy of the Sumberwangi community. Batik making training will be held in 2018. This training still has various obstacles and problems. This paper aims to find out how to strengthen the batik production system, foster motivation, and public awareness to improve the quality of batik production so that it can improve the economy and support the ATP (Agro Techno Park) program in the UB Forest area. This paper shows that by making “Griya Batik” as a place of batik production, it is easier for Sumberwangi people to manage their batik production. The use of natural resources in the Sumberwangi area is carried out by optimizing the production of natural dyes for batik coloring. Natural coloring agents used are derived from mahogany trees, strawberry plants and yakon flowers. Besides the use of natural dyes, another important factor is the strengthening in the batik design sector. The unique and distinctive design Sumberwangi can attract market interest. Strengthening in the natural dye and batik design sectors is expected to increase competitiveness and attract market interest.

KEYWORDS
Batik, Natural dyes, Sumberwangi, Training

INTRODUCTION
Sumberwangi is a village located in one of the regions in Malang, East Java, Indonesia. This village is included in the forest area of Universitas Brawijaya (UB) Education or called UB Forest. Located at the foot of Mount Arjuna, this village has a lot of potential for the economic sustainability of the community. The change in the arrangement of the region in this region raises a variety of problems. Changes in the status of land that becomes UB's educational forest causes the cultivation and management of commodities to be limited, because forest management must follow the actual pattern of production and conservation forests. Habits of people who tap pine trees also have an impact because of the prohibition of tapping pine trees. This has an impact on the decline in the community's economy because most of the basic income of farmers is lost. Community empowerment is needed to sustain the economy of the Sumberwangi community.

One of the program to empower Sumberwangi community is to train and assist batik making. Batik is a typical Indonesian handicraft drawn on cloth, where the results of batik can be used as clothing. Batik training and assistance were chosen because batik demand...
is increasing from time to time. In addition to the development of fashion, there is an intense government program regarding increasing the empowerment of regional potentials. This will have a positive impact on the economic sustainability of the community, especially since the city of Malang is a tourist city. The community needs to be trained and strengthening is needed so that the results of the training can be optimally absorbed. Some of the strategies include empowering batik makers, applying natural dyes for coloring batik so that this community service program produce environmentally friendly batik.

Batik is a cloth made traditionally and mainly also used in traditional dimensions, has a variety of decorative patterns and certain patterns that are made using a dye technique with batik wax as a color barrier material. Therefore, a cloth can be called batik if it contains two main elements, namely if it has a dip technique that uses wax as a barrier to the colors and patterns that are typical of batik. Batik motifs are formed with liquid wax by using a device called a canting for fine motifs, or a brush for large-sized motifs, so that the liquid wax seeps into the fabric fibers. Cloth that has been painted with wax is then dyed to the desired color, usually starting from light colors. Immersion is then done for other motifs with a darker or darker color. After several coloring processes, the fabric that has been batik is dipped in chemicals to dissolve the wax [1].

Making batik on cloth can use chemical dyes or using natural dyes. In recent decades, synthetic colors have received a lot of criticism, and consumers are reluctant to accept products with synthetic colors, and prefer natural dyes. On the basis of the relative dependence of consumers on natural products, health, nutrition, pharmacy, fashion and environmental stewardship, natural dyes are the main alternative as a substitute for synthetic dyes. Besides that products with natural dyes have a good market [2].

Sumberangi village is located in the Mount Arjuna area which has various types of flora. Utilization of flora can be done to support the making of batik one of which is the manufacture of natural dyes. This is the same as the opinion [3] that natural dyes can be obtained from nature derived from animals (lac dyes) or plants such as from roots, stems, leaves, skins and flowers. Natural dyes have many benefits of using natural dyes using natural materials for batik coloring in line with the concept of using environmentally friendly products by utilizing natural coloring sources. The use of batik made from natural dyes is the use of biodiversity which will have an impact on the preservation of biodiversity and economic income of the community [4].

This service is expected to be able to strengthen the community’s human resources by increasing production capacity with a variety of batik variations. The Sumberwangi community will continue to be fostered and assisted until an independent small medium enterprises (SME) is formed and the batik products are processed so that they can become distinctive features and souvenirs of Malang Raya. Batik products are expected to increase the income of the people of Donowarih Village and the preservation of batik can be maintained well.

MATERIAL AND METHOD

Sumberangi village is located in the Mount Arjuna area which has various types of flora. Utilization of flora can be done to support the making of batik one of which is the manufacture of natural dyes. This is the same as the opinion [3] that natural dyes can be obtained from nature derived from animals (lac dyes) or plants such as from roots, stems, leaves, skins and flowers. Empowerment material for rural communities is seen as a process of community transformation that must be fully understood through scientific thought and real field problems. This research uses literature survey and combined with case studies. A case study was carried out at the foot of Mount Arjuno in Donowarih Village, Malang Regency. Community empowerment as a form of UB's Doctoral Service program is carried out as part of an NGO (Non-Governmental Organization) to channel knowledge and technology that can improve the knowledge and economy of the local community. Serving
doctoral activities carried out for 6 months. One part of the doctor's service is sending 5 real students (KKN) in Sumberwangi Village, Donowarih to accompany intensive community empowerment activities for one month. Activities undertaken by students include "Arranging Batik Griya" and "Making Natural Dyes". This program is a design of the UB to help increase human, economic, and social cultural resources in Sumberwangi which is a fostered village of Brawijaya University. In addition, the monitoring process is carried out by members of the Dedicated Doctor and the Institute of Research and Community Service (IRCS) UB on a regular basis. Natural dyes have many benefits of using natural dyes. The use of batik made from natural dyes is the use of biodiversity which will have an impact on the preservation of biodiversity and economic income of the community [4].

To provide a complete picture of the main ideas, sections are arranged systematically based on a mixed methods approach. The first part explains the background and objectives. Then, the second part reviews the literature related to sustainable development and empowerment. The third part is about the method that explains the implementation of community empowerment. The result is a theoretical framework that is used as a guide in achieving the main objectives of this study. After that, a comprehensive discussion was given to explain how to sustain sustainable development through community assistance starting from the production process to marketing. The final section will summarize the discussion and findings into conclusions to provide a framework for achieving sustainable community empowerment.

RESULT AND DISCUSSION

Manufacture process of natural dyes

The making of batik in Sumberwangi sub-village has been using synthetic dyes or artificial dyes. Because of this, through the Community Service Program (CSP) by students, they want to create new innovations using natural coloring. In this program, the CSP group looks for natural materials that are available in Sumberwangi. The materials used as samples for the manufacture of natural dyes are the bark of mahogany and avocado leaves. The process of making natural dyes can be seen in Figure 1.

The first process is finding materials that will be used for making natural dyes that have never been used by local villagers as natural dyes and which are easily found around the area where. Plant surveys are carried out in residents' fields to find out what plants are on the plantations and the potential to be used as new natural dyes. Plant survey results found several plants that can be used as natural coloring agents, among others, mahogany bark, strawberry plants, avocado leaves and paitan flowers.

The next activity is to collect data. Data collection in the form of knowledge in the procedure for making the correct batik dye. Isolation of pigments / natural dyes from plants can be done by extracting plant parts by using solvents that match their polarity with the substances to be extracted. Natural coloring agents can be obtained by extracting from various parts of the plant using water solvents at high or low temperatures. In this way the substances taken vary greatly depending on the type of source [5].

Sampling for testing the strawberry leaves, avocado leaves, paitan flowers, and mahogany skin by boiling until leaving a little cooking water to soak the batik cloth, the boiling process can be seen in Figure 2.

After boiling, batik cloth that has been designed batik Figure 3. Soaking for 1x24 hours. Soaking is intended so that natural color dyes can stick and then drying is done. After the drying process, it was found that from a variety of materials that were tested in the manufacture of natural dyes, mahogany skin produced an optimal color to be applied to batik cloth by producing an orange color (Figure 4).
Figure 1. Manufacture Process Of Natural Dyes

Figure 2. The Process Of Boiling Mahogany Bark

Figure 3. The Process of Staining Batik
CONCLUSION

The process of making natural dyes is intended to preserve Sumberwangi’s environment. Besides being environmentally friendly, using natural dyes is also very economical. In this activity, some plants that are used as natural coloring agents include mahogany bark, strawberry plants, avocado leaves and paitan flowers. The process of making natural dyes undergoes several processes namely boiling, applying to the fabric and drying. The results obtained in the form, materials from mahogany bark can produce optimal natural dyes compared to other ingredients.

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REFERENCES


Pujilestari, T. 2015. Review: Source and Utilization of Natural Dyes for
ABSTRACT

Plagiarism among lectures is still happened. Using Turnitin is one of a prevention plagiarism, so the lecturers and students are able to give feedback later. This study has proposed to prevent a plagiarism between the students and optimize student to have language literacy in digital age. This research method used descriptive qualitative. The participants were the students of Universitas Brawijaya. The data collections were interviews, observations and documentation. This research output was utilizing the Turnitin as plagiarism prevention method and built critical thinking in 4.0 era. The Turnitin helps students’ awareness to have integrity. The lecturers are helped on writing errors detection and plagiarism reduced by using Turnitin.

KEYWORDS
Plagiarism, Turnitin studio feedback, good governance, pedagogical approach, digital literacy.
writing error will try to correct it according to Turnitin's feedback. The process of improvement in student work involves critical thinking, students’ reading comprehension, understanding their writing comprehensively and try to enrich new vocabulary so that their work is not indicated plagiarism.

Turnitin is a plagiarism detector application that can be used to check the "similarity" of scientific work. Lecturers as instructors can create classes on the Turnitin account to be used in gathering assignments. Students can upload their articles, and Turnitin can provide feedback to determine the level of similarity of student articles before being given a final grade. Lecturers/instructors and students are able to use Turnitin feedback to improve their writing in a language class.

Thus this research questions below formulated as follow:

How do EFL students perceive the use of Turnitin for anti-plagiarism checker software to build their awareness in learning Second Language Acquisition through pedagogy approach?

![Fig. 1. Screenshoot of the result showed in Turnitin Feedback studio](image-url)
LITERATURE REVIEW

This research focuses on efforts to prevent plagiarism by optimizing students' critical thinking skills and digital literacy in the 4.0 era through the use of Turnitin applications. Turnitin is an application that can detect plagiarism whose license has been recognized in 126 countries in the world and can be accessed using ten languages and processes more than 200,000 papers per day [5]. Turnitin developed by paradigms, LCC. Turnitin has licensed connected to 24 billion websites on the Internet [6]. Turnitin's work system divides into three, namely originality check is checking work through matching a text with the information contained on a web repository, GredeMark digital assessment is checking a work digitally, and PeeMark is checking results are independently determined to depend on the instructor's decision. This shows that Turnitin is widely recognized in the world as an accurate plagiarism detection device.

Turnitin is a test tool for students themselves who can be used individually to monitor learning and to support academic writing [7], [8]. Turnitin is also equipped with peer review features in the global field including content, organization, and quotations as well as in local fields which include: vocabulary, grammar, mechanics, and formats [4]. The features provided by the Turnitin foster students' thinking abilities that they can function as an anti-plagiarism control device.

Turnitin can give a deterrent effect for students to carry out plagiarism because they realize that their writing automatically is assessed for similarity by Turnitin accurately, but caution is needed in evaluating the assessment of the results [8], [9] stated that the use of Turnitin helps students to find some benefits on improving writing skills, but the results of the inaccurate Turnitin evaluation increase their negative attitude towards their use as well. Therefore, the same understanding is needed between lecturers and students about plagiarism and the Turnitin system. Besides, cross-checking lecturers, feedback on students' academic writing, and additional changes to the system configuration in detecting plagiarism are needed to avoid plagiarism misconceptions. Their research became the basic foundation for the utilization of Turnitin classes and the optimization of feedback from lecturers and students.

Pecorari states that there are two kinds of plagiarism namely textual plagiarism is copying without attribution and accidentally and prototypical plagiarism is intentional copying [10]. Shi further mentions three types of borrowing words into writing, namely (a) writing without reference, (b) writing by reference, (c) writing by quotation [11]. A writing is said to be plagiarism if (a) is copied exactly, (b) is slightly modified by adding or subtracting words or replacing words with synonyms, or (c) paraphrased by formulating word order or changing words from the original text. According to [12] plagiarism has several types based on how it is applied, namely: (1) Word Switch Plagiarism that is quoting sentences, fragments of sentences or paragraphs from the work of other authors then replacing some words in the sentence without changing the order of words or times and without including the author's name or source of the citation. (2) Plagiarism style that is quoting with the language style that is the same as the original author even though the sentence has been changed with new words or paragraphs. This becomes plagiarism if it does not include the source of the quote. (3) Plagiarism metaphor that is quoting or copying other written works that are used to clarify the meaning of the writing itself. This becomes plagiarism if it does not include the source of the quote. (4) Plagiarism Idea, namely taking and quoting an author's idea for solving a problem or describing the concept of a phenomenon and quoted without including the name of the initiator or source of information. (5) Self-plagiarism, the writer quotes or traces part or all of his work identically and sends it to several journals to be published, without including information on his work or previous work that has been published in previous scientific papers.
Ledwith and Risquez examined the anti-plagiarism response to promote paired judgment. Their research aimed to look at the responses and perceptions of students who are at the university after their first use of Turnitin [13]. The results were clear from the research showing that students respond to the use of Turnitin by trying to make changes to full sentences with the same meaning. The students used Turnitin as a practical form of monitoring the results of work that is not only obtained from a pair of assessment opinions. Furthermore, students understand the use of plagiarism tools besides that they are also responsible for the writings they make. Through Turnitin, students realize that plagiarism is an act that is not following the writer's morals.

According to [14] plagiarism is understood to be a serious matter and contrary to the moral rules of the writer. The researchers tested several forms of plagiarism from student writing focused on Turnitin. As a result, Turnitin only identified the semi-automatic form of plagiarism. Ali and Ajmi conducted a study regarding the perspective of the use of Turnitin for faculty and students [15]. Research conducted to test the integrity of students, especially in Mechanical Engineering. In this study, researchers tried to identify the effectiveness and limitations of use directly. The results of this study indicate that Turnitin is very effective in use and there are no significant limitations in writing.

Research by [16], examines the use of Turnitin as an educational tool for students in the process of developing a dissertation. Turnitin is used not only to explain which sentences require paraphrasing but rather emphasizes accidental plagiarism. This study uses a quantitative approach by showing the results of Turnitin scores and academic writing. Writing in the form of background, literature review and methodology are then directed to be analyzed using Turnitin. The results of the research for a year showed that at least five repetitions were needed to reduce the number of plagiarism while increasing the writing quality of the doctoral students.

Turnitin is known as a plagiarism detection machine. Furthermore, Turnitin gave pedagogical influence in writing. Ellery states that plagiarism is a pedagogical problem [17]. His research states that plagiarism is stated to be common in certain environments that depart from several factors such as the attitude of not feeling guilty of taking without permission, shortening time, personal judgment, and lack of prevention. Davies and Howard say that the act of plagiarism in the profiteering of scientific work must produce several problems such as failure to give context to scientific work, lack of critical analysis cycles from sources obtained [18]. Thus, the making of excellent scientific work should depart from writers who are aware of the study of in-depth reading sources, understanding strategies in good writing, and instructors for students must be able to handle in the form of student writing responses that cannot be overcome by computers.

Plagiarism is not only used in an academic environment, but is used for business as a form of integrity in the workplace [19]. The research links individual personality possessed integrity, honesty, and cheating. The results showed that a person who has high integrity is stable, has responsibility and self-control. Besides that, those who have high integrity produce a slight deviation in the workplace. Thus, the integrity that is owned and the act of plagiarism has a great emphasis on one's work personality.

MATERIALS AND METHODS
Context and participants

Participants in this study were 67 students who were enrolled in two sections of English Subject in Faculty of Cultural Studies and Faculty of Economic and Business, one for midterm test and the other for final exam, which the co-authors teach respectively in 2019. Participants included the proficiency level of the students in this class was between intermediate-mid and advanced-low according to ACTFL proficiency scale. Therefore, they were taken benefit from writing instruction that had an explicit focus on language, but did not need any intensive ESL
courses. They have limitation knowledge in English academic writing and none of them had used Turnitin prior to the beginning of the study.

Procedures
In both Class 1 and Class 2, we set up the Turnitin platform in our course management system (Desire2Learn). We briefly trained students how to use Turnitin PeerMark for peer review. We delivered a PowerPoint presentation explaining the main Turnitin functions: PeerMark questions, Commenting tools, Composition marks, and Originality report. Students were asked to watch a YouTube video tutorial illustrating the procedure of using Turnitin for peer review. Afterwards, students conducted a small peer review trial activity, in which they practiced writing feedback using multiple Turnitin functions on short paragraphs their peers submitted. After the trial session, those students who were willing to participate in this study signed the consent form, which allowed us to use their data for this research project. The participants were asked to complete a 20-minute pre-task questionnaire concerning their background information.

Data analysis
To answer Research Question we collected students' writing drafts and peer feedback on the two common assignments (summary & response paper and argumentative paper) in Class 1 and Class 2 archived in the Turnitin platform. We focused on students' use of commenting tools and composition marks and categorized the comments first into those that focus on global issues and those that focus on local issues [20].

FINDING AND DISCUSSION
Turnitin Feedback Studio
There are commented on the writing feedback that they were aware about putting the comments (Tab. 1).

Students' perception on Turnitin Summarize
By using Turnitin studio, the students has several comments (Tab. 2) and the Turnitin studio comments are allowed students to constructive to produce their writing (Tab. 3).

<table>
<thead>
<tr>
<th>Class</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Article isn’t necessarily about “digital immigrant” not being able to keep up but more about the fact that they teach different. (Student A, Task 1)</td>
</tr>
<tr>
<td></td>
<td>Add more to it, explain why they should be separated and the benefit of it. (Student B, Task 1)</td>
</tr>
<tr>
<td></td>
<td>In the paragraph above, your argument and the acknowledgment of naysayers get lost and there is no clear separation of what you believe compared to the naysayers beliefs. I would work on making it more distinctive. (Student C, Task 2)</td>
</tr>
<tr>
<td></td>
<td>This is a great analogy. (Student D, Task 1)</td>
</tr>
<tr>
<td>B</td>
<td>Think this is wrong facts. A persons intelligence is just a number on scale and is not measured in percentage. As it says the article he got an IQ of 135 not an IQ of 135%. (Student D)</td>
</tr>
<tr>
<td></td>
<td>Contradicting? You first say this is NOT going to be a very hard task, and then you say impossible. (Student G)</td>
</tr>
<tr>
<td></td>
<td>I think that this introduction doesn’t have a good a solid hook to catch the attention, because the author did not give surprise information or any kind of interesting stories. (Student J)</td>
</tr>
<tr>
<td></td>
<td>After reading, supporting ideas brought by the author aren’t really relevant to the topic making reading sometime confusing. (Student F).</td>
</tr>
</tbody>
</table>
Tab. 2. Students’ perception on Turnitin Summarize

<table>
<thead>
<tr>
<th>Class</th>
<th>Comment</th>
</tr>
</thead>
</table>
| 1     | - I think using Turnitin studio, it is easier and much more efficient. All of the editing tools and the questions made it clear what we needed to fix.  
- I like the clarity of it. It is simple and easy to use. I revised my paper more effectively. |
| 2     | - This is my first time to use Turnitin. I feel comfortable and easy, rather using papers. This application helped me to re-correct and highlights using computer were high points.  
- This is good because we could easily use. Sometimes hard-writing is hard to read, and also the quality is also changed easily depends on who did feedback. |

Tab. 3. The other comments allowing Turnitin studio comment to constructive to produce students writing

<table>
<thead>
<tr>
<th>Number</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I like better than a face-to-face review, because it was private and I could take my time and actually give helpful tips to my peer.</td>
</tr>
</tbody>
</table>
| 2      | I really enjoy using Turnitin for feedback process, because it gets rid of a bias if you are doing it with friend and it lets people truly critique.  
(Student H) |
| 3      | I feel like this reduces the awkwardness that comes with revising others work in person. This allows us to write responses / comments more thorough.  
(Student D) |

CONCLUSIONS

In order to fulfill today’s generation characteristic as digital native generation that will facing future 4IR with uncertainty and complex skill that needed, learning methods need to be modified from lecturer-centered learning into student-centered learning process. Regarding to environmental chemistry courses, several student-centered learning method such as contextual learning, higher order thinking learning, cooperative Learning jigsaw and animation techniques, small group discussion, problem based learning, inquiry learning, discovery learning, and problem solving can be applied.

ACKNOWLEDGEMENT

We would like to say thanks to Faculty of Cultural Studies Universitas Brawijaya especially BPPM who support us in funding of Hibah Doktor.

REFERENCES


HOW TO TEACH ENVIRONMENTAL CHEMISTRY COURSE IN THE 4TH INDUSTRIAL REVOLUTION ERA

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ABSTRACT
Changing the way of educating in higher education which related with industrial revolution 4.0 (4IR) is inevitable. In 4IR era, World Economic Forum stated that there are several skills which are needed such as complex problem solving, critical thinking, creativity, people management, coordinating with others, emotional intelligence, judgement and decision making, service orientation, negotiation, and cognitive flexibility. So that, modifying of learning concept is needed not only in teaching learning centered into student learning centered but also in paradigm of learning. In environmental engineering study program, an environmental chemistry course is a mandatory subject for first year students that is needed for basis of knowledge on studying another subject in the next semesters. In this article, we will discuss about how to teach in environmental chemistry that related with industrial revolution 4.0 using descriptive method. Several modifications are needed such as paradigm shift of learning from competency-based education to outcome-based education, learning method which related with today's digital native generation.

KEYWORDS
Environmental chemistry, Education 4.0, Learning method

INTRODUCTION
A global competition and rapid adaptation of product to market demand are driving the industrial production that requiring advances manufacturing technology. 4th Industrial Revolution (4IR), a strategic initiative introduced by German government, is an approach that transforming of industrial manufacturing through digitalization and exploitation of technologies and concept such as the use Internet of Things (IoT), integration of technical and business processes in the company, digital mapping and smart factory which able to reduce production, logistic, and quality management cost up to 30% [1]. There are also several advantages of this concept including (1) an improvement of consumer responsiveness, (2) a shorter time to market, (3) a custom mass production with low overall production cost, (4) more efficient use of energy and resources, (5) more flexible working environment.

The dynamic and rapid global changing has increased in 4IR. Yet, we cannot imagine new jobs that will be exist even ten years from now. What we do know is only that the skills needed are different from the previous one. World Economic Forum (WEF) reports that the top ten skills that will be needed for future of jobs are complex problem solving, critical thinking, creativity, people management, coordinating with others, emotional intelligence, judgment and decision making, service orientation, negotiation, and cognitive flexibility [2]. Cognitive flexibility and emotional intelligence were the two new skills that added due to works become automated and more flexible. Workers will be
need to be able to do different type of tasks in different context so that Higher Education (HE) needs to prepare of 4IR [3]. HE has important role in transitions of past industrial revolution with mass production powered by electricity into present industrial revolution with automation economy [3].

In other side, now days students are included in generation Z that born from 1995 through 2010. They have been profoundly shaped by the advancement of technology, a volatile economy, and social justice movement [4]. By using the internet and smartphone, generation Z students have access to more information than previous generation. In order to educate this new generation effectively, educators must understand the overarching characteristics, perspectives, and styles of these students. In term of learning process, generation Z students prefer to engage in learning opportunities in which they can apply what they learn to real life immediately. But, several of them like watching others complete tasks before applying the learning themselves. They also want to know that the concepts they were learned have broader applicability to more than just example [4].

As a mandatory course that offered for students in environmental engineering program in environmental engineering study program in Universitas Brawijaya, Indonesia, environmental chemistry is essential course to be studied. This subject discusses all important aspect of environment and chemistry such as the anthroposphere, the biosphere, the hydrosphere, the geosphere, and the atmosphere [5] which specified in several topic as acidity and alkalinity, hard water, chlorine, dissolved oxygen, biological oxygen demand, chemical oxygen demand, nitrogen, phosphate, oil and grease, heavy metal, complex compound and salts, hydrocarbon and organic chemistry, pesticides, dyes, and solvent, xenobiotic compound, carbohydrate, protein, and fats, polymer, and photochemical transformation [6]. The current practice on environmental chemistry teaching still using conventional lecturing method that unsuitable for today’s generation. So that, several modifications are needed such as paradigm shift of learning from competency-based education to outcome based education, learning method which related with today’s digital native generation.

MATERIALS AND METHODS

The literature review was conducted to analyze teaching method that suitable to unravel problems on how to teach environmental chemistry course in the 4th industrial revolution era. Several sources such as books, scientific articles was used for identifying and synthesizing the design of learning. The steps were taken in this study are 1). Collecting several information such as environmental chemistry learning process in Environmental Engineering Study Program, outcome-based education system, and the relevance to the 4th IR, 2). Data analysis, 3). Designing the learning concept of environmental chemistry that based on Outcome based education that adjusted to the future challenge that will be faced.

RESULTS AND DISCUSSION

According to Seemiller, there are four things that can effectively engaged with generation Z. They are video-based learning, incorporating intrapersonal learning into the class and group work, community engagement opportunities for students to address underlying societal needs, connecting in internship opportunities [4].

Even though, the learning outcome of environmental chemistry course is only able to apply math, basic science and basic engineering to identify, analyze, and solving environmental engineering problems. In order to achieve skills that are needed for future job and
<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Learning Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction and water in chemistry</td>
<td>Contextual learning</td>
<td>➢ (activating knowledge).&lt;br&gt;➤ (acquiring knowledge).&lt;br&gt;➤ (understanding knowledge).&lt;br&gt;➤ (applying knowledge).&lt;br&gt;➤ (reflecting knowledge).</td>
</tr>
<tr>
<td>2</td>
<td>Acidity and alkalinity</td>
<td>Higher order thinking learning</td>
<td>Higher-order thinking takes thinking to a whole new level. Students using it are understanding higher levels rather than just memorizing math facts. They would have to understand the facts, infer them, and connect them to other concepts.</td>
</tr>
<tr>
<td>3</td>
<td>Hard water</td>
<td>Cooperative Learning</td>
<td>The jigsaw learning techniques is a structured, cooperative strategy that avoid many of the problem of other form of learning in group [7]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jigsaw and animation techniques</td>
<td>The jigsaw method provides a cooperative learning environment which fosters learner activity, joint acquisition of content a mutual explaining.</td>
</tr>
<tr>
<td>4</td>
<td>Chlorine</td>
<td>Small group discussion</td>
<td>This Learning method can help student to stimulate critical thinking and communication with their friends.</td>
</tr>
<tr>
<td>5</td>
<td>Dissolved Oxygen, Biological Oxygen Demand and Chemical Oxygen Demand</td>
<td>Higher order thinking learning</td>
<td>Higher-order thinking takes thinking to a whole new level. Students using it are understanding higher levels rather than just memorizing math facts. They would have to understand the facts, infer them, and connect them to other concepts.</td>
</tr>
<tr>
<td>6</td>
<td>Nitrogen, phosphate, oil and grease</td>
<td>Higher order thinking learning</td>
<td>Higher-order thinking takes thinking to a whole new level. Students using it are understanding higher levels rather than just memorizing math facts. They would have to understand the facts, infer them, and connect them to other concepts.</td>
</tr>
<tr>
<td>7</td>
<td>Heavy Metal (Fe and Mn)</td>
<td>Problem based learning</td>
<td>Problem-based learning (PBL) is a student-centred pedagogy in which students learn about a subject through the experience of solving an open-ended problem found in trigger material. The PBL process does not focus on problem solving with a defined solution, but it allows for the development of other desirable skills and attributes.</td>
</tr>
<tr>
<td>8</td>
<td>Salt and complex compounds</td>
<td>Inquiry learning</td>
<td>The inquiry-based teaching approach is supported on knowledge about the learning process that has emerged from research [8]. In inquiry-based science education, children become engaged in many of the activities and thinking processes that scientists use to produce new knowledge. Science educators encourage teachers to replace traditional teacher-centered instructional practices, such as emphasis on textbooks, lectures, and scientific facts, with inquiry-oriented approaches that (a) engage student interest in science, (b) provide opportunities for students to use appropriate laboratory techniques to collect evidence, (c) require students to solve problems using logic and evidence, (d) encourage students to conduct further study to develop more elaborate explanations, and (e) emphasize the importance of writing scientific explanations on the basis of evidence [9].</td>
</tr>
<tr>
<td>9</td>
<td>Organic Chemistry</td>
<td>Discovery learning</td>
<td>Discovery Learning is a method of inquiry-based instruction, discovery learning believes that it is best for learners to discover facts and relationships for themselves. [10]</td>
</tr>
<tr>
<td>10</td>
<td>Pesticides, Solven/solvents, and dyes</td>
<td>Problem based learning</td>
<td>Problem-based learning (PBL) is a student-centered pedagogy in which students learn about a subject through the experience of solving an open-ended problem found in trigger material. The PBL process does not focus on problem solving with a defined solution, but it allows for the development of other desirable skills and attributes.</td>
</tr>
</tbody>
</table>
Table 1. Learning method that proposed in topic on environmental chemistry course (continued)

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Learning Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Metabolism of xenobiotic compounds</td>
<td>Higher order thinking learning</td>
<td>Higher-order thinking takes thinking to a whole new level. Students using it are understanding higher levels rather than just memorizing math facts. They would have to understand the facts, infer them, and connect them to other concepts.</td>
</tr>
<tr>
<td>12</td>
<td>Chemical and Photokimia transformation</td>
<td>Problem solving</td>
<td>Problem-solving is a student-centered pedagogy in which students learn focus on problem solving with a defined solution.</td>
</tr>
<tr>
<td>13</td>
<td>Carbohydrates, proteins, and fats</td>
<td>Higher order thinking learning</td>
<td>Higher-order thinking takes thinking to a whole new level. Students using it are understanding higher levels rather than just memorizing math facts. They would have to understand the facts, infer them, and connect them to other concepts.</td>
</tr>
<tr>
<td>14</td>
<td>Synthetic polymer</td>
<td>Higher order thinking learning</td>
<td>Higher-order thinking takes thinking to a whole new level. Students using it are understanding higher levels rather than just memorizing math facts. They would have to understand the facts, infer them, and connect them to other concepts.</td>
</tr>
</tbody>
</table>

related with current generation characteristic, learning process must be modified into suitable method. Hence, suggested learning method of each topic proposed in Table 1.

Implementation of ICT in learning can improve current basic skill in learning such as critical thinking, creativity, innovative thinking, digital literacy [11]. So that, dealing with 4IR HE 4.0 must combining the academic development and development of 21st century learning skill [12].

Problem based learning (PBL) also can be implemented on learning in environmental chemistry course for emissions and source, transport and transformation, and exposure, effects and toxicity themes [13]. PBL is based on student’s learning process which aided by the exploration and collaboration of students with others because this learning process is student-centered that includes high degree of activity and collaboration among students [14]. This learning process provides several benefits such as enhancing creative thinking ability, self learning skill as well as self-evaluation [15].

In other hand blended learning which applied in several universities in Indonesia also can be applied. Blended learning is able to improve lecturers skill and creating fascinating learning experiences for students. Blended learning in environmental chemistry is suitable for subject that requires direct practices that initiated with project task supported with learning theory, and followed by test and quiz for measuring student’s understanding [16].

CONCLUSIONS

In order to fulfill today’s generation characteristic as digital native generation that will facing future 4IR with uncertainty and complex skill that needed, learning methods need to be modified from lecturer-centered learning into student-centered learning process. Regarding to environmental chemistry courses, several student-centered learning method such as contextual learning, higher order thinking learning, cooperative Learning jigsaw and animation techniques, small group discussion, problem based learning, inquiry learning, discovery learning, and problem solving can be applied.

REFERENCES


Industrial Revolution”, chapter 1, p 21-24.


ECODIVER SKILLFULNESS FOR FISHERMEN COMMUNITY OF SIDOASRI VILLAGE, MALANG, TOWARD MARINE ECOTOURISM BASED ON COMMUNITY

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ABSTRACT
One year ago (2018) group of fishermen at Sidoasri Village who grouped into community monitoring group (Pokwasmas) has been introduced on types of coral which abundance on their village, conserved their ecosystem by deploying steel reef framework, transplantation, and mapping another coastal biodiversity that was blessed on that area. Dive ecotourism will be key to support marine ecotourism that economically viable alternatively to “sell” of coral reef to the community. The eco-diver is training series to understand the community monitoring group for types of substrate: hard coral, soft coral, rock, sediment, and algae. Yet, to recognize of reef fishes such as commercial fish, Napoleon wrasse (Cheilinus undulates), parrotfish, and snapper. Other important ornamental fish is butterflyfish (Chaetodontiids) that important for bio-indicator of coral reef health. Those all education material was taught in room, otherwise to sharp the knowledge, all participants had invited into the sea, practiced and observed marine biota in small group. Overall, the training of Eco diver toward marine ecotourism based on community is well prospect of ecotourism in the future in Sidoasri.

KEYWORDS
Ecotourism, Community-based, Eco-diver, Biodiversity, Sustainable environment.

INTRODUCTION
The coastline of Malang extends over 77 km from sub-district Ampel Gading (east) to Dono Mulyo (west) where 14 beaches lay on it. Up to recent time, most of those beaches are undeveloped well [1]. The opening of new ways in southern part of Java for 3 years ago became a drawcard for tourists in these areas. Beach and sea become new attractions of sightseer for their vacation. Some of local destinations that successfully managed by community were Pantai Bolu-bolu (Tirtoyudo sub-district), Pantai Tiga Warna, Pantai Tamban and Pantai Ngantep (Sumber Manjing sub-district) [2], and Pantai Bantol (Donomulyo sub-district) [3]. Otherwise changed of paradigm of tourism in the world that prefer get closer on nature and culture instead glamour holiday gave significantly increase visiting of those areas.

The ecotourism is a new term that appears late of the 1980s and grew in some different terms such as ecotourism, eco-tourism, ecotourist(s), eco-tourist(s), nature-based tourism and nature tourism [4]. Since early 1990’ to recent time the concept of ecotourism has been developing that accommodate world-changing. Blamey defined that ecotourism is nature-based activities that involve education to explain the ecosystem and sustainably managed [5]. The recent definition almost same as previous but it was added some main principal such as preservation or conservation, distribution of benefit and ethics or awareness. And the main purpose is emphasizing on
enjoyment of experience, minimizing impacts and sustainability [6].

Marine ecotourism was partly derived from marine tourism that conventionally explored marine and coastal environment through specific activities such as cruise ship, yachting, whale or dolphin watching, fishing and individual water sports [7]. It has been developed into specific activities in wider range from coastal area (mangrove), intertidal area (seagrass and coral reef) also offshore (manta and mammals) [8]. Artificial reef development and deployment become popular for marine ecotourism. Combination of artificial reef and coral transplantation can unite conservation and tourist attraction [9]. SCUBA diving as one of popular underwater sport gain as tool of this activity when divers through recreational diving can concern on reef creatures. The success of this program can be seen on Pamuteran Bali, which local community and diver/tourist established marine ecotourism through coral reef [10].

This success full is not coming instantly, supporting NGO, government and university need to create a good formula on marine ecotourism program. The first homework should be done is promoting the potential of coral reef and create to be hot spot SCUBA diving destination in the future. The fishermen on Sidoasri are far away from basic knowledge of identifying coral reef biota both of coral and reef fish as well. The ecodiver training is one comprehensive system, that was globally standardized by Reef Check International, to teach of coral and reef fish identify that was two important of monitoring healthy coral reef. The purpose of this study is to train the local fishermen on Sidoasri that grouped as Pokmaswas using ecodiver program.

MATERIALS AND METHODS

Study site

The program was conducted in Sidoasri village, Malang (Figure 1). This village is 70 km away from downtown Malang and takes 3 hours using land transportation. The village has the second-longest of coastline after Tambakrejo with 10,484 km [11].

Ecodiver Training

The ecodiver training was used participatory rural appraisal (PRA) that allowed the fishermen active, relax, and flexible during discussing in the training. They can make up their opinion freely and mix with games created unformal condition that allowed all material of ecodiver can be absorbed well [12].

Figure 1. Map of Sidoasri village
Figure 2. Types of substrates were introducing to local community: Hard coral (A), recently killed coral (B), sponge/SP and soft coral/SC (C), rock (RC) and rubble (RB) (D), NIA (E) and sand (F).

Fig. 3. Types of reef fishes. By ordering word, A-I were butterfly fish, grouper, barramundi cod, parrotfish, bump head parrot, sweetlips, snapper, moray eel, and hump head wrasse.
a. Substrate
The substrate defined as all reef fauna that may have an important role for coral reef ecosystem. Ten types of substrates were recognized into fishermen, they were hard coral, soft coral, sponge, other, nutrient indicator algae, rock, recently killed coral, silt, sand, and rubble (Figure 2). Dummies of all categorized were used to accelerate of understanding training member.

b. Reef fish
Number and types of reef fishes (Fig. 3) could be used as coral health bio-indicator. The abundance of butterflyfish (local: kepe-kepe) has been used for indicating good coral condition, also other fish like parrotfish would control of growing algal nearby of coral colony. In this training recognizing types of fish were done using dummies fish.

RESULT AND DISCUSSION
Attractive Education through Ecodiver
Since introduce around 1998 Reef Check protocol has been widely used in 400 reefs of 40 countries in the world [13]. The protocol of Reef Check also used by local community group that active regularly monitored coral condition, that some term came as community-based management. Ecodiver is trained person who followed the Reef Check protocol while did monitoring.

a. Substrates
Hard coral (HC) is all scleractinian coral that deposited of calcium carbonate and became major of reef-building. Soft coral (SC) is non-reef builder from Alcyonacea. Sponge (SP) is simple animal that has pores, they can be indicator as pollution sign. Any algae that have > 1 cm high is categorized as NIA or nutrient indicator algae. The other term is rock (RC) any surface of substrate that juvenile of coral can settle. The white colour of dead coral called as RKC for recently killed coral. Silt (SI), sand (SD) and rubble (RB) was indicator of sedimentation and mechanical force destruction.

b. Reef fish
Common reef fish was categorized into two groups that were indicator and economically important species. Butterflyfish (Chaetodontidae) or kepe-kepe for local name is a fish that prey on coral polyp or tissue in whole life so that this group is also known as corallivores. The high abundance of this fish as indicator the coral reef in healthy condition [14]. The next of fish have high value for human due to high demand for consumption and ornamental fish. Grouper (Serranidae) (local name: kerapu) and barramundi cod (Cromileptes altivelis, local name: kerapu tikus) have high price in the market, but because overfishing activity the number of this fish significantly decline. High-value fish is Humphead wrasse (Cheilinus undulatus) and 3 last those have economically important were Parrotfish (Scaridae, local name: kakatua), Bumphead parrot (Bolbometopon muricatum), Sweetlips (Haemulidae), Snapper (Lutjanidae, local name: kakap) and Moray eel (Muraenidae).

Field practice and toward marine ecotourism
The second phase of this training was field practice. Group of local fishermen was divided into small group that should have a name using coral or fish. In the first session these groups should note and guess dummies as representative of all types of substrates that have been distributed along 10 of reef banner. Session two is similar activity but the subjects change with reef fish dummies. The highest score has been awarded and the lowest one punished by sang songs.

Ecodiver is basic knowledge that shall become the trigger to increase sense of belonging to the prestigious of coral reef ecosystem in Sidoasri village and discern of skill identity of marine biota. Once the visitors/tourists came in in this area to spend...
their time, the community had ability to guide them into hot spot diver and introduce about coral reef in their area.

CONCLUSION
Coral reef is one attraction in Sidoasri village and still gave marginally effect on socioeconomic of community. Ecodiver becomes the first step to increase ability and understand of local community in coral reef environment also protect them from damage of marine ecotourism activity in the future. The involvement of local people to develop “new destination” of marine ecotourism is always needed to ensure sustainability and responsibility to protect of marine ecosystem.

ACKNOWLEDGEMENT
The authors extend their sincerest thanks to a member of coral reef study group Acropora of Marine Science Universitas Brawijaya who has prepared of FGD also thanks to all member Pokmaswas at Sidoasri village for assisting UB’s team in the field. This work has been funded by Research and Community Service (LPPM) Universitas Brawijaya through PNBP number: DIPA-042. 01.2.400919/2019.

REFERENCES


STUDENT COMMUNITY SERVICES IN TERNATE AND TIDORE REGIONS THROUGH KKN KEBANGSAAN 2019 PROGRAM

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ABSTRACT

The development of tourism in Ternate and Tidore includes natural tourism, historical tourism and souvenirs. Two targeted locations were Dufa-Dufa and Rum Village. Dufa-Dufa Village is one of the administrative region in North Ternate District, that known for its fisheries and agriculture potential. Rum Village included in the administration area of Tidore. The development of Rum Village potential in agriculture focused on the main commodities that cultivated by farmers, namely cloves and nutmeg. The development include product development and tourism strategic design. The students were part of Universitas Brawijaya’s delegation for KKN Kebangsaan 2019. The programs include (i) mapping of potential regions for tourism based on spatial and social-economic conditions, (ii) compilation of the concept to integrates ecotourism based on local competitive products, (iii) introduction of disaster mitigation based on possibility that happened in Ternate and Tidore regions. The results include packaging design, development plan and disaster mitigation plan.

KEYWORD
Development plan, Strategic design, Ternate and Tidore, Tourism,

INTRODUCTION

North Maluku Province, Indonesia is famous for historical tourism and spices. The spices was known since 13th century when Chinese ship came and did trade in the Maluku region, namely Ternate and Tidore. Chinese traders were then followed by traders from Arabic and Gujarat (14th century), Portuguese (1512), Spanish (1521), English (1579) and Netherlands (1667) [1]. The Region of Ternate and Tidore were then moving into international trade cities with superior commodities of spices and fishery products [2]. However, the potential of the area went down with the emerge of other active port [3]. Ternate City has the potential to be an international trading centre like Singapore due to its international trade routes. However, the infrastructure is not yet provided [4].

The North Maluku Province which faces the Pacific Ocean directly has the potential to
become an international gateway for the Eastern Indonesian Region [5],[6],[7]. Some of the leading commodities are nutmeg, cloves, tuna fisheries, skipjack, lobster, sea cucumbers, and nickel and gold, all of which can be directly traded through ports or airports in North Maluku [8]. Likewise, the need for imported goods for industrial activities in eastern Indonesia can be served. The infrastructure development will further increase the number of foreign tourist arrivals, so that the tourism sector will develop further [9].

The development inequality issue has become a major concern, especially for areas that are classified as underdeveloped and remote like North Maluku Province [10]. Therefore, Universitas Brawijaya set a Program of Doktor Mengabdi (DM), a community service program to assist the development such area. The potential of ecotourism and historical tourism is also very potential to be developed by involving the role of the community based on the surrounding environment [6]. The DM was supporting a student community service program called Kuliah Kerja Nyata Kebangsaan (KKN Kebangsaan) 2019, with other 54 universities under the Ministry of Research and Technology, Republic of Indonesia.

MATERIALS AND METHODS

Condition analysis and development plans
The location selected for KKN Kebangsaan was in Ternate and Tidore. The KKN was followed by 55 Public Universities in Indonesia. The condition analysis for both locations are as follows:

a. Dufa-Dufa Village, Ternate City
   Based on observations and interviews, it was found that Dufa-Dufa is vulnerable to natural disasters such as earthquakes, volcanic eruptions, cold lava floods, tsunamis and landslides. Moreover, natural disasters occurred in surrounding regions in 2019. The other issue was the lack of knowledge of the Dufa-Dufa community regarding responses/actions when dealing with natural disasters and how to reduce the impact.

b. Rum Village, City of Tidore Islands
   Table 1 shows the issues faced by Rum Village

Roadmap of the Sustainable Program
The community services of Rum Village and Dufa-Dufa Village were arranged in a continuous program scheme for 3 years. The plan for the long term implementation of the DM program is the collaboration between Universitas Brawijaya, local university and the local Government. The Collaboration Program is carried out in a self-financing and self-managed, and is carried out in multi years. The proactive role of the community is needed in the success of the empowerment program [11].

a. First Year
   The first step to start a series of activities is licensing and field surveys of partners. The main program in Rum village, Tidore is the development of nutmeg products and disaster mitigation by constructing earthquake resistant houses. Meanwhile, the activities of the DM team in Dufa-Dufa Village consisted of the development of processed fishery products and the development of marine tourism objects.

b. Second Year
   The results of mapping of regional potential in the first year will be developed in the second year (2020) with the proactive of relevant stakeholders. Implementation of an annual event or festival can introduce Development of Integrated Ecotourism in Ternate City and Tidore Islands City.

c. Third Year
   Promotion of tourism sector and Micro Small and Medium Enterprises (MSME) in the region carried out in the third year (2021). Strengthening Standard Operating Procedures (SOP) and management of tourism destination also carried out with the cooperation and assistance of relevant stakeholders.

The planning program of development of tourism sector and MSME with sustainable manner Ternate City and Tidore Islands City for 3 years presented in Table 2.

Community service actions in 2019
Community service activities are carried out by the DM team of Universitas Brawijaya and KKN Kebangsaan 2019 in the Dufa-Dufa village, Ternate. The main DM and KKN team activities consisted of disaster mitigation, ecotourism potential development, disaster mitigation and reading garden initiation. Meanwhile, community service activities in Rum Village, Tidore consist of development of clove products, design of disaster resistant houses and disaster mitigation.

RESULTS AND DISCUSSION

Table 1. Problem analysis of Rum Village, City of Tidore Island

<table>
<thead>
<tr>
<th>No</th>
<th>Area</th>
<th>Problem analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Public facility</td>
<td>• Lack of public road lighting&lt;br&gt;• Lack of internet acces</td>
</tr>
<tr>
<td>2</td>
<td>Plantation</td>
<td>Farmer groups shortage of land for sunning the cloves</td>
</tr>
<tr>
<td>3</td>
<td>Education</td>
<td>Lack of after school education</td>
</tr>
<tr>
<td>4</td>
<td>Social</td>
<td>The general public consumes cigarettes especially for young and old people</td>
</tr>
<tr>
<td>5</td>
<td>Economy</td>
<td>• Yields from the plantation sector are sold to middlemen at low prices, especially in the sale of cloves&lt;br&gt;• There is no community initiative to process the harvest in order to have more economic value&lt;br&gt;• There is still a lack of network to market plantation products other than being sold to middlemen</td>
</tr>
<tr>
<td>6</td>
<td>Tourism</td>
<td>The lack of attention to environmental cleanliness and maintenance of tourism facilities</td>
</tr>
</tbody>
</table>

Source: Observation Data, 2019

Table 2. The Development Plan

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>a. Village Potential</td>
<td>• Mapping of regional potential and initiation of integrated ecotourism pilot scale</td>
<td>• Community empowerment by coordinating relevant stakeholders</td>
<td>• Assistance SOP of integrated ecotourism governance in Tubo and Dufa-Dufa</td>
</tr>
<tr>
<td>b. Fishery Products</td>
<td>• Strategy for developing local food from fisheries in Dufa-Dufa Village</td>
<td>• Realization of the processed fishery production in Dufa-Dufa village</td>
<td>• Governance of production and marketing for fishery products</td>
</tr>
<tr>
<td>c. Development of Batik with Ternate's Design</td>
<td>• Initiation of Batik with Ternate’s design as one part of Batik Nusantara (BATARA)</td>
<td>• Technology of Production the Ternate Batik that is effective and efficient</td>
<td>• Governance of the production and marketing of processed fishery products</td>
</tr>
<tr>
<td>d. Tourism</td>
<td>• Observation and recommendation for development of tourism destination</td>
<td>• Provision of facilities, infrastructure and tourism information systems</td>
<td>• Evaluation of tourism management with sustainable development</td>
</tr>
<tr>
<td>e. Culture/History</td>
<td>• Inventory of local culture/history and its philosophical meaning</td>
<td>• Continuous exploration and training for culture and history sites</td>
<td>• Governance and regeneration of cultural actors in Tubo and Dufa-Dufa</td>
</tr>
</tbody>
</table>
a. Product development for tourists Ternate to improve the community's economy. One of the tourism potential in the Dufa-Dufa Village is the Fish Bone Monument that located on the coast Dufa-Dufa beach. However, the landmark was not well maintained. Team of DM and KKN Kebangsaan 2019 carried out the task of cleaning up around the Fish Bone Monument with community and related stakeholders, and promote it through social media.

The development of tourism destination around the Fish Bone Monument was also followed by converting the surrounding fishermen’s commodity into local products that have quality and competitiveness. Products that have been processed by the Dufa-Dufa community included shredded fish, fish chips and fish crackers. The DM team and KKN Kebangsaan 2019 redesigned processed product logos that appealed to consumers, design packaging until marketing these products by online and offline. Offline marketing is carried put by submitting the concept of ‘Souvenir House’ in around Fish Bone Monument. With the ‘Souvenir House’, fish processed products were expected to be more popular to consumers. The existence of ‘Souvenir House’ has become one of the factors in the development of tourism destination and the increasing income of coastal communities. The packaging design of processed fish products and online marketing shown in Figure 1.

b. Disaster Mitigation

Socialization activities about disaster mitigation carried out for the Dufa-Dufa communities which aims to provide basic knowledge related to disaster response actions. The socialization activity carried out into 2 segments, namely for elementary school students and the general public. The high potential for disasters in the Dufa-Dufa Village are volcanic eruptions, earthquakes and cold lava floods. With the dissemination of disaster mitigation, the community expected to be understand about some principles of disaster resilient areas, evacuation and local wisdom towards nature.

Technically, the DM team and KKN Kebangsaan 2019 contacted the relevant stakeholders to collaborate on socializing and simulating the disasters. Some preparations for the socialization include internal meeting, observations, technical preparations, and implementation of the disaster mitigation socialization. This socialization activity is additional program from the development of tourism destination which is motivated by some natural disasters occurred in 2019 in Indonesia.

Figure 1. Processed Fish Products And Online

Rum Village, Tidore Island City

The theme of program the DM team and the KKN Kebangsaan 2019 carried out in Rum Village, North Tidore District, Tidore Islands City consisted of “Cloves of Rum” and “Construction
of Bamboo Rum for Earthquake Resistant Houses.

a. Cloves of Rum

The majority of Rum Village communities work as clove farmers. The issue was the abundance of clove commodities at main harvest time. The community needed assistance related to the processing of clove products and marketing strategies for the processed clove products. Another issue was the added value from the sale of farmers’ clove products was still low, because the lack of postharvest handling that affects the quality of clove, and the lack of entrepreneur’s ability to understand consumer demand and market supply.

b. Construction of Bamboo Rum for Earthquake Resistant Houses

Rum Village is located in the coastal area and surrounded by Mount Kie Matubu, Mount Maitara, and Gamalama which were the main attraction for domestic and foreign tourists. On one hand, the natural landscapes were beautiful, cultured atmosphere and has limited urban noise. On the other hand, the threat of disaster can come from the active volcano. The community knowledge was marginal about understanding disaster resilient areas. Based on observations, DM team and KKN Kebangsaan 2019 found data on the condition of the dwelling buildings in Rum Village as in Figure 2.

In Figure 2, condition data shows 60% (21 houses) of less suitable houses and 8.6% (3 houses) of not suitable houses. The feasibility of community housing is the concern of the local government and related stakeholders. DM team and students redesigned earthquake-resistant low-cost housing. Local wisdom for earthquake resistant home design is the use of bamboo reinforced concrete blocks as an innovative earthquake resistant low cost house. The bamboo in Rum Village can be used as a resource for making earthquake resistant low-cost housing samples. Figure 3 below is the design of bamboo reinforced concrete beam foundations in Rum Village.

CONCLUSIONS

Universitas Brawijaya’ DM team and KKN Kebangsaan 2019 did community services in Dufa-Dufa Village, Ternate City and Rum Village, Tidore Kepulauan. The tourism sector development plan for the next 3 years needs to
be continued with an evaluation study of the implementation of the activities). The communities were enthusiastic and supportive the development activities of the tourism sector, MSME industry and the socialization of disaster mitigation. The successful programs included tourism destination, product development, and earthquake resistant design.

ACKNOWLEDGEMENT

The Doktor Mengabdi Team would like to appreciate the generous funding from Institute of Research and Community Services (LPPM-UB) and Universitas Brawijaya. A special thanks is dedicated to Universitas Khairun and DIKTI for the successful KKN Kebangsaan 2019 program. We would like to acknowledge the other 54 public universities participated in KKN Kebangsaan, especially those who collaborated with Universitas Brawijaya’s students in Ternate and Tidore.

REFERENCES


ABSTRACT

Batik, is one of the oldest ancestral heritage of Indonesia's culture. Every part of Indonesia has their own unique characteristic of motives. Sakaq Tada Village is a village located in Kecamatan Mook Manaar Bulatn Kabupaten Kutai Barat Provinsi Kalimantan Timur. The name of Sakaq Tada Village originates from the word sungai (Sakaq) and not there which translates as tak ada which is pronounced Tada in Kutai language. This village is the location of the Doktor Mengabdi Universitas Brawijaya program is held. Planning of making a development in the village with the resources available in the village to improve the economy of the village was made and the aim of this research is to describe the development and empowerment program in Sakaq Tada Village, to understand the benefit of empowerment and development impact of this program and to introduce and give education to Sakaq Tada Villagers on how to make batik clothing with a Kalimantan motive. The development that was given to Sakaq Tada villagers has been running optimally through the development of human resources and improvements of technology skills, which will increase the knowledge and skills and also motivation for the villagers to make batik clothing. The empowerment done was given a facilitation on how to make a batik and also knowledge of arts and batik and also marketing.

KEYWORDS
Empowerment, batik craftsmen, welfare, Sakaq Tada.
empowerment of batik craftsmen in the village of Sakaq Tada, as well as to determine the benefits and the impact of empowerment and development of batik craftsmen.

Batik development in Sakaq Tada Village is a community empowerment and is a part of government’s plan. According to ADD (Anggaran Dana Desa) in 2017, local government has set up a soft-skill training development in a form of intensive sewing training, and is seen to be potentially developed further. This community empowerment is supported by the high enthusiasm from the community and the government when following the trainings for Dayak motives Batik.

Local Autonomy Law from the government states that local government needs to develop and participates in the growth of their districts as part of national developments by exploring and utilizing their own potential and also empower the community as a part of the economy development in order to improve the welfare of the community and local revenue (PAD) [4]. To add that Batik is an Indonesia’s icon in international arena, it is important for the government to preserve Indonesia’s culture heritage [5].

METHODS
Time and Place
This research is held at Sakaq Tada Village, Kecamatan Mook Manaar Bulatn, Kabupaten Kutai Barat, Provinsi Kalimantan Timur through Doktor Mengabdi programs on 1 July until 30 July 2019.

Research Phase
This research conducts several stages, which are:

a. Preparation Phase
Tools and materials needed for the training which are cotton cloth, canting, wax (batik night), brushes, pencils, erasers, stoves, pans, scales, coloring agents (Naphthol, Indigodol, Nitrites, color salts, caustic soda, HCl), coloring containers, and water. Competent trainers in experts in making batik acquired from an experienced batik artist and observation of the surrounding village in hope to find a motive unique enough for Kampung Sakaq Tada Village own characteristics.

b. Implementation Phase
First stage is to give introduction of batik philosophy itself where batik is an art that can actually be done by anyone but needs will and determination. With the method of lecture and practical session, villagers are asked to follow the step by step process of making a batik which includes motive drawing, pencantingan, coloring, drying and boiling. Every method is give detailed instructions and tips on how to make it so villagers can apply the training independently.

c. Final Phase
Villagers can produce their own batik clothes with their own characteristics of the village hand made. To evaluate the training, involvement of some villagers are not well accounted for and government support is not maximally given especially in the aspects of arts and of them is batik making.

Analyzing Phase
Analyzing phase in the development of batik making in Sakaq Tada village is a part of a phase where analysis from various data acquired in precious stages. This stage includes questionnaire and discussion from a group of villagers during the batik training.

RESULT AND DISCUSSION
Batik Training
Some phases in the process of making the batik is completed in Sakaq Tada village, some of them are 1) motive drawing process on cloth, 2) motives that are completed goes through cainting process using wax, 3) continued with colouring process using dye, 4) dying process if completed and goes through the dying process and last 5) boiling at the end to melt wax on the cloth and the end product as a usable batik clothing. This follow the scheme of the program that were given to the villagers of Sakaq Tada village which can be seen in Figure 1.
Batik is one of art that can be developed easily in Sakaq Tada village because of its own background with various abundant nature products and villager’s excellent artist skills. Starting from the introduction of batik’s philosophy to the villagers that attracted a lot of attention and wanted to explore more with the method of lecture and practice session for every step on batik making process until producing their own batik. The various abundant nature product has also helped the villagers to keep producing new motives unique to only Sakaq Tada Village. With the help of batik instructors and students, the villagers have produced over 10 handmade batik and intended to keep adding more as the villagers are keen and interested. It continues and villagers now also produce uniforms for 17 August Independence Day celebration and also products to sell.

Batik development

These are the examples of motives that were made by the Sakaq Tada villagers with the help of students through Doktor Mengabdi Universitas Brawijaya program which can be seen in Figure 2.

The training from Doktor Mengabdi Universitas Brawijaya has resulted to bring a positive impact for Sakaq Tada village and can be a hope and means of increasing villager’s income especially for villagers in a low economy status using the means of increasing the business capacity so it will result as an independent business.

This batik development and empowerment given to the villagers by facilitating the process of making batik clothing and trading access. Facilitation given can also help increase the knowledge of making a batik. Also, these can also help sell it through the wide range of markets. According to [6], empowerment is an effort that is needed to be done and one of them is by spreading out market areas to add more selling value and can be a product that compete with other global products.

**Figure 1. Program scheme**

The process of making simple batik and has potential artist  
Batik introduction  
Batik training  
Villagers shows some interest towards batik, making and maintained production

**Figure 2. (a), (b). Kalimantan Batik motives**

To add more to the point above, the batik development and empowerment that has been given to the craftsmen is a guided training. This is done to provide some knowledge to make new innovations for the products and service offered, human resource development and technology. Other than that, this guided training and batik development and empowerment can increase the villager’s welfare.

Similar to the research conducted by Kumalasari [7] about empowerment of batik
craftsmen by Dinas Koperasi, UKM, Perindustrian, Perdagangan, dan ESDM, Kabupaten Sidoarjo for Industri Kecil Kampoeng Batik Jetis Kabupaten Sidoarjo. The results were that the efforts done for this development has given a tremendous impact and benefits to the batik craftsmen.

On the other hand, a research conducted by Kurniawati [8] the community empowerment in the aspect of economy by the Badan Pemberdayaan Masyarakat Kota Mojokerta, where independence of the economy aspect especially productivity and villager’s in low income is increased, found as the result of the research.

CONCLUSION

1. Batik Empowerment to Sakaq Tada Village is related to the facilitation of making a batik and knowledge on marketing.

2. Training given to the community by the Doktor Mengabdi program has ran optimally especially in the process of making a Kalimantan motive batik with the hope of developing human resource and increasing the technology capability, more innovative motives design, and a better quality product and also can increase the community welfare.

REFERENCES
IMPROVEMENT OF EFFICIENCY OF KAFFIR LIME OIL (CITRUS. HYSTRIX DC.) DISTILLATION PROCESS IN PEOPLE DISTILLATION UNITS

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ABSTRACT

Kaffir lime oil (Citrus. Hystrix DC.) is one type of essential oil produced by the people and has a relatively stable price. Improved efficiency of the process of distillation of kaffir oil by improving the handling of raw material of twigs and how to separate the kaffir lime oil with condensate water. In this activity the raw material is chopping using a chopper cutting machine, giving a hinge at the top of the distillation kettle and installing a funnel that is connected to the pipe and designed based on the connected vessel. The results obtained show that the cutting of kaffir lime branches can reduce the length of branches by 10-15 cm, thereby increasing the capacity of the kettle and made the oil extraction process more optimal. Hinge installation makes it easy to load and unload raw materials so as to ease the burden on workers and save time up to 1 hour. While the installation of a connected vessel-based oil container can relate to improving the quality of kaffir lime oil. The optimization of this process can increase the yield of kaffir lime oil by 0.24%.

KEYWORDS

Kaffir lime oil, distillation, separation, efficiency, modification

INTRODUCTION

Oranges, the family Rutaceae are known as one of the important horticultural crops that are widely cultivated in the tropical and subtropical regions of southern Asia. If Pomelo (C. grandis (L.) Osbeck) is widely known among other sweet oranges in Vietnam [1], but kaffir lime (C. hystrix DC.) Known as orange for cooking is very popular in Thailand, Malaysia and Indonesia [2]. Furthermore, citrus plant parts, such as leaves, fruit peels and twigs are used as sources of essential oil-producing materials [3], including kaffir lime oil derived from Tulungagung, East Java obtained from distillation of citrus twigs [4]. Kaffir lime oil production in Indonesia is still very limited, only around 2-3 tons per year [5].

Kaffir lime oil (Citrus hystrix DC.) Is one of the new commodity essential oils which is recently needed because of the high price and relatively stable especially in the international market. Although kaffir lime oil is a newcomer, it is a commodity that has excellent prospects and is always needed on an ongoing basis in the perfume, fragrance, cosmetics, pharmaceutical, soap, and other industries. Kaffir lime oil has a very high citronellal content so that it is very potential to be developed into derivative compounds. Kaffir lime oil is an essential oil that can be obtained from the distillation process of kaffir lime plants which are easy to grow and are easily obtained in Indonesia such as the leaves [6], fruit peels [7], fruit [8], and twigs [4] using steam (steam distillation) that is steam produced from a boiler then passed into the material so that the oil contained in plant tissue will come out and be carried by steam water. The water vapor containing oil is then passed in the cooler then the results are separated. These treatments are many factors that influence the acquisition of kaffir lime oil.
Entrepreneurs for distillation of kaffir oil began to be developed in Indonesia, one of which is in Tulungagung Regency whose production capacity reaches 3 tons/day. This is certainly a contribution to regional income and empowerment of local wisdom-giving communities, with the number of distillers reaching 6 steam distillation equipment. One of the problems faced by the group of distillers of kaffir oil in Tulungagung is that there is pre and post oil refining. The distillation process is less effective due to several factors, including the process of distilling kaffir lime branches without being chopped, this can cause contact between the water vapor produced with the surface of the material to be minimal so that the oil yield is low and the capacity of the distillation device is not optimal. The next obstacle is the process of unloading materials from conventional distillation devices, the process of removing materials takes a long time so that the subsequent distillation process becomes inefficient if calculated economically. The next problem faced by the group of distillation of purut orange oil refiners in Tulungagung Regency is the process of separating the distilled oil from hydrosol, so far the distillation separation has been carried out in a conventional manner by accommodating the distillate in a container and taking the oil by taking the top layer until all the oil is separated visual observations alone, this method certainly greatly affects the results of the calculation of percent yield and quality of oil produced because imperfect separation will cause high water content in oil, this certainly causes a drop in prices if sold on the National and International markets.

Analysis of the problem provides a general description of the distillation process that occurs in the community. To provide solutions to these problems requires the participation of academics and practitioners from the campus, so that there is a continuous process between the results of research that has been produced and the application directly in the community. In this case the process of refining kaffir lime oil both pre, process, and post-refining is the key in producing essential oils of a standard quality, specifically increasing the yield of the resulting product and its purity and can be accepted in the National and International markets with relatively stable prices.

**MATERIALS AND METHODS**

**Material**

Twigs of kaffir lime oil (Figure 1), direct steam distillation unit, some stainless equipment to modify the distillation unit, chopper, and oil separator.

**Methods**

**The distillation of kaffir lime twigs**

A sample of kaffir lime (C. hystrix) was obtained from a farmer's kaffir lime plantation in Tulungagung regency, East Java. All fresh samples are put into a distillator and carried out water-steam distillation of 500 kg for 5-6 hours. The essential oil obtained was dried with MgSO₄, characterized organoleptic and physical properties and stored in a dark glass bottle. This distillation process is the preliminary data for conventional distillation that has been carried out by the kelompok usaha bersama Jaya Abadi which focuses on the distillation of essential oils.

![Figure 1 Material Kaffir Lime Twig Methods](image1)

**Trial distillation with a chopper machine for kaffir lime twigs**

A sample of kaffir lime (C. hystrix) was obtained from a farmer's kaffir lime plantation in Tulungagung regency, East Java. All fresh samples were chopped with an automatic chopper, and put into a distillator and carried out water-steam distillation of 500 kg for 5-6 hours.
The essential oil obtained was dried with MgSO₄, characterized organoleptic and physical properties and stored in a dark glass bottle. This distillation process is the preliminary data for conventional distillation that has been carried out by the kelompok usaha bersama Jaya Abadi which focuses on the distillation of essential oils.

**Trial of loading and unloading waste from the modified distillatory unit**

The distillation boiler modification is done by cutting the boiler so that it is separated from the furnace and placed in a semi-permanent position. The boiler is modified with additional wheels and connected by hydraulics to the side of the boiler, so that when it comes to the process of removing waste from the boiler there is no difficulty. This trial process can be carried out after the distillation process has been completed to remove material from the distillery.

**Trial of oil distillation and separation with a oil’s separator**

After distillation process is the separation of distillate of kaffir lime oil produced with water using an oil separator. Distillate generated at the distillation condenser is connected to the pipe and connected to the oil separator, in this process the water will come out into the drain and the oil will be collected automatically.

**Test the quality of kaffir lime oil**

Samples of essential oils were analyzed by GC-MS using the Shimadzu type (QP 2010S), the database in the library was used as an automatic comparison to assist the analysis of chemical structures. Beside that, quality was analyzed based on SNI such as, specific gravity, optical rotation, and refractive index.

**RESULT AND DISCUSSION**

Cultivation of kaffir lime plants in the regency of Tulungagung is centered in Rejotangan and Sumbergempol sub-districts. In general, the nursery process in the two sub-districts uses seedlings in the form of citron orange seeds and through the stem cuttings system that costs not much. Kaffir lime plants can only be harvested after two years from the planting period.

According to farmers, the cultivation process of kaffir lime is not difficult if farmers can eliminate pests and provide the right fertilizer. In the first week systemic herbicides are given to plants. When the buds have started to blossom, spraying with insecticides and leaf medicine. Its function is to remove the caterpillars and chocolate ladybugs which cause the leaves to wilt and die. For the next fertilization process depends on the weather. In the rainy season, fertilizing is done using phonska fertilizer and ZA. The use of this fertilizer causes the plants to bear fruit quickly, while farmers only need the leaves. In the rainy season, farmers minimize the use of fertilizers that contain nitrogen because it can damage crops. Irrigation of kaffir lime plants is only done once a month, but if it feels like it has begun to dry it can be done more than once.

Basically, kaffir lime plant is a type of plant that is easy to be cultivated and quite profitable, because kaffir lime plants only need to be planted once and can survive more than 30 years. Farmers of kaffir lime plants not only sell leaves but also twigs of kaffir lime plants. Kaffir lime leaves and twigs can be harvested twice a year to produce maximum yields. Farmers can also harvest three times a year or depending on the needs of farmers, but the yields obtained produce leaves of poor quality.

Based on field surveys, it is known that the people in Rejotangan and Sumbergempol Districts have learned how to cultivate kaffir lime plants, but due to the unstable price of kaffir lime leaves, many people have converted the kaffir lime land to other plants such as sugar cane and elephant grass. Based on field surveys, it is also known that most people already know that kaffir lime twig not only be used as firewood but can also be sold. So far it can be concluded that the Districts of Rejotangan and Sumbergempol have the potential to supply raw materials for distillation of kaffir lime oil. In addition it is known that there are approximately 80 hectares of kaffir
lime land in four districts in Tulungagung Regency.

During the field survey, the process of observing distillation of kaffir lime oil was also carried out. During the observation process of kaffir distillation, information was obtained that at the Distillery of the Koperasi Usaha Bersama Jaya Abadi there were six steam distillation devices. Before the distillation was carried out, raw materials were collected in the form of kaffir lime branches which had been separated from their leaves from farmers scattered in three districts namely Rejotangan District, Sumbergempol District, and Ngunut District. Every day can be collected kaffir lime branches around 6 tons. The twigs that have been collected are then distilled to produce essential oil with six distilled tools in the Koperasi Usaha Bersama Jaya Abadi. The distillation process of the six boilers requires a different time due to the different capacities of the boilers. During the refining process, the fire used must be stable in order to produce maximum essential oil. After the refining process is completed, the oil that has been collected is then continued with the filtering process. The filtering process is carried out manually with a filter cloth so that essential oils are obtained which have been separated from the water.

Based on field observations, some data were obtained in the process of distillation a set of old equipment at the KUB Jaya Abadi. There are four boilers that are used and have different capacities. Boiler 1 with a capacity of 600 kg requires three hours of distillation to produce approximately 0.9 kg of oil with a volume of water in a furnace of around 2388 liters. Boilers 2 and 3 with a total capacity of 700 kg require four hours of distillation to produce approximately 1
kg of oil with a volume of water in the furnace around 1650 liters. Boiler 4 with a capacity of 600 kg requires three hours of distillation to produce approximately 0.9 kg of oil with a volume of water in a furnace of around 2388 liters. Based on these data it can be said that the greater the capacity of the kettle for kaffir lime twig, the longer the time needed for the distillation process and the more essential oil produced. In the old set of tools, the raw materials used were not chopped first, causing the amount of oil produced to be less than optimal because the contact between the steam and the branches was not optimal. In addition, the filtering process before making the separator is still using a manual method that causes the separation does not produce maximum oil.

Prior to the modification of the distillation unit (Figure 2), the efficiency of the unit was still ineffective, this was due to several factors such as the process of distillation of kaffir lime branches without being chopped, the process of unloading material from conventional distillation units, and the distillation separation process carried out manually. As a result of the distillation process that is still less effective causes the results of distillation is less than optimal in terms of both time and quality.

Referring to the three factors, the old distillation modification is made, which is made an automatic chopper which aims to chop the kaffir lime branches so as to maximize the capacity of the distillation unit and provide wider contact between steam and branches, so as to obtain oil with a greater yield. and the quality of oil produced is better. The second improvement is modifying the distillation boiler to be semi-automatic by adding wheels and hydraulic pressure to rotate the kettle, and making a separate boiler, so that the modified distillation tool can help facilitate the process of loading/disposal of waste. In an economical calculation this process will provide benefits in terms of time efficiency. The third improvement is done by making a distillation separation tool or called a separator to separate oil and water. Separation of oil using a separator can improve the quality of the oil produced and minimize the water content contained in oil. Thus the kaffir lime oil produced has the best quality. The process of installing the equipment is carried out for 14 days.

When a new set of tools has been made, some data is obtained from the process of refining the new set of tools. Boilers 5 and 6 with a capacity of 1000 kg require a seven-hour distillation process to produce approximately 2.7 kg of oil with a volume of water in the furnace around 1980.6 liters. In the refinement of the first refining device, an automatic chopper was made. Oil products that should be obtained after the raw material is chopped are twice as much as the raw materials that are not chopped. This is due to the greater contact between water and twigs and also the quantity of kaffir lime branches used in the kettle which can contain more kaffir lime branches, which is double. So that it can lead to efficiency in time, quantity of raw materials, and also the results of oil obtained. The second repair is done by modifying the refining boiler to be semi-automatic by adding wheels and hydraulic pressure to rotate the kettle, and making the boiler separate. The results of these improvements lead to more efficient time and make it easier to remove the distilled purified lime waste. The third improvement is done by making a distillation separation tool or called a separator to separate oil and water. When compared with manual filtering, this separator is very effective in separating oil and water from the distillation process. Actually the use of separator does not affect the amount of oil obtained but affects the efficiency of time and the separation between oil and water is better.

There are several factors that influence the amount of essential oil obtained from the distillation. The first factor is if there are still many leaves on the kaffir lime branches that will be distilled. That causes more oil to be obtained. The second factor is the size of kaffir lime branches, the smaller the kaffir lime branches used will produce more oil and vice versa. So that the amount of oil obtained from the six
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boilers at the distillery is uncertain and can only be predicted.

From the distillation process carried out at KUB Jaya Abadi besides producing kaffir lime oil, the refining process also produces various kinds of waste. Waste produced from the distillation is waste twigs, leaves, water, ash, and charcoal. The resulting waste is not just thrown away, but is reused so as not to pollute the environment. The resulting twig waste is then used as firewood in the refining process. Besides the waste does not pollute the environment, the use of twig waste as firewood will also save fuel costs in the refining process. The resulting leaf waste is then used as food for goats by the workers in the distillery which keep goats. So far the leaf waste does not endanger the goats that are kept, there are even goats whose age lasts up to one year, healthy and fat body. Ash and charcoal waste generated from the burning process is used as compost for plants by the surrounding community. Waste water generated from the distillation process is not utilized, but flowed into a dead river near the distillery. Based on these observations it can be said that KUB Jaya Abadi really utilizes various kinds of waste obtained from the distillation results so that it is more useful and not wasted.

CONCLUSION

The process of kaffir lime distillation after the modification of the kettle can shorten the loading and unloading time, after the chopper is made it can reduce the size of the twigs, and the oil separator can separate water from oil well, thus the overall efficiency of the distillation process increases from the time and quality of the oil.

ACKNOWLEDGEMENT

The author gave a gratitude to Institute of Research and Community Services (LPPM) Universitas Brawijaya for financial support, Essential Oil’s Institute, Universitas Brawijaya for supporting for kaffir lime analysis, and also to our partner Balai Penelitian Tanaman Jeruk dan Buah Subtropika (BALITJESTRO) and Koperasi Usaha Bersama Jaya Abadi, Tulungagung Regency for providing all necessary facilities and material to conduct the the experiments.

REFERENCES


DEVELOPMENT OF LOCAL COMMODITY-BASED AREAS "AGRO-ECO-PARK" AT THE BORDER (CASE STUDY IN SUNGAI LIMAU VILLAGE, SEBATIK TENGAH NUNUKAN REGENCY, NORTH KALIMANTAN)

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ABSTRACT

Travel destinations become an important factor to recognize an area and can be a source of foreign exchange. Sebatik Island is divided into two regions, namely Indonesia in the south and Malaysia in the north. At present there are almost no important and interesting tourism objects in Sebatik besides Stakes 3 and Garuda Statue. Both of these places are less attractive because without the support of interesting facilities. Therefore it is necessary to develop a tourist area that is able to attract tourists but also be able to grow the regional economy. The purpose of this study is to determine the local potential and models of tourist areas that can be developed. The results of the study indicate that viable natural resources have the potential to support tourism areas such as cocoa, banana, durian and local fruits, while human resources are the development of arts from Flores and Bugis that can support traditional dances and souvenirs. The development of the tourism area is carried out in stake 7 which has a contour of an area of 2 hectares with a view of the city of Tawau, from one hilltop as the agro region of the valley as an ecological and adventure area and the other hill as a region of interest and games. The concept of ecology is developed through each fruit seed that is eaten will be planted by visitors in a poly bag that will be named after the visitor's name to be planted on site if it has grown well and is free of plastic packaging.

KEYWORDS
Agro-eco-park, cocoa, sebatik

INTRODUCTION

National cross border areas are increasingly becomes a very strategic area and plays an important role in building and maintaining regional sovereignty [1]. This national border region is a place of interaction between globalization and locality for the community daily life therefore that in the effort for developing this region optimal capacity should be carries on to improve community resilience in economic, social, political and cultural developments. Especially in Sebatik Island which borders directly with Malaysia [1], [2].

Sebatik Island is includes the area of trade routes between two countries. This activities was carried out on the Limau River over the past century before the Indonesia and Malaysia proclaimed their independence. This area is known as one of the entrances of trade routes and economic activities on Sebatik Island and their surrounding. From wooden ships from Malaysia come with a number of food items as well as other commodities that color the region economy activities that needed between the two countries.

As the purposes of this articles that report the results of the community services of Brawijaya
University, Doktor Mengabdi program, Sungai Limau Village was chosen and they are very supportive in the assistance of the development of "Cocoa Agroindustry Initiation in Efforts to Develop Agrotourism in Sungai Limau Village, Central Sebatik District, Nunukan Regency, North Kalimantan Province". This program is expected to provide establishment of the fundamental development of farmers or the surrounding community. Therefore, the development of a cocoa tourism village in Sungai Limau Village in order to increase the diversity of village products were viable in the future.

The purpose of this study was to determine the potential of Sungai Limau village as an agrotourism area.

**METHODS**

This research was carried out in Sungai Limau Village, Sebatik Tengah District, Nunukan Regency, North Kalimantan Province in the period of 1-30 July 2019. The agricultural commodities examined in this study were from various plantation, namely: cocoa, durian, banana, cempedak and terap/marang In order to give comprehensive discussion on how the socio technical aspects impact on the establishment of the potential economy creation in the region, therefore the variables used include internal factors (Table 1) and external factors (Table 2).

The internal factors variables were operationalized based on the literature search in the area for community development practices in the rural areas as well as validated by the local government.

To balance the discussion as per se we will use the SWOT analyses, the external factor also identified using the same approach.

By highlighting that two variables that we categorized as internal and external factors, the mapping of the Potential of Cocoa Tourism Village that covers the area of land, ownership, map of the area of cocoa plantations and surrounding areas that includes potential supporters such as outbound, home stay etc. based on SWOT analysis could be carried out.

**Table 1. Internal Factors**

<table>
<thead>
<tr>
<th>No.</th>
<th>Variabel</th>
<th>Indicators</th>
<th>Operational Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Human Resources</td>
<td>Age</td>
<td>Number of citizens in the productive age. Education and skills of citizens that has the potential to be developed.</td>
</tr>
<tr>
<td></td>
<td>Management [3]</td>
<td>Education and/or skills</td>
<td></td>
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<td></td>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Infrastructure [4]</td>
<td>Tools and farming machinery</td>
<td>Facilities to facilitate citizens’ activities in cultivating land, such as tractors, harvesting equipment, etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.</td>
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To give comprehensive discussion on how the socio technical aspects impact on the establishment of the potential economy creation in the region, therefore the variables used include internal factors (Table 1) and external factors (Table 2).
Table 2. External Factors

<table>
<thead>
<tr>
<th>No.</th>
<th>Variabel</th>
<th>Indikator</th>
<th>Definisi</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>2. Price</td>
<td>• The value of a customer acceptance of a product and become farmers’ income.</td>
</tr>
<tr>
<td>2.</td>
<td>Capitalization/Loan provider [8]</td>
<td>1. Governance</td>
<td>• There are private and state-owned bodies that offer capital loan services for farmers to develop businesses.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Ease administration</td>
<td>• Requirements needed to apply for capital loans must be met by farmers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Government assistance</td>
<td>• Increased ability and knowledge of citizens to increase crop productivity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Policy</td>
<td>• Procedures that must be obeyed by citizens in their economic activities.</td>
</tr>
</tbody>
</table>

Table 3 SWOT Analysis Table

| STRENGTHS (S) | WEAKNESSES (W) |
|---------------|----------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Internal      |                | 1. Availability of potential human resources (S1) | 1. Low level of managerial and technology human resources (W1)                                                                          |
|               |                | 2. Fruit production (S2) | 2. Uncertain climate shift (W2)                                                                                                          |
|               |                | 3. Available land (S3) | 3. Lack of postharvest activities (W3)                                                                                                |
|               |                | 4. Supportive climate (S4) |                                                                                                                                          |
|               |                | 5. Introduction of communal infrastructure (S5) |                                                                                                                                          |
| External      |                | 1. Development of cocoa based agro-tourism and fruit product processing (S2, S3, S4, S5, O1, O3) | 1. Managerial and technology assistance to women community organization (W1, O1, O2)                                                    |
|               |                | 2. The establishment of private partnership to open market in others areas (S2, S3, O2) | 2. Development of village enterprises to assure the marketing of product and tourism management (W1, W3, O2, O3) |

OPPORTUNITIES (O) | STRATEGY SO | STRATEGY WO |
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<tbody>
<tr>
<td>1. Open market opportunities (O1)</td>
<td>1. Development of cocoa based agro-tourism and fruit product processing (S2, S3, S4, S5, O1, O3)</td>
<td>1. Managerial and technology assistance to women community organization (W1, O1, O2)</td>
</tr>
<tr>
<td>2. Partnership with private sector (O2)</td>
<td>2. The establishment of private partnership to open market in others areas (S2, S3, O2)</td>
<td>2. Development of village enterprises to assure the marketing of product and tourism management (W1, W3, O2, O3)</td>
</tr>
<tr>
<td>3. Opportunity to uses the land for tourism related activities (O3)</td>
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<td></td>
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THREATS (T) | STRATEGY ST | STRATEGY WT |
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</tr>
</thead>
<tbody>
<tr>
<td>1. There are no established market in the village (T1)</td>
<td>1. Development of women community organization to market the product with the integrated agro-tourism marketing (S1, S2, S3, S4, S5, T1)</td>
<td>1. Advanced product training to the society (W1, W2, W3, T1)</td>
</tr>
</tbody>
</table>

Purposive sampling consists of two groups of respondents in this study that were given structured questionnaires and interviewed and observed during the period of research. This
categorization allow the researcher to obtain first hand quality information, were the grouping includes:

1. Expert respondents included the Village Head, farmer group, agricultural field extension officers, and entrepreneur farmers of Sungai Limau Village to obtain data in the form of internal and external strategic factors in commodity development in Sungai Limau Village.

2. Respondents in Sungai Limau Village community. The results of questionnaires and interviews from respondents were used to find out the residents' agricultural activities so that the factors that have influenced the results can be identified.

RESULT AND DISCUSSION

Sungai Limau Village was established in 2010 based on Perda (government regulation) of Nunukan Regency No.4 in 2010. Sungai Limau Village is administratively located in Sebatik Tengah District, Nunukan Regency, North Kalimantan Province. Sungai Limau village has two hamlets namely Limau Hamlet and Berjoko Hamlet and 14 Rukun Tetangga (RT) roughly translated as neighborhood administration. The population of Sungai Limau Village based on the March 2019 Monograph at the village office was 2,866 with a population of 1,511 men and women of 1,355, with the majority of the population aged 15-65.

The results showed that Sungai Limau village had abundant plantation potential. In addition to oil and cocoa, in Sungai Limau Village also produced various fruits such as bananas and durian.

Based on the SWOT analysis table (Table 3), agro-tourism development is viable and its predict the success of the program to be developed for the long run. As the information gathered that the village provides 2 hectares of land with stunning views towards Tawau but not far from the Sebatik ring road. The ecotourism location is between two adjacent hills. The first hill is used for a chocolate production with the factory already there. The valley between the two hills is used as a food court and playground, while the other is used as a homestay and chocolate garden. The food court is used to market processed products and ready-to-eat products so that visitors can enjoy local food on-site and buy souvenirs from the locals communities.

Another area of improvement is to improve the skills of citizens needs so that in the future they are willing and able to process the yields of plantations and improving the ability of village enterprises administrators in the managerial field need to be fostered in order to be able to manage existing natural resources.

The agro eco-park area development model is carried out by dividing the area into 3 or 4 zones, namely the factory zone (1) and the food court (2), game zone and plantation (3) and the view zone to Malaysia and homestay (4).

In the first zone (Figure 1), a cocoa factory was established, so visitors could see the process of making cocoa powder and enjoy a variety of processed chocolate and local food in the food court (2). In order to support the food court, training in processed fruit is made into dodol and candy. In order to meet the water needs that so far have only relied on rain water, water is flowing from the source to the residents' housing area.
Fig. 1. Factory and food court zone

Fig. 2. Game zone
In the second zone (Figure 2), a playground and flower garden are created which serve to make visitors feel at home and get to know local and national flowers. The playing arena is equipped with flying fox.

In the third zone (Figure 3) is a hill with views of the city of Tawau. This hill will be equipped with a National Monument in the form of Sebatik Island which can be used for selfies and is equipped with accommodation.

**CONCLUSION**

Agro-eco parks are worth developing in Sungai Limau village.

**REFERENCES**


INCREASING THE EFFICIENCY OF PINEAPPLE JUICE PRODUCTION THROUGH INTEGRATED CUP SEALER DISSEMINATION

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ABSTRACT
Ngancar Subdistrict is a production center for pineapple varieties namely Smooth Cayenne and Queen that supports the superior product of Mount Kelud tourism in Kediri Regency. Murni Mandiri SME is one of the producers of pineapple juice brand "Namako" with a production capacity of 50 liters per day. The monthly sales turnover is 3-4 million with a profit of around 25-30% so it is feasible to be developed. During this time, the production process uses manual equipment ranging from boiling, filtering, and packaging in the form of cups and bottles. The demand of product has reached 100 liters per day, even during the Eid Al-Fitr season and holidays which can reach up to 100 times. The problem point faced by this SME is the low production capacity due to inadequate production equipment so that consumers’ demand cannot be maximally fulfilled. Therefore, it is necessary to transfer technological innovations that will improve efficiency and effectiveness in the production of pineapple juice in the form of Integrated Filter Machines and Cup Sealers with Appropriate Technology scale that meets LLM (Low Technology, Low Investment and Marketable) requirements so that they are easily adopted by the SME. The advantage of these machines is that it can implement a continuous pineapple juice production system and directly evaluate the resulting quality which is integrated from cooking, filtering, controlling and packaging in one continuous flow so that the quality and quantity will be more effectively controlled.

KEYWORDS
Production efficiency, Dissemination of machines

INTRODUCTION
Fruits and vegetables are important sources of food nutrients such as vitamins, minerals, and fiber because the water content of fresh fruits and vegetables is more than 80% (wb), but these commodities are highly perishable [1]. World fruit production is around 609 million MT in 2010-11 [2]. According to estimates, almost 20-40% of the fruit is damaged due to decay, mishandling during transportation and lack of cold storage temperatures and processing technique errors [3]. Food preservation is used to avoid damage to food products and to extend shelf life [4]. Fruit can be saved by converting products such as jam, jelly, fruit bar, juice, pickles, murabba etc [5]. Kediri Regency is one of the regions in East Java Province that has a lot of potential tourist attractions based on natural, historical, religious and local material commodities such as bananas, tofu, pineapple, pumpkin honey and durian. Mount Kelud Tourism with a location of 30 km from the center of Kediri City is very prospective for tourists that are supported by the presence of Smooth Cayenne and Queen pineapple varieties as typical souvenirs. Currently in Judeg Hamlets, Ngancar Subdistrict, Kediri Regency is a pineapple cultivation center.
Tens of hectares of pineapple plants are cultivated by the majority of the community as a livelihood. The processing of pineapple into food and beverage products has long been known by the public, with the growth of several businesses producing pineapple preparations such as pineapple juice, sweets, pineapple lather, pineapple jelly and canned pineapple. Ngancar Subdistrict as the Smooth Cayenne and Queen pineapple center has been launched by the Regional Government of Kediri Regency by making a symbolic icon of the pineapple fruit located at the entrance to the Kelud Mountain Tourism site as shown in Figure 1.

![Figure 1. The Symbolic Icon of Ngancar Subdistrict as the Center for Smooth Cayenne and Queen Pineapple Plants](image)

Instant drinks are a type of practical and ready-to-serve products that can be bought and enjoyed by consumers at any time as soft drinks with high consumer demand opportunities. Farchad Poeradisastra, the Chairman of the Fruit Juice Beverage Division at the Soft Drinks Industry Association (ASRIM) stated that many companies were working on the beverage market business because the market growth was quite rapid. In the last 5 years, the average growth was between 15-20% per year with a micro and small-scale market share reaching up to 30%. Moreover, with the increasing number of large-scale industry players entering this industry, using marketing communication strategies and getting instant drinks into the market is getting better, it is expected to become one of the main choices of profitable ready-to-drink beverages.

The population and consumer purchasing power in Indonesia which is increasing in accordance with economic growth, is one important factor in the growth of the processed food and beverage industry with various types and variations of products. Data from ASRIM and the Ministry of Industry in 2013 showed that the beverage industry grew 8-9% per year with the growth of the bottled beverage market by 11-15% compared to 2012 supported by an increase in domestic market consumption. Information from the Association of Indonesian Bottled Drinking Water Companies (ASPADIN) and the Indonesian Association of Food and Beverage Entrepreneurs (GAPMMI) shows bottled water sales in 2012 of 19.8 billion liters increased to 21.9 - 22.7 billion liters in 2013 with growth reached 10%. Especially in the beverage industry, consumption of soft drinks in Indonesia is dominated by bottled water by 84.1% and others such as fast food tea, carbonated drinks, others soft drinks by 15.9% [6]. This condition is very supportive for the growth of the beverage industry in packaging.

Judeg Hamlets, Ngancar Subdistrict, Kediri Regency is a strategic area that supports Mount Kelud tourism as well as Smooth Cayenne and Queen pineapple cultivation centers. Smooth Cayenne pineapple has a distinctive sweet and slightly sour taste and is even more superior to the honey pineapple (Queen) planted by farmers on the slopes of Mount Kelud [7]. Pineapple contains a protease enzyme called bromelain, which can be used for various purposes in the food industry. Pineapple contains a lot of vitamin C and it can be consumed in fresh and processed form. Pineapple is a tropical and subtropical fruit that is famous for having a specific taste and has a balanced sugar and acid content [8]. Pineapple (Ananas comosus L) has been well known by the people of Indonesia. Pineapple contributes 8% of fresh fruit production in the world, and Indonesia
is the third largest producer of fresh and processed pineapple after Thailand and the Philippines [9]. Pineapple is available as fresh fruit, canned fruit and juice [10]. Fruit juice is a liquid extracted from the fruit that can be consumed. This liquid can have a turbid or clear appearance depending on the source of the fruit and may contain oil or carotenoid pigments available in the fruit [5]. It gives a fresh, sweet and sour combination when it is used as a main ingredient for the production of pineapple cider drinks. Murni Mandiri SME is one of the producers of pineapple juice brand called "Namako" in Ngancar Subdistrict which has been existing since 2015 with a production capacity of 50 liters per day and has 4 workers. The pineapple used are Smooth Cayenne and Queen type which are the main commodities in Ngancar Subdistrict. The local government of Kediri has declared pineapple as the icon of superior product in Ngancar Subdistrict in order to increase regional competitiveness and empower the surrounding community. The monthly sales turnover is 3-4 million with a profit of around 25-30% so it is worth to be developed. The availability of raw materials for the production of pineapple juice is guaranteed, supported by the large number of people in the Ngancar Subdistrict (almost 80%) who are conducting Smooth Cayenne and Queen pineapple cultivation.

During this time, the majority of the production process is done manually starting from boiling, filtering and packaging in the form of cups and bottles to meet consumer demand in the Regency and City of Kediri. Product demand has reached 100 liters per day, even during the holiday season and Eid which can reach up to 100 times compared to normal market demand reaching 2,000 boxes. However, it cannot be served optimally due to the limitations of production equipment. Increasing the efficiency of beverage production can be done by mechanizing the process through technology transfer according to the needs [11]. Increased production capacity can be achieved through the transfer of mechanical technology to the process stages that have been carried out with low capacity [12]. The aims of this community service activity is to increase the efficiency and quantity of pineapple juice production, increase labor productivity, and improve product quality through an integrated cup sealer dissemination so that Murni Mandiri SME will have a higher competitiveness.

MATERIAL AND METHOD

The method of implementing community service is the dissemination and technical assistance activities using an Integrated Filter and Packaging (Cup Sealer) to improve the efficiency of pineapple juice production performance. The partner of this activity is Mr. Koleksi, the owner of Murni Mandiri SME in the Judeg Hamlets, Ngancar Subdistrict, Kediri Regency as a pioneer in the production of pineapple juice on the slopes of Mount Kelud. The specifications of the Integrated Filter and Packet (Cup Sealer) consist of:

- Full food cooking container and shelter with full stainless food grade and 50 liters volume capacity
- 1 Whistle, bimetallic thermometer and high-pressure cooker,
- 1 piece of Control Tub,
- 1 Nano Filter
- 1 Semi-Automatic Single Cup Sealer with 300 watts of power
- Wheeled stainless frame

RESULT AND DISCUSSION

The result of the implementation of this activity is a technology transfer of Integrated Filter and Packer (Cup Sealer) as in Figure 2.
Integrated Cup Sealers

This set of equipment is an integration of the cooking and filtering process as well as packaging pineapple juice so that it can save production time and labor costs. Operationally the filtering process with nano filter will also produce a clearer quality of pineapple juice. This filtering technology is an advantage of the Integrated Filter and Packaging equipment model. Separation technology using membranes has several advantages: separation can be done continuously and simple, does not require additional chemicals, and the energy requirements are very minimum used for filtering from apple cider [13]. The use of filter machines has an efficient impact on the production process. The usual screening process takes longer time up to 25-30 minutes because it must be repeated several times and the gauze needs to be washed repeatedly. However, with a filter machine, the filtering process can be done at once and the screening process only takes up 5 minutes [14].

The use of semi-automatic cup packaging machines makes the filling process done automatically. The use of this tool increases the precision of filling and streamlines the packaging process [12]. Packaging innovation is very influential on the quality of the products produced. Packaging is a way to provide the right conditions for food ingredients and products. In principle, the package or container is an object with a certain shape with sufficient strength so that it is able to protect the product from physical damage and contamination [15]. The use of semi-automatic cup sealers has an impact on reducing product reject in the packaging process and better packaging appearance. Based on the economic value of the product, such improvement increased the quality and quantity of the products. It also contributes to more efficient and better labor productivity so that the effect of profit contribution can increase. Efficiency is a benchmark for an effort to be able to achieve maximum profits at the level of use of certain inputs [16]. Efficiency is used as a measure that supports the use of resources in the production process to produce output as a process characteristic that measures the actual performance of resources relative to predetermined standard resources. The availability of production facilities (inputs) does not mean to show a high productivity. Instead, knowing how to do business efficiently is an effort which is very important. Quality and quantity increase, efficiency and better labor productivity result in increased profitability by reducing production costs. A high level of profitability in the company will increase competitiveness between companies. The high level of profit signifies the company's future growth [17]. By using a semi-automatic cup packaging machine, the filling process is carried out automatically. The use of this tool increases the precision of filling and streamlines the packaging process [12].

CONCLUSION
The findings in this dissemination confirmed that integrated cup sealer in the production of pineapple juice can increase efficiency and production capacity in Murni Mandiri SME, as well as the increase in labor productivity. Furthermore, the technology transfer of packaging using an integrated cup sealer can improve the product quality and product packaging appearance thereby minimizing the occurrence of reject products.
REFERENCES


[12] Martati, E and D Widyaningtyas, 2016, Peningkatan Efisiensi Produksi Minuman Sari Stroberi (Fragariax annasa D) dan Tamarillo (Chypomandra Betacea) (Increasing Production Efficiency of Strawberry...
Proceedings of International Conference on Innovation and Technology (ICIT) 2019

Journal of Innovation and Applied Technology (JIAT). Special Issue 2020 number 1, e-ISSN : 2477-7951

(Fragaria x annasa D) and Tamarillo (Chypomandra betacea) Drink Production. Journal of Innovation and Applied Technology (JIAT). 2(2), pp. 266-272.


Kaaro and Hartono, 2002. Perilaku Keputusan Investasi Berbasis Peluang Investasi dan Ketersediaan Keuangan Internal (Investment Decision Behaviour Based on Investment Opportunities and Internal Financial Availability). Prosiding...
ORGANIZATIONAL AND FINANCIAL MANAGEMENT GOVERNANCE: TOWARDS THE SUCCESS OF VILLAGE-OWNED ENTERPRISE IN MANAGING PICKING MAWAR VILLAGE TOURISM IN GUNUNGSARI VILLAGE-BATU CITY

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ABSTRACT

Village-owned enterprises (BUM Desa) are business entities whose almost all of the capital is owned by the Village through investment, which has a strategic role to accommodate activities in the economic and public services sector. BUM Desa Sejahtera Gunungsari has been formed since 2018, when the Mayor of Batu launched the Movement to build a Tourism Village by encouraging the village to activate BUM Desa to manage tourist destinations. Gunungsari Village has the tourism potential of Picking Roses, land of lanterns and cultural arts. The problem is that the BUM Desa management is not ready to organize the organization's management, business management strategies, tourism promotion, marketing and accountability system. The method used by the Participatory Research Analysis (PRA) and Strategic Management approach with 4 stages: the environment observation, strategies formulation, strategies implementation, and evaluation or control. The solutions of these problems are emphasized on environment observation and strategy formulation. Therefore, it is necessary to develop an appropriate BUM Desa management model for Tourism Villages which consists of a management system, financial management, and governance of promotion and marketing cooperation (online). The application of financial management uses the BUM Desa Accounting Application System which must be supported by improving the knowledge and skills of BUM Desa administrators through training in the use of the system.

KEYWORDS
BUM Desa, Tourism Village, Management Governance, Financial Governance

INTRODUCTION

The development of Batu City is currently heading towards the policy of developing rural tourism, both based on natural potential and creative. Therefore, in order to improve the development and the distribution of tourism economy in the Batu City area, it is necessary to identify, excavate, and analyze tourism owned by the village. The development of the Tourism Village is very important considering the rapid development of tourism must be felt by the community. This is also in accordance with the Vision and Mission of Batu City, which is “Desa Berdaya, Kota Berjaya”. The policy of mapping and exploring tourism potential in rural/urban villages to be encouraged to become Tourism Villages in accordance with the direction and spirit of the Minister of Culture and Tourism Regulation No: PM.26/UM.001/MKP/2010 concerning General Guidelines for National Program for Community Empowerment (Program Nasional Pemberdayaan Masyarakat/PNPM) in Independent Tourism through Tourism Village. Thus, PNPM Mandiri Tourism activities are focused on developing regions that have an element of tourist attraction.
in the form of a diversity of natural wealth, culture, and man-made products as well as creative industries that become tourism activities in the tourism village.

The development of the Tourism Village concept is an alternative tourism based on local potential. The development of a Tourism Village is not only a destination object that is able to encourage the development of the local economic sectors of the community through -Owned Enterprises (BUM Desa) to local social institutions such as the PKK and Youth Organization can play an active role. This makes Tourism Village not just a concept of tourism, but it becomes a model of the concept of community empowerment in a sustainable and educational manner.

Gunungsari Village is one of the administrative regions located in the Bumiaji District area. The area of Gunungsari Village is still dominated by agricultural areas and few farms and located on the slopes of Mount Arjuno. Gunungsari village has a history which is quite famous for the rose picking tourism village located in the Dusun Brumbung. This history prompted the Batu City Government to explore what tourism potential could be developed in Gunungsari Village to be developed as a base for Tourism Villages. So, the Batu City Government Tourism Office conducted a study and mapping of the potentials of Gunungsari Village, both natural, cultural, and community creative potential. The results of this study will be one of the Batu City Tourism Village models is very appropriate and reasonable.

Gunungsari village once had a glorious period when booming rose sales in the mid-2000s were managed by the Association of Farmers Groups (Gapoktan). Gapoktan cooperates in building a management system by developing rose garden tourism. More than 80 types of rose varieties from various countries and continents are bred here. Various domestic and foreign tourists are competing to come and see and do comparative studies here. This prompted the Batu City Government to move back to be able to work together with the community to various forms of creative economic activities, but also will be one of the mechanisms of conservation of local culture and excellence that must be maintained. In addition, the concept of a Tourism Village is expected to be able to become an alternative model for community empowerment, where the culprit structure can be done in stages and massive. The village economic body known as the Village

Gunungsari Village was chosen because in addition to being the main target of developing the Tourism Village model in Batu City, it also has a variety of natural and cultural potentials as well as the community's creative skills, which have the potential to be developed in synergy to become a Tourism Village Area. Potential natural attractions include Juntur twin Coban waterfalls, pandawa caves, etc. The potential of cultural tourism includes artifacts carrying the great carrying, bullengan dance culture, reog dance, and the potential for creative product tourism such as lantern villages, ladu culinary villages, milk education tourism villages, rose picking villages, etc. The readiness of village officials and the village community of Gunungsari is also quite high, as can be seen from their active participation during the study planning process. Based on the above thought, the selection of Gunungsari Village, Kec. Batu City, Bumiaji as one of the Batu City Tourism Village models is very appropriate and reasonable.

Picking rose village is a residential sector that is inhabited by people in the sector in the Brumbung Hamlet. Named the village of picking roses because the hamlet has a superior commodity in the form of picking roses offered
for tourist visitors. In Brumbung Hamlet, a joint community farmer group develops a rose plant in one large area of the rose plant, from which the tourism aspect offered is rose picking tours and rose picking creation activities managed by a joint local farmer group and coordinated by the Village Owned Enterprises (BUM Desa). The management of the rose picking area will be coordinated by the Gunungsari Village Government, so that it has more uniform management rules and can be fair to all farmers.

The development of the tourism sector is supported by the expertise of the Brumbung Hamlet community in creating roses, for example they already have the basic expertise to make a banket (bouquet) and almost every house that has a yard has become a rose plant land. Another initiative is that almost every house has various pictures/paintings with roses on their walls. This shows from a participatory point of view, the community strongly supports the picking rose tourism village program, where the feedback will have an impact on the welfare of the people of Dusun Brumbung and its surroundings. In addition, the government of Gunungsari Village has a tourism village program, one of which is the rose-picking village tour in the Brumbung Hamlet. Some paddy fields will be developed for farming rose plants which will be conceptualized to be enjoyed by the general public, namely rose picking tours and rose creations. In addition to the rose commodity, the rice field area presents a beautiful view with a mountain background and Batu City with its iconic Among Tani City Hall.

Different from the previous era, the development of Picking Mawar Tourism is now handled by the Prosperous Village-Owned Enterprises (BUM Desa). BUM Desa as explained in the Regulation of the Minister of Villages, Disadvantaged Regions and Transmigration Number 4 of 2015, has a strategic role that is to accommodate all activities in the economic field and/or public services managed by the Village and/or inter-Village cooperation. BUM Desa Gunungsari Prosperity has been formed since 2018 based on Village Regulation Number 5 Year 2018 and appointment of Village BUM Managers with Decree of Gunungsari Village Head Number 13 Year 2018. BUM Desa's stretching was felt since 2018 when the Mayor of Batu launched a Movement to build a Tourism Village in Batu City by encouraging villages to activate BUM Desa to manage tourism destinations (attractions). Gunungsari village has the tourism potential of Picking Roses, land of lanterns and cultural arts [1]. The Department of Tourism coordinates the tourism development policy between infrastructure development by the relevant agencies and encourages the Village Head and BUM Desa to prepare physical development activities for tourist destinations (attractions) managed by BUM Desa.

BUM Desa Sejahtera in Gunungsari Village does not yet have a readiness for management strategies and technical management systems. In addition to tourism management in the community is still quite new and limited human resource capabilities, it is needed assistance from academics who have experience in developing local scale productive economic institutions.

Based on these conditions, the problems discussed in this paper are:

a. What is BUM Desa Sejahtera's financial management strategy?

b. What is BUM Desa Sejahtera's marketing management strategy?

METHODS

The method used to implement solutions to problems faced by BUM Sejahtera Village is Participatory Research Analysis (PRA) with a Strategic Management approach developed by Hunger and Wheelen cited by [2] and [3] which provide a strategic management framework how is the role of the organization, in this case BUM Desa, to carry out various strategic policies in managing tourist destinations. There are four stages, i.e:

a. Environmental scanning;
   The thing to do is to observe the partner location, namely BUM Sejahtera Village
located in Gunungsari Village, Bumiaji District, Batu City.

b. Strategy formulation
Based on observations of BUM Desa Sejahtera, a strategy was made to strengthen BUM Desa governance, which includes management governance, financial management, marketing governance, and online marketing in the development of Tourism villages.

c. Strategy implementation
After the preparation of strategies for strengthening BUM Desa Prosperous Institutions, dissemination was carried out in the form of socialization, counselling and assistance in implementing strategies for strengthening BUM Desa governance.

d. Evaluation and control
Implementation of strategy will be followed by an evaluation and control mechanism.

RESULT AND DISCUSSION

Village-Owned Enterprises (BUM Desa) is a manifestation of the participation of the village community as a whole so that it does not create a business model that is hegemonied by certain groups at the village level. That is, these rules are manifested in a solid institutional mechanism. Strengthening institutional capacity will be directed to the existence of rules that bind all members. BUM Desa was legalized according to the Village Regulation regarding the Establishment of BUM Desa. The considerations underlying the village to establish BUM Desa are to channel village community initiatives, develop village potential, manage and utilize the potential of village natural resources, the existence of human resources capable of managing it, and the inclusion of capital from the village government in the form of village financing and wealth submitted to be managed as BUM Desa.

Permendesa No. 4 of 2015 article 2 explained that the establishment of Village Owned Enterprises is intended as an effort to accommodate all activities in the economic sector and public services managed by the village or inter-village cooperation. As stated in the following chapters, the basic objective of the establishment of BUM Desa is clearly formulated to improve the village economy, optimize village assets to benefit the community, increase community efforts in managing the economic potential of the village, and so on. [5]

In general, the establishment of BUM Desa is intended to [6], [7]:

a. Improve services to the community (minimum service standards) to develop community businesses in the village.

b. Empowering villages as autonomous regions with regard to productive endeavors for poverty alleviation, unemployment and increasing village income.

c. Increasing the independence and capacity of villages and communities in strengthening the economy in the village.

To manage BUM Desa with a maximum and right target requires a strong idealism from BUM Desa administrators. As stated in [8], and [9], the management of BUM Desa must be carried out using the principles of:

a. Cooperative
All components involved in BUM Desa must be able to conduct good cooperation for the development and survival of their businesses.

b. Participative
All components involved in BUM Desa must be willing to volunteer or be asked to provide support and contributions that can drive BUM Desa's business progress.

c. Emancipative
All components involved in BUM Desa must be treated equally regardless of class, ethnicity or religion.

d. Transparency
Activities that affect the interests of the general public must be known by all levels of society easily and transparent.
e. Accountable
All business activities must be technically and administratively accountable.

f. Sustainability
Business activities must be able to be developed and conserved by the community in village-owned enterprise with a basic membership mechanism and self-help that is run professionally and independently. In line with this, village owned enterprise requires accurate and precise data information about the local characteristics of the village, including the socio-cultural characteristics of the people and market opportunities for the products and services produced by the local community.

BUM Desa Sejahtera governance model in Gunungsari Village, Bumiaji District, Batu City, Malang can be described as Figure 1.

Based on the diagram, the position of the village illustrates the combined construction and function of the Self Governing Community with Local Self Government. The form of Self Governing Community is able to formulate village authority based on the origin rights of village-scale local village authority in the form of a participatory clear development framework and priorities by combining Local Self Government which is also able to formulate the authority assigned by the Government, Provincial Government or Regency Government/Cities are in accordance with statutory provisions in a participatory clear framework and development priorities.

To achieve the target of BUM Desa Sejahtera, which is to create a prosperous Gunungsari village community, strategies are needed in both financial management and marketing management. The following are strategies that BUM Desa Sejahtera can do:

Financial Management Strategies of BUM Desa Sejahtera:
- a. Control the financial administration of BUM Desa Sejahtera through the provision of transaction evidence
- b. Implement the Village-Owned Enterprise Accounting Application System (SAAB) to facilitate the recording and reporting of BUM Desa Sejahtera financial

Marketing Management Strategies of BUM Desa Sejahtera:
- a. To add information about BUM Desa Sejahtera on the website gunungsari.batukota.go.id

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**Figure 1. Village Owned Enterprise Governance Diagram**

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b. To manage social media BUM Desa Sejahtera professionally, including through Instagram, Facebook, Twitter

c. To establish official and professional cooperation between tourism villages to expand market share while increasing the quality of the Gunungsari tourism village network

CONCLUSIONS
It can be concluded from the paper as follows:

Financial Management Strategies of BUM Desa Sejahtera
a. Control the financial administration of BUM Desa Sejahtera through the provision of transaction evidence

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b. To manage social media BUM Desa Sejahtera professionally, including through Instagram, Facebook, Twitter

c. To establish official and professional cooperation between tourism villages to expand market share while increasing the quality of the Gunungsari tourism village network

REFERENCES


ICIT 2019 is aimed to provide platform for exchange of experiences, innovation and technological changes/advances among academia, scientists, professionals, and/or business in global environment; to initiate collaboration in research and technology with local, national and international stakeholders; and to disseminate research results and its application to communities or industries. The conference was attended by 150 participants from Singapore, Malaysia, Australia, South Korea and Indonesia, with 92 presenters divided in five plenary talks. The conference topics include engineering, sustainable agriculture and agricultural engineering, basic science, information system and technology, green cities, green industries, management and business, social economic and community development, education, as well as health, medicine, and public health.