PROGRAM BOOK

The 6th International Conference on Sustainable Future for Human Security (SUSTAIN) 2015: "Sustainable Development and Global Change"

Sanur Paradise Plaza Hotel & Suites, Bali, Indonesia
Bali, November 17 - 19, 2015

PROGRAM

The 6th International Conference on Sustainable Future for Human Security

Sanur Paradise Plaza Hotel & Suites
Bali - Indonesia, 17 - 19 November 2015

TUESDAY, NOVEMBER 17, 2015

08:30 - 09:00 Registration
09:00 - 09:45 Conference opening ceremony (Griya Agung Ball Room 2F)
09:45 - 10:00 Break
10:00 - 12:30 **Plenary Session**
Keynote speaker 1: Prof. Naoki Ishihara (Ritsumeikan University)
Keynote speaker 2: Ridwan Sutriadi, ST, MT, Ph.D. (Institut Teknologi Bandung)
Keynote speaker 3 : Prof. Minoru Yoneda (GCOE HSE - Kyoto University)
12:30 - 13:30 Lunch (Sanur Harum Restaurant 1F)

	Parallel session 1						
	Energy and Social Research	Energy and Environmental Technology	Disaster Preparedness, Management and Recovery	Bio technology	Human Security: Actors and Factors	Climate Change, Soil & Water Conservation	Sustainable Urban Growth
14:15 - 16:00	(Tabanan Room 4F)	(Amlapura Room 4F)	(Bangli Room 4F)	(Singaraja Room 4F)	(Mangupura Room 4F)	(Legian Room 2F)	(Griya Agung Ball Room 2F)
	EnE19	EnE09	DM13	EnE14	SP10	STF22	BE01
	EnE29	EnE16	DM14	SA06	SP30	EnE13	BE02
	EnE25	EnE17	DM17	SA10	SP37	STF06	BE06
	SP29	EnE18	DM21	SA14	SP33	SA18	BE09
		EnE31		SA04	SP34	SP12	

16:00 - 16:15 Coffee break

	Parallel session 2						
	Waste Management	Energy Modelling, Bioenergy Utilization	Human Security and Policies	Bio technology	Sustainable Development	Biodiversity & ecosystem services	Urban Planning
16:15 - 18:00	(Tabanan Room 4F)	(Amlapura Room 4F)	(Bangli Room 4F)	(Singaraja Room 4F)	(Mangupura Room 4F)	(Legian Room 2F)	(Griya Agung Ball Room 2F)
	EnE03	EnE23	SP24	SA09	SP02	STF03	BE12
	EnE06	EnE34	SP14	SA22	SP07	STF09	BE16
	EnE24	EnE10	SP19	SA25	SP08	STF05	BE20
	EnE30	EnE05	SP35	SA26	SP26	STF11	
	EnE15	EnE35	SP23	SA27	SP20		

19:00 - 21:00 Gala Dinner (Denpasar Room 3F)

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	EnE03	EnE23	SP24	SA09	SP02	STF03	BE12
	EnE06	EnE34	SP14	SA22	SP07	STF09	BE16
	EnE24	EnE10	SP19	SA25	SP08	STF05	BE20
	EnE30	EnE05	SP35	SA26	SP26	STF11	
	EnE15	EnE35	SP23	SA27	SP20		

19:00 - 21:00 Gala Dinner (Denpasar Room 3F)

WEDNESDAY, NOVEMBER 18, 2015

08:30 - 09:00 Registration

	Parallel session 3						
		Human Security: Actor and Factor	Hydro-Disaster	Food Production and Postharvest	Sustainable Development	Silviculture & Rehabilitation	Building Science & Structure
09:00 - 10:45	(Tabanan Room 4F)	(Amlapura Room 4F)	(Bangli Room 4F)	(Singaraja Room 4F)	(Mangupura Room 4F)	(Legian Room 2F)	(Griya Agung Ball Room 2F)
		SP31	DM05	STF04	SP01	STF08	BE05
		SP32	DM08	SA03	SP21	STF12	BE07
		SP13	DM16	SA05	SP16	STF21	BE17
		SP38	DM15	SA08	SP17	STF24	
		SP15		SA28	SP22		

10.45 - 11.00 Break

	Parallel session 4						
		Conservation & Rurban	Geo-Disaster	Food Production and Postharvest	Sustainable Development	Sustainable Forest Product	Housing
11:00 - 12:45	(Tabanan Room 4F)	(Amlapura Room 4F)	(Bangli Room 4F)	(Singaraja Room 4F)	(Mangupura Room 4F)	(Legian Room 2F)	(Griya Agung Ball Room 2F)
		BE04	DM03	SA16	SA20	STF13	EnE12
		BE18	DM19	SA17	SP18	STF14	EnE22
		BE11	DM20	SA24		STF16	BE25
		BE19		SA02		STF17	
						STF18	

12:45 - 13:45 Luncheon (Sanur Harum Restaurant 1F)

14:00 - 15:00 Best Paper Announcement (Griya Agung Ball Room 2F)
Conference closing ceremony (Griya Agung Ball Room 2F)

THURSDAY, NOVEMBER 19, 2015

starts at 09:00 Tour (Only for tour-registered participants)

The 6th International Conference on Sustainable Future for Human Security

Sanur Paradise Plaza Hotel

Bali – Indonesia, 17-19 November 2015

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Introduction

Welcome to Bali, Indonesia.

The 6th International Conference on Sustainable Future for Human Security will address problems of primary importance for human security, discussing and proposing a more constructive and progressive approach to ensure future societal sustainability. The meeting will provide a common forum for a wide range of researchers and practitioners specialising in a range of subjects related to the conference themes.

The past five conferences have attracted more than 700 participants from Europe, Africa and Asia, with highly-qualified papers and posters. This time we are expecting more than two hundred participants for oral and poster presentations. The SUSTAIN conference originated from the need to provide an inter-disciplinary forum where the most serious problems affecting a sustainable future for human security can be discussed, in recognition of the fact that many future problems cannot be solved by a "siloed" approach.

This year, the SustaiN Society organizes the 6th International Conference on a Sustainable Future for Human Security (SustaiN) 2015, and co-hosted by :

1. Kyoto University:
   - Research Institute for Sustainable Humanosphere (RISH), the SustaiN 2015 Conference is supported by RISH Kyoto University, as the 300th Symposium on Sustainable Humanosphere
   - Inter-Graduate School Program for Sustainable Development and Survivable Societies (GSS)
2. Ritsumeikan University
   - Toward New Peace Studies, Ritsumeikan Global Innovation Research Organization (RGIRO)
3. Universitas Gadjah Mada, Indonesia,
4. The University of Jember, Indonesia,
5. Indonesia Islamic University, Indonesia,
6. Brawijaya University, Indonesia
7. Hasanuddin University, Indonesia.

The Sustainable Future for Human Security also includes the following objectives:

- To provide a forum for international researchers community to discuss, share and exchange their latest research progress in relation with sustainable future issues.
- To develop and promote a sustainable networking between participants to hold human securities and bridging ideas into policies and desired realities.
- To broaden information access for scientific communities toward global scientific, technology, social, economics and engineering societies.
- To empower Asian in general and South East Asia in particular for research collaboration, network and partnership among researcher communities and decision makers.

Therefore the hosts and organizers cordially invite global scholars to discuss, disseminate and share their knowledge, research and ideas at our 6th SustaiN.

On Behalf of the committee we would like to welcome you to Bali.

Regards

Dr. Robby Permata
General Chair of Organizing Committe

Dr. Hatma Suryatmojo
Chairman of International Scientific Committee

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Sustainable agriculture

Paper Code : **SA02**

Title : **Determining a Scenario to Protect Typical Origin-based Product Using the Geographical Indication Case Study on the Milkfish of Sidoarjo**

Author : **Imam Hariyanto, Surip Mawardi, Soetriono**

Abstract

This research aims to identify the scenarios of geographical indication which could be applied to milkfish in Sidoarjo District. The scenario analyzed is based on the specificity of the product, the impact of economic, social, and environment. Research location is defined purposely in Sidoarjo District. The research methods used are the method of survey and Rapid Rural Appraisal. The samples are determined by the method of judgement and snowball sampling. Data analyses are done by Hierarchy Process Analysis and SWOT. The results show there are four scenarios of the implementation of geographical indication are established, namely, smoked milkfish from production system of intensive monoculture, smoked milkfish from production system of monoculture and polcultur, raw milkfish from production system of extensive polyculture, and other milkfish-based products except the smoked milkfish. The analysis results show that the raw milkfish from production system of polyculture extensive get the highest value. This scenario is in the White Area, which means this scenario is feasible for local communities to implement and are able to run it.

Keywords: Geographical Indication, Milkfish of Sidoarjo, milkfish production system, origin-based product

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Paper Code : **SA03**

Title : **Seaweed Utilization As Phytoremediation Of Vanamei Shrimp Farming Waste In Recirculation Systems (Environmental Friendly Design of Sustainable Shrimp Culture)**

Author : **Sinung Rahardjo, A. Harsono Soepardjo, D. Djokosetiyanto, Abimanyu Takdir A**

Abstract

This research aim to create a model of shrimp culture applications using seaweed as phytoremediation in recirculation systems. With the research is expected to solve issues of environmental damage to the exploitation of mangrove forests for shrimp culture area and culture waste disposal into open waters. The data showed that damage the environment and the spread of various diseases that lead to crop failure and reduced production of shrimp culture in several countries including Indonesia. To solve these problems, need a shrimp culture technology with ecological approach, known as eco-friendly shrimp culture (environmental friendly) with waste utilization as optimal as possible. In addition, these technologies should be inexpensive and easily applied by society and economically profitable. The sea grass as well as biological filter can also increase the value of aquaculture production. With the increasing value of the benefits of waste will have a positive impact on the use of resources more efficiency. The research data showed that Graciliria sp has the ability to utilize organic waste shrimp farming vanamei was higher than Eucheuma sp and Caulerpa sp. Field-scale model test results show that the use of seaweed is also able to increase the growth of shrimp culture and water quality. So that, this technology is able to reduce the level of water pollution and maintain the sustainability of the production and aquaculture activity.

Keywords:Sustainable aquaculture; fitoremediasi; Gracilaria, L. Vanamei

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6th International Conference on Sustainable Future for Human Security, SustaiN 2015

Determining a Scenario to Protect Typical Origin-based Product Using the Geographical Indication

Case Study on the Milkfish of Sidoarjo

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Abstract

This research aims to identify the scenarios of geographical indication which could be applied to milkfish in Sidoarjo District. The scenario analyzed is based on the specificity of the product, the impact of economic, social, and environment. Research location is defined purposely in Sidoarjo District. The research methods used are the method of survey and Rapid Rural Appraisal. The samples are determined by the method of judgement and snowball sampling. Data analyses are done by Hierarchy Process Analysis and SWOT. The results show there are four scenarios of the implementation of geographical indication are established, namely, smoked milkfish from production system of intensive monoculture, smoked milkfish from production system of monoculture and polyculture, raw milkfish from production system of extensive polyculture, and other milkfish-based products except the smoked milkfish. The analysis results show that the raw milkfish from production system of polyculture extensive get the highest value. This scenario is in the White Area, which means this scenario is feasible for local communities to implement and are able to run it.

Selection and peer-review under responsibility of the SustaiN conference committee.

Keywords: Geographical Indication, Milkfish of Sidoarjo, milkfish production system, origin-based product

1. Introduction

1.1 The Role of Geographical Indication

A number of studies indicate that, under appropriate conditions, the geographical indication can contribute to development in rural areas. (WIPO, 2015)[1]. Certification of geographical indication could be a promotional tool for

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Selection and peer-review under responsibility of the SustaiN conference committee.

typical regional products so could support the marketing process (WIPO, 2015)[2], for example by guaranteeing that the product sold is a originally typical product, then the seller could set a higher price (premium) compared to the same products which don't have the guarantee of the authenticity of origin (WIPO, 2015)[2]. In the end, the producers could earn a higher income. In Indonesia, which is the world's largest archipelago country and has a lot of typical products produced by each region, geographical indication could be a great development tool for these areas, which, if implemented properly, the accumulation results could be one of the tools to support the country's development.

In Indonesia, geographical indication becomes one of the protection of intellectual properties and be set in the country regulation, namely in Act No. 15 Year of 2001 about Brand (Chapter VII) and Government Regulation No. 51 Year of 2007 about Geographical Indication. In the both of rules, they explain that the geographical indication is a sign that shows the area of origin of a product, that is caused by geographic, environmental factors including natural factor, human factors, or a combination of both, producing a certain quality and characteristic on the product. Geographical conditions of each area are different, so they would produce different characteristics of products also, as the result Indonesia has many typical products, such as Cilembu Tuber, Arabica Coffee of Gayo Aceh, Arabica Coffee of Flores Bajawa, Horse Milk of Sumbawa, etc. (Directorate General of Intellectual Property, 2015).

1.2 The Specificity of Milkfish from Each Production Systems

Sidoarjo is one of districts in East Java province that are still breeding milkfish traditionally (Fournier, S. et al., 2012). Milkfish breeding has traditionally done by producers using green algae as fish feed. But that does not mean all producers in this area do traditional breeding practice, because there are some producers who use artificial feed (concentrate), or better known as intensive breeding practice. Milkfish production is about 70%, which is exported for fishing activity, while 30% is sold to local and national markets (Fournier, S. et al., 2012).

During this time, milkfish bred in the delta area has typical no earthy smell, in contrast to milkfish from other regions, such as Gresik and Lamongan, which has an earthy smell. The non-appearance of it that becomes the typicity is due to the geographical environment in Sidoarjo. In contrast to other areas, the water of ponds in the Sidoarjo Delta area is rich of green algae as natural food for milkfish [FKMT, 2014]. In addition, the producers do a reversal of land every they will begin breeding activity aiming to restore the organic substance and pores in the soil. Apparently, it is effective to make *klekap* (some kind of moss) stuck more strongly on soil substrate, so it's not mixed with water and to be not eaten by milkfish. Because it doesn't eat the *klekap*, then milkfish doesn't have an earthy smell as an influence of the *klekap*. Further, based on a laboratory test conducted by FKMT (Communication Forum of Pond Society – GI organization of Sidoarjo Smoked Milkfish), in water of the Sidoarjo Delta area is not found bacterias containing geosmine enzym, which usually causes earthy smell to fish bred in the freshwater pond environment [Flick, 2011].

1.3 The Breeding Practices and Reason to Apply the Geographical Indication

Traditionally milkfish breeding is one of the 3 breeding practices conducted by the producers with a production system of extensive polyculture, that breed tiger shrimp associated with milkfish. Moreover, there are 2 kinds of breeding practice others, namely the production system of intensive monoculture and intensive semi-polyculture. To sum up all of them, the differences between each production system will be shown in the following table:

Table 1. The difference in the practice of fish farming Milkfish in Sidoarjo Regency

Production System	Aquatic nature	Monoculture/ Polyculture	Feed	Characteristic of Milkfish Produced
Intensive Monoculture	Brackish	Monoculture	Artificial	• Do not have earthy smell • Having concentrated smell
Semi-intensive Polyculture	Freshwater	Polyculture with whiteleg shrimp	Artificial	• Rather have earthy smell • Having concentrated smell
Extensive Polyculture (traditional)	Brackish	Polyculture with tiger shrimp	Green algae	• Do not have earthy smell • Do not have concentrated smell

Based on Table 1 above, it has been known that milkfish bred traditionally does not have earthy smell, as described in the previous section regarding the typical characteristic of milkfish. As time goes on, the people of this region began to develop various milkfish-based processed products. Until now, there are several kinds of product such as smoked milkfish, steamed milkfish, otak-otak milkfish (milkfish fillet steamed in banana leaves with spices), crispy milkfish, and milkfish abon (powder obtained from milkfish and spices, which can be put on rice). Each product has different form and characteristics, but all of them have the characteristic of no earthy smell. These reputation and typical characteristic of milkfish which need to be protected from a case of counterfeiting products by specific persons who want to take advantage by selling fake products using the name "Milkfish of Sidoarjo". Furthermore, for consumers, Geographical Indication also provides a guarantee the origin authenticity of milkfish used as raw materials of milkfish-based processed products, as well as provides complete information about the history and tradition of the product purchased.

1.4 Determining the Scenario of Geographical Indication to Milkfish

The protection of geographical indication requires careful consideration, as it not only related to a legal registration, but will be a part of the strategy of regional development to protect intellectual property and improve the economy of local communities. The determination of what products need to be protected is one of the things that must be decided by the producers together with other associated supply chain actors. Besides, the breeding practices that are diverse must also be considered, because each of these practices produces milkfish with specific characteristics. Directly, not all of producers could be involved in the system of geographical indication, and, of course, there is a risk to exclude some producers which will make that decision to be unfair for them. Nevertheless, geographical indication is expected to provide positive impacts to aspects of the economic, social, and environment for the local community (producers and other actors) in Sidoarjo. Therefore, this research aims to analyze the several alternatives of geographical indication scenario that is most worthy to be implemented and local communities have the ability to run it.

2. Methodology and Data

2.1 Location of Research

The location of this research is determined by purposive method, i.e., determining the research location purposely (Bogdan and Taylor in Afandi, 1993). This research is conducted in the delta area of Sidoarjo that consists of 8 sub districts, namely Waru Sedati, Sidoarjo, Buduran, Candi, Tanggulangin, Porong, and Jabon. These areas become the center of breeding and marketing of milkfish. Explicitly showed by this picture below:

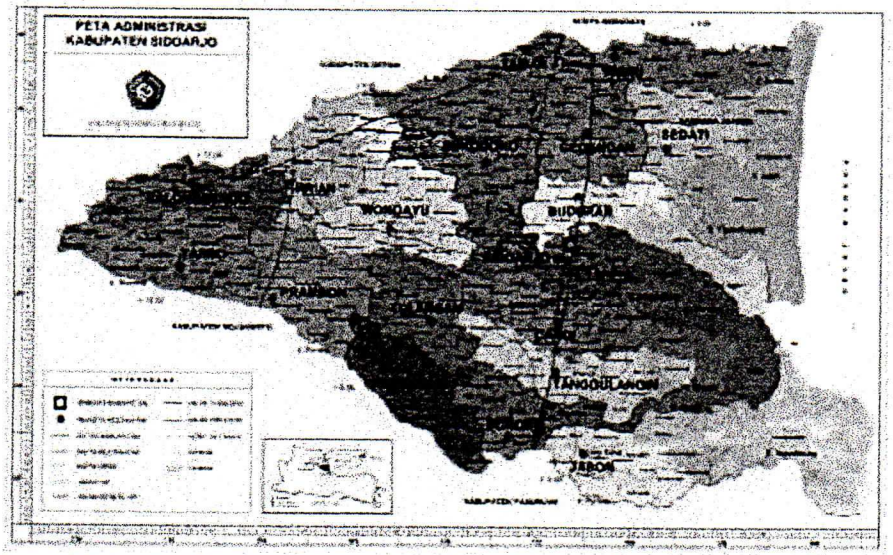

Figure 1. Map of Sidoarjo District (Source: http://img.docstoccdn.com/thumb/orig/25701911.png)

2.2 Sampling Determination

Sampling is done by several methods, including judgement sampling (Mustafa, 2000) with a number of 11 persons, snowball sampling (Mustafa, 2000) with a number of 46 persons. Sample determination for the judgement sampling got from first meetings with local communities to obtain justification by them about people who could be key informants for each topic of the problem which will be analyzed.

2.3 Data Collection

Data collection is carried out by survey and Rapid Rural Appraisal (RRA). The survey is done to observe and get an explanation of the problem in a particular area or specific location. In this activity, only a part of the population will be used as the object of research (sample), where that selected part must be representative. (Daniel et al., 2006). RRA is not too focus on a representative sample, but it is more emphasis on understanding of the social and economic reality related to biophysical region or community. By this, the answer of a certain problem could be obtained in short time and low cost, but also scientifically can be accounted for (Daniel, 2005).

2.4. Methods Of Data Analysis

As stated by Durand et al. (2013) that there are two important stages in the implementation of geographical indication, namely, registration and activation. Especially about activation, this process is related to the ability of local communities to implement quality control systems and traceability on their GI product, i.e milkfish. Another important thing is to assess sustainability of the scenario. Quantitatively in assessing the feasibility and sustainability, this research use Hierarchy Analysis Process to determine the most worthy scenario, and SWOT Analysis to know the position of the scenario in SWOT matrix. First, this figure below show the structure of hierarchy:

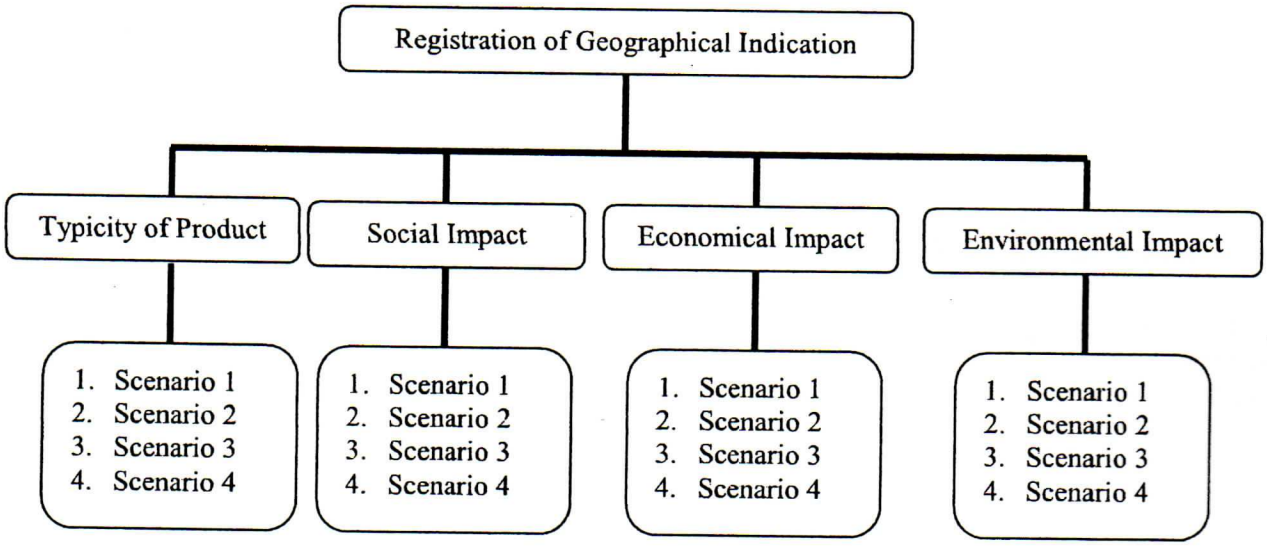

Figure 2. Structure of Hierarchy

SWOT analysis is carried out by identifying internal and external factors (Rangkuti, 2006). Internal factors are all factors that support the success of the implementation of geographical indication scenario that come from within the local community. Meanwhile, external factors are factors that can support the success of the implementation of geographical indication scenario that come from outside the local community. The distribution of both factors is presented in table 2 below.

Table 2. Distribution of Internal and external factors to the SWOT analysis

Category	Internal Factors	External Factors
Strength	S 1	O 1
	S 2	O 2
	S 3	O 3
	S 4	O n
	S 5	
	S n	
Weakness	W 1	T 1
	W 2	T 2
	W n	T n

The distribution of internal and external factors can be explained as follow:

S 1 = the specificity of product
S 2 = availability of natural feed (green algae)
S 3 = traditional breeding practice
S 4 = the use of synthetic chemical products
O 1 = exclusion of some producers
O 2 = social value
O 3 = local government support
O 4 = potentiality of promotion
W 1 = production cycle
W 2 = annual production capacity
T 1 = land area of pond
T 2 = supply of milkfish from outside Sidoarjo
T 3 = difference processing technique of milkfish

3. Results

3.1 The Alternative Scenario of Geographical indication

Based on 4 production systems that produce different characteristics of milkfish, it's possible to propose these following scenarios of geographical indication. One important thing to mention that two of four scenarios are smoked milkfish due to it's the most traditional processed product in Sidoarjo, which meets a requirement of traditionality and reputation aspects of geographical indication. The feasibility of each scenario will be described qualitatively as below:

1) Scenario 1: Geographical indication for smoked milkfish from the production system of intensive monoculture

The first scenario is to register the geographical indication for smoked milkfish from production system of intensive monoculture. This system has an advantage, because it could produce larger milkfish in a short period and is easy to set the harvest time through time management and quantity of feed given. However, there are some potential negative impacts for long term period regarding aspects of social, economic, and environment issues. This table will describe simply the first scenario.

Table 3. Summary of Scenario 1

Kinds Of Impact	Description
Social	Only 12% of producers who implement this production system. There is a quite large exclusion of producers.
Economy	A high dependence on feed concentrate which are expensive, so make producer pay much cost. There is flavor of concentrate that raises so potentially makes consumer to be not happy.
Environment	Feed residues (that are not consumed) + synthetic pesticides could potentially damage aquatic ecosystems and endanger human health. Low environmental recovery.

2) Scenario 2: Geographical indication for raw milkfish from the production system of extensive polyculture

The second scenario has bigger potential for success than the first scenario. This scenario is to register the geographical indication for raw milkfish bred in the production system of extensive polyculture or better known as traditional breeding practice, because it uses natural feed (green algae) and no synthetic pesticides to control predators and species of competitors. All impacts are potentially quite positive and could be expected to be sustainable for the long term. In addition, this scenario also meets the requirements for the registration of geographical indication as a great appreciation by producers and produce products that comply with the typical characteristic of milkfish in Sidoarjo which as long as it has been known (in accordance with its reputation), compared to milkfish from other production systems. This table will explain the impacts of this scenario:

Table 4. Summary of Scenario 2

Kinds Of Impacts	Description
Social	The exclusion of producers is pretty low because 69% of producers who implement this production system.
Economy	There is no dependence on feed concentrate. Natural feed with green algae cost efficiently for producers. The savory taste of milkfish that has been recognized.
Environment	Complementary species (shrimp eats milkfish feces). Low synthetic products. High enviromental recovery

3) Scenario 3: Geographical indication for smoked milkfish from the production system of extensive polyculture and intensive monoculture in brackish water

The third scenario is the geographical indication for smoked milkfish from fish bred in brackish water which consists of the production system of extensive polyculture and intensive monoculture. This option can accommodate not only scenario 1 but also scenario 2 which related to the typical and traditional breeding practice. Therefore, this scenario could reduce level of the exclusion of producers. Nevertheless, particularly in this scenario of geographical indication, milkfish produced will have two kinds of quality, i.e. fish fed with concentrate and by green algae. This option requires a well traceability and strong quality control system to identify the origin of the production system (extensive polyculture and intensive monoculture) and guarantee the specific quality for consumers and also potentially make another problem for other supply chain actors.

4) Scenario 4: Geographical indication for milkfish-based products from all production systems

Besides the scenarios above, and because the smoked milkfish from all production systems has been registered as geographical indication, then registration for the scenario of milkfish-based products also have the possibility to be registered as a geographical indication. The reason is that because these products are also made from milkfish bred in the Sidoarjo Delta and have its typicity caused by natural and human factors as mentioned in previous scenarios. Although they have no highly historical reputation such as the smoked milkfish, but if seeing the consumer interest is high, then there is the potentially positive impact of the registration of geographical indication for milkfish-based products.

There are several milkfish-based products produced in Sidoarjo, such as steamed milkfish, crispy milkfish, otak-otak milkfish, and milkfish abon. But if viewed from a geographical indication perspective that requires a clear identification of the specificity of a product, then products otak-otak milkfish and milkfish abon can be eliminated, because it is made by mixing a lot of herbs and spices so it has a flavor that is dominated by them, consequently the typical flavor of milkfish is very difficult to be identified, and it becomes difficult to distinguish with the other similar products.

For the registration of geographical indication, steamed milkfish and crispy milkfish could be priorities, because the processes of their production are not mixed with a lot of herbs and spices, so the typical taste of milkfish is still easy to be identified. However, because the raw material comes from all production systems that produce milkfish with different qualities, then the traceability control should be implemented properly by all actors involved. The goal

is to make the same quality of the geographical indication product marketed, so it does not cause confusion among consumers.

3.2 Alternative Ways to Do the Traceability Control

Because milkfish from each production systems have different characteristics, then all actors involved in the supply chain of geographical indication must implement and ensure traceability control on the origin of milkfish to make sure that the product complies with the criteria that was specified in the Book of Requirement. Referring to the commercialization, milkfish could be known that there are still major weaknesses in this stage, because the processor does not know the origin of milkfish they use and cannot guarantee the authenticity of origin to consumers. It is therefore still necessary research more in depth later on the condition of traceability implementation, including the determination of the relevant and reliable criteria, so can be measured easily on the field in large volume, to know the origin of milkfish.

There are two criteria that could satisfy this condition. The first is the appearance of milkfish organs which can be used to help in determining the kinds of feed that are provided (natural or concentrate). There are pretty clear differences in terms of size (volume) and color of fish organs, because milkfish fed with concentrate has a larger size and brighter body color, whereas milkfish fed with natural feed has smaller organs and darker body color. This control technique has a high reliability (very trustworthy results), but it requires actors to dissect the body of milkfish, so they can check the condition of internal organs of the milkfish they buy or sell. However, this method is not practical and a bit complicated to do.

The second criteria that can be used to distinguish milkfish from salty water and fresh water is the smell of the fin part of the back. This technique is especially done by local actors to check the freshness and the smell of mud. Even this way is quite practical to do in large volume, but its reliability still needs to be tested more deeply. Actually for more definitive results, it can be done by organoleptic test, but this way requires professional human resources, special equipments, and are not effective in large volume products. The GI organization could also hire the services of an accredited certification agency to guarantee the specific characteristic of milkfish, however this requires good coordination and cost.

3.3 Determination Of The Selected Scenario

Hierarchy Process Analysis uses the registration of geographical indication as the goal, whereas the criteria used are the typicity of product and some impacts that have been mentioned in the previous section. The alternatives used are the scenarios of geographical indication that also have been described in the previous section. The calculation of this analysis that has been done with the Criterium Decision Plus Student Version 3.0.4 obtained the following results:

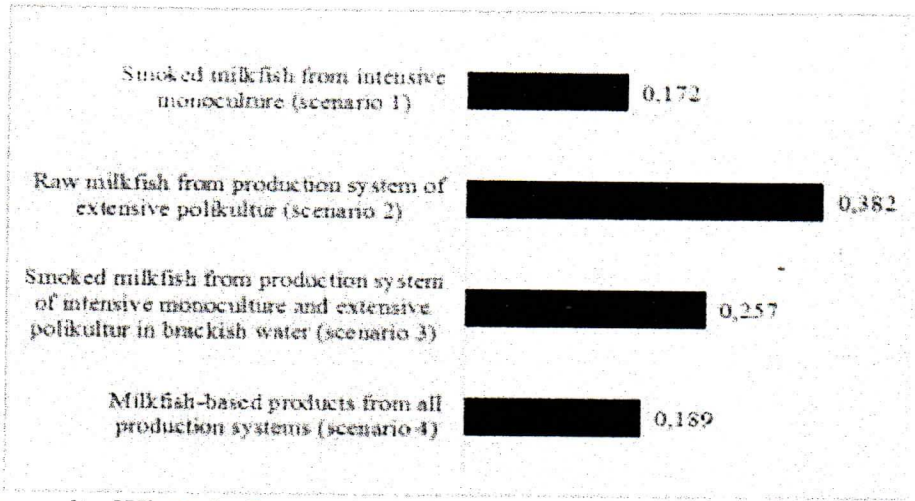

Figure 3. The result of Hierarchy Process Analysis to determine the scenario of geographical indication

Based on the results above, it can be concluded that raw milkfish from the production system of extensive polyculture gets the highest priority value (score 0,382) to be registered as a product of geographical indication. Second priority is smoked milkfish from the production system of extensive polyculture and intensive monoculture (score 0,257). The third priority is milkfish-based products from all production systems (score 0,189). While the fourth priority is smoked milkfish from the production system intensive monoculture (score 0,172). So, the raw milkfish from the production system of extensive polyculture or traditional systems is the selected scenario of geographical indication which is following the scenario 2 described in the previous section.

This following Figure 4 is the result of SWOT analysis that has been done as can be seen in the matrix below:

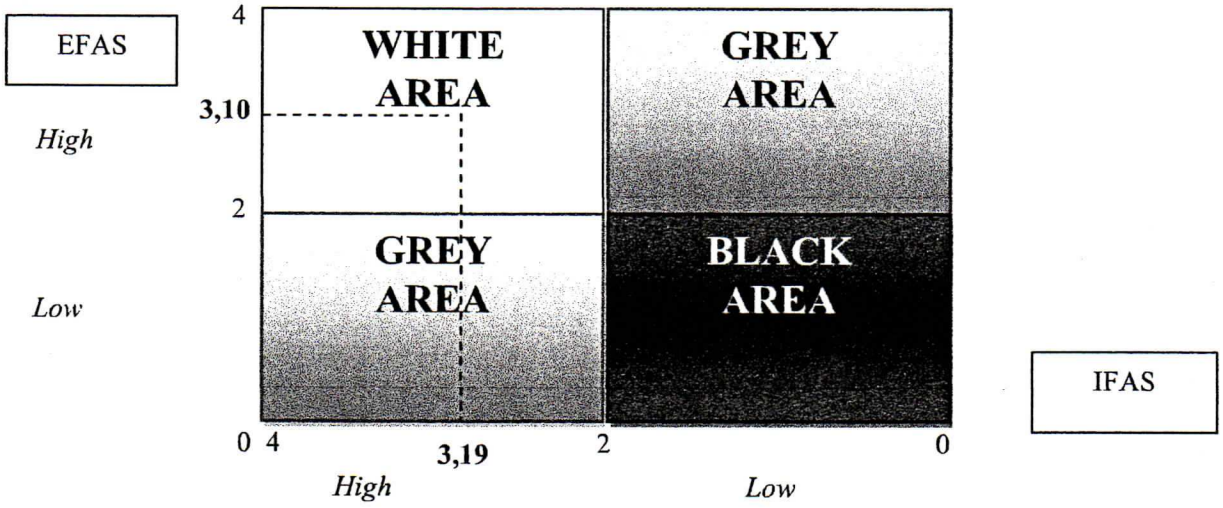

Figure 4. The matrix of SWOT analysis to determine the position of the scenario of geographical indication

The calculation based on the result of SWOT analysis above shows the value of IFAS (Internal Factors Analysis Summary) is 3.19 and EFAS (External Factors Analysis Summary) is 3.10. From those values then the selected scenario of geographical indication for raw milkfish of the production system of extensive polyculture is in White Area (Strength-Opportunity), which means that this scenario is feasible to be implemented and local actors are able to run it.

4. Discussion

The scenario of geographical indication, namely raw milkfish from the production system of extensive polyculture, indicates a positive impact for the sustainability of the milkfish breeding and producers. Although Smoked Milkfish of Sidoarjo is already registered as a geographical indication in 2014, but the selected scenario needs to be considered to be a material to improve the Book of Requirement. For example, producers could put the use of milkfish that is bred traditionally as raw materials for smoked milkfish. But all these policies must be discussed, be agreed, and be implemented collectively by producers and other actors of the supply chain involved.

FKMT as an organization who manages the geographical indication is still new and does not have enough knowledge to implement the system of quality control and traceability, as well as to apply sanctions to any infringements that occurs. However, with good support from the local government of Sidoarjo District, it could be expected that FKMT will have stronger institutional to run two mentioned systems. But onother more important thing is considering to include traditional milkfish breeding into the Book of Requirement so that the system gets protected as the ancestral heritage of local communities which is very valuable to keep existing.

A project of cooperation between the Governments of Indonesia and Switzerland, namely Indonesia-Swiss Intellectual Property (ISIP) Project, has been providing support to milkfish of Sidoarjo as a part of strengthening program on the use of geographical indication in Indonesia. Identification of specificity and supply chain have been conducted deeply to be the basis of the protection of geographical indication. To strengthen the FKMT institution is

done by providing several trainings and workshops aiming to improve the knowledge and skills of its members to run what had been agreed collectively in the Book of Requirements. It could be expected that in the few next years, FKMT could already be a financially independent body to do promotion and marketing of milkfish products.

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