Strategy of Quality Improvement of Pond Shrimp

by Andi Noor Asikin

Strategy of Quality Improvement of Pond Shrimp Post Harvest Management (*Penaeus monodon* Fabricius) in Mahakam Delta (Case Study)

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Abstract - Mahakam Delta area, which is situated in Kutai Kartanegara Regency, has become a pond center that gives a significant contribution to shrimp export of East Kalimantan Province. Pond-produced shrimps, however, do not always accord to the intention of cold storage companies at expected price. The companies even sometimes reject the request due to poor quality of the product. The decreasing shrimp quality may be due to maintenance process by the pond farmers as well as the improper collectors. In the other hand, importing countries have decided more and more restricted requirements for the imported fishing products. This study was held in Muara Jawa, Anggana, and Muara Badak Districts using techniques of data collection of in-depth interview with twelve respondents. In order to improve shrimp quality, farmers or the producers have to formulate a strategy towards the improvement of the post harvest shrimps from the pond using an Analytical Hierarchy Process (AHP). Results of the AHP consist of as follows: (1) application of pond shrimp post harvest technology and improvement of facilities and accommodation that support the quality improvement of the pond shrimps, (2) human resource quality improvement of pond farmers, collectors, and field instructors, (3) development of pond culture by applying best practices principle and local policies in order to improve the quality of the pond shrimps, and (4) improvement of interagency coordination, monitoring, and evaluation to enhance the pond shrimp quality.

Keyword: Strategy; AHP; quality; shrimp; collectror Mahakam delta and farmers

I. INTRODUCTION

Mahakam Delta is an area that is part of the administrative jurisdiction of Kutai Kartanegara Regency. It has three districts: Muara Jawa, Muara Badak, and Anggana. Mahakam Delta is situated 25 kilometer away from Samarinda, the capital city of the East Kalimantan Province (*BPS Kabupaten Kutai Kartanegara*, 2010). The delta does not only function as fishing site but also becomes the place for vary industries, such as coal mining, oil fields, docking, and plumbing. The fishing activities in Mahakam Delta are dominated by pond fishing. The area ranges 107.221 hectares, consisting of 49,309 hectares of coastal forest, 57,912 hectares of ponds with 10,645 pond

units. In other words, the pond area is wider than the coastal forest (Suyatna *et al.*, 2010).

In general the Mahakam Delta pond activities can be perceived extensive with a primitive technique according to pond modelling standards available in Indonesia (Noryadi and Syafei, 2008). Ponds in the Mahakam Delta were categorized irregular from their type and form (rectangular, *cube*, and hexagonal). Each pond had average area of 1.5-50 ha/unit with the average pond area of 5.0 ha (Noryadi and Syafei, 2008). The culture systems applied were monoculture and polyculture (between shrimps and *bandeng*). Whereas water management system made use of water tide. The annual average pond production in the Mahakam Delta was 111.9 kg/ha or 38.4 kg/ha/year. From productivity aspects of the annual average pond production by commodity, the productivity rates of each fishing product were as follows: *udang windu* 5.19 kg/ha with the average products of 6.67-128 kg/ha; *ikan bandeng* 6.79 with the average products of 0-222.50 kg/ha; *udang bintik besar* 49.02 kg/ha with the maximum rate of 253.33 kg/ha and minimum rate of 5 kg/ha; and *kepiting* 10.89 kg/ha with the average products of 0-57 kg/ha (Noryadi *et al.*, 2006).

Shrimp production obtained by the pond farmers did not always agree with the cold storage companies' price expectation. Poor maintenance by the pond farmers and the collectors caused the decreasing quality of the products. The decreasing quality did not only affect the price but also the safety rate of the shrimps for consumption. In some export target countries, such as Japan, United States and European Union, particular restrictions required safety food for the fishing products they imported, such as: (a) heavymetals free, in particular mercury (Hg) and *timbal* (Pb); (b) fresh and H_2S, black spot, and indol free; (c) clean and free from bacteria (*Salmonella, Vibrio,* and *E. coli*; and (d) free from residuals and antibiotics (http://binaukm.com, 2010). In order to support Indonesian exports to other countries while fulfilling the desired requirements, the quality improvement of the pond farmers and collecters were deemed necessary to produce high quality shrims as raw material for cold storage products. Quality and safety became two important elements in order for the products to be marketable to the customers.

According to the above discussion this study were held to formulate proper strategies to improve the quality of *udang windu* derived from the ponds, in particular in the

Mahakam Delta territory of the Kutai Kartanegara Regency.

II. MATERIALS AND METHODS

Place and Date of Study

The study was held in Muara Jawa, Anggana, and Muara Badak Regencies that became the center for pond activities in the Mahakam Delta. The study lasted six monts from March to September 2011.

Instruments and Study Materials

The study used such instruments and equipments as questioner, camera, tape recorder and writing devices.

Procedure of Study

Study location and respondents were determined by a purposive sampling method (Singarimbun *et al*., 1989). The study was done by questioner-based in-depth interviews with actors and stakeholders. There were twelve respondents involved in this study who consisted of six local people, two persons from corporate groups, two people from governmental instutition, and two academicians.

Data Analysis

To determine the strategy of the pond shrimp post harvest quality improvement in Mahakam Delta this study applied an Analytical Hierarchy Proces (AHP) sing an expert choice 2000 software. This method was aimed to determined to prioritize the pond post harvest quality improvement. Problem solving process using the AHP was performed according to the principles of decomposition, prioritization and logical consequence (Saaty, 1993; Lee *et al*., 2009). The analysis of the strategic decision making included value point calculation from different choices available to either corporations or to decision makers (Hughes, 2009). The priority program determination was based on the pair comparison rate with its factor square according to Saaty comparison scale (1993), see Table 1 below. Furthermore, some problems could be expressed in opinions with a scale interval of 1-9 (Saaty, 1993; Marimin, 2004). A hierarchical structure for determining the priority would follow this comparison scale.

Table 1. Comparison Rate in AHP

Scale rate	Description
1	Criterion/alternative A is as important as B
3	A is slightly more important than B
5	A is more important than B
7	A is far more important than B
9	A is absolutely more important than B
2,4,6,8	In case of hesitation arises between two criteria

Source : Saaty (1983) and Marimin (2005).

The AHP output was a holistic improvement, which signaled a choice for each decision alternative (Lasserre, *et al*., 2009; Lee, *et al*., 2009).

III. RESULT AND DISCUSSION

Some alternative activities that can be strategies for improving the shrimp post harvest quality from the ponds are as follows: (1) improving quality and quantity of field instructors to support the improvement of the pond shrimp post harvest, (2) applying best practices principles to pond shrimp culture, (3) enhancing monitoring and evaluation to improve the management of the shrimp post harvest products, (4) developing quality- and pond farmer welfare oriented pond culture, (5) strengthening co-operation to enhance the management of the shrimp post harvest from the ponds with either government and private sectors, (6) enhancing knowledge and skills of the pond farmers in performing the pond post harvest from the ponds management (application of 'cold chain system'), (7) making available policies on optimal pond space management to improve the management of the post harvest shrimp products, (8) improving quality standards of the pond shrimps, and (9) improving facilities and accommodation that support the improvement of the post harvest pond shrimp.

Of these alternatives, a choice must then be made to determine the Strategy of Quality Improvement of the Pond Shrimps Post Harvest in the Mahakam Delta using the following criteria: (1) sustainability, (2) effectiveness and efficiency, and (3) fairness. In addition, concerned role players must also be involved to determine the Strategy of Quality Improvement of the Pond Shrimps Post Harvest, such as (1) government, (2) community, (3) private sectors, and (4) academicians, as illustrated in the Figure 1.

According to Helmi (2002) economic efficiency, fairness and sustainability are the key principles to the new policy-making for the natural resource management. Results of the analysis using the Expert Choice 2000 software and according to these criteria showed that management planning has to be effective and efficient followed by sustainable and fair management, in which all parties play their roles equally, as Table 2 illustrates.

Strategic choices:
1. Improving quality and quantity of field instructors who support the improvement of the pond shrimp post harvest management
2. Improving monitoring and evaluation to enhance the shrimp post harvest management
3. Applying best practices principles in pond shrimp culture
4. Quality- and pond farmer-oriented pond shrimp culture improvement
5. Strengthening co-operation to improve pond shrimp post harvest management with government and private sectors
6. Enhancing knowledge and skills of pond farmers pond shrimp in post harvest management ('cold chain system' at each level)

7. Policy-making on optimal pond space management to support the improvement of the pond shrimp post harvest management
8. Improving quality standards for pond shrimps
9. Improving facilities and accommodation that support the pond shrimp post harvest management.

Alternatives
1. Applying technology for pond shrimp post harvest and improving facilities and accommodation that support the quality of the pond shrimps.
2. Improving quality of pond farmer, collector, and field instructor human resources
3. Applying best practices principles to pond culture development and local policies on pond shrimp quality improvement
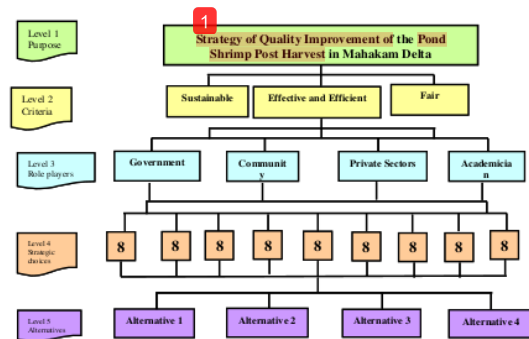4. Improving interagency coordination, monitoring, and evaluation

Figure 1. Model of Hierarchical Structure in Determining Activity Prority for the Quality Improvement of the Pond Shrimp Post Harvest in Mahakam Delta

Table 2. Criteria Priority Value

No	Aspects	Values	Priorities
1.	Effectiveness and Efficiency	0,540	1
2.	Sustainability	0,297	2
3.	Fairness	0,163	3

Source : Research Output, 2011.

According to the analytical results of the criteria aspects using Expert Choice 2000 software the inconsistency index resulted in 0.01. It meant that the above results had fulfilled the Saaty's (1993) requirements. The analysis continued with determining priorities for the role players as depicted by Table 3 below.

Table 3. Role Player Priority Value

No	Role Players	Values	Priorities
1.	Community	0,467	1
2.	Private sectors	0,277	2
3.	Government sectors	0,160	3
4.	Academicians	0,095	4

Source: Research Output, 2011.

Results in Table 3 shows that community plays the most dominant role in determining whether the pond shrimp post harvest management is successful. Community also gives a major contribution to the pond shrimp post

harvest management. It is due to the community's direct involvement in vary activities of the pond shrimp post harvest management, which extremely affects the shrimp quality and price, which, in turn, has a direct effect on their own income. Training and education are expected from the private sectors. In addition, private sectors as the shrimp exporters will determine the price and quality of the marketed products. Government sectors as the policy *stakeholders* are expected to perform programs and to make policies to improve the pond shrimp post harvest management. Academicians play an important role in disseminating their academic knowledge to the community as the role players. To enhance the post harvest shrimp good quality coordination and co-operation of each of the stakeholders are necessary towards the well-performing of the Strategy of the Pond Shrimp Post Harvest Quality Improvement.

Results of the AHP analysis using the Expert Choice 2000 software shows the policy priority mentioned in Table 4 below.

Table 4. Priority Value of Alternatives for Shrimp Post Harvest Quality Improvement

No	Alternatives	Values	Priorities
1.	Policy on the optimal pond space management to support the improvement of the pond shrimp post harvest management	0,275	1
2.	Quality- and welfare-oriented pond culture system development.	0,612	2
3.	Strengthening co-operation between government and private sectors to improve the pond shrimp post harvest management	0,132	3
4.	Enhancing knowledge and skills of the pond farmers and collectors in the pond shrimp post harvest management ('cold chain system' at each level)	0,129	4
5.	Improving facilities and accommodation to support the quality of the pond shrimp post harvest management	0,118	5
6.	Improving quality and quantity of the field instructors to support the pond shrimp post harvest management	0,066	6
7.	Applying best practices principles to the pond shrimp culture system	0,049	7
8.	Improving quality standards for pond shrimps	0,037	8
9.	Improving monitoring and evaluation to support the pond shrimp post harvest management	0,032	9

Source : Research Output, 2011

The above table shows that alternatives for the highest shrimp quality improvement was obtained from the

optimal space management policy that supports the shrimp post harvest management with the value of 27.5%, followed by quality- and welfare-oriented pond culture development (16.2%). The third priority went to strengthening co-operation between government and private sectors (13.2%). The fourth priority was enhancing knowledge and skills of the pond farmers and collectors in the pond shrimp post harvest management using 'cold chain system' (12.9%). The fifth priority was improving facilities and accommodation that support the pond shrimp post harvest management (11.8%), followed by quality and quantity improvement of the field instructors (0.66%) and best practice principles application (0.37%). The lowest alternative was the improvement of minitoring and evaluation to enhance the shrimp post harvest management (0.32%). After all alternatives had been decided, the process went through the further stage, clustering of the nine alternatives mentioned-above based on the following principles: (1) functional relationships between the clustered alternatives; (2) the clustering was in line with code of duty of the *SKPD,* which is responsible for implementing an effective pond shrimp post harvest management; (3) comprehensive study of the pond shrimp post harvest management, which includes pond shrimp post harvest technology, human resources (pond farmers, collectors, and field instructors), operation standards for the pond shrimp post harvest management, the need for coordination and monitoring, and government evaluation in improving the pond shrimp quality monitoring.

According to the above principles the formulation of the management alternative after the clustering will be as the followings:

1. The application of the pond post harvest technology and improvement of facilities and accommodation that support the pond shrimp quality improvement.
2. The improvement of human resources of the pond farmers, collectors, and field instructors.
3. The development of pond culture using best practices principles and local policy to improve the pond shrimp quality.
4. The improvement of interagency coordination, monitoring, and evaluation to improve the pond shrimp quality.

The next stage was performing an AHP analysis of the clustered strategic choices using Expert Choice 2000 software to determine the leading alternative. Results of the alternative showed an inconsistency rate of 0.05, lower than that of required by Saaty (2009), 0.1. It meant that the results were consistent and accepted. Table 5 presents the leading alternative priority value according to the clustering.

According to the AHP results using the Expert Choice 2000 software the alternative priority after the clustering in the pond shrimp post harvest management was the improvement of the pond shrimp quality management with the highest value (39.1%), followed by the development of pond culture using best practices principles and local policy to improve the pond shrimp quality (27.6%), the improvement of human resources of the pond farmers, collectors, and field instructors (19.5%), and the improvement of interagency coordination, monitoring, and evaluation to improve the pond shrimp quality (13.8%).

Furthermore, the calculation of the management alternative after the clustering showed that post harvest technology and human resource factors (pond farmers, collectors, and field instructors) had the 66.7 and 33.3% of the total contribution. These two factors, accordingly, became the leading alterantives to be applied to the pond shrimp quality improvement policy in Mahakam Delta.

Table 5. Priority Value of Management Alternative After Clustering

No	Alternatives	Values	Priorities
1.	The application of the pond post harvest technology and improvement of facilities and accommodation that support the pond shrimp quality improvement.	0,391	1
2.	The improvement of human resources of the pond farmers, collectors, and field instructors.	0,276	2
3.	The development of pond culture using best practices principles and local policy to improve the pond shrimp quality.	0,195	3
4.	The improvement of interagency coordination, monitoring, and evaluation to improve the pond shrimp quality.	0,138	4

The AHP results using the Expert Choice 2000 software recommended the leading alternative of the Pond Shrimp Post Harvest Management, as detailed in the Figure 2 (appendix).

IV. CONCLUSION

1. The application of the pond post harvest technology and improvement of facilities and accommodation that support the pond shrimp quality improvement (0.391)
2. The improvement of human resources of the pond farmers, collectors, and field instructors (0.276)
3. The development of pond culture using best practices principles and local policy to improve the pond shrimp quality (0.195)
4. The improvement of interagency coordination, monitoring, and evaluation to improve the pond shrimp quality (0.138)

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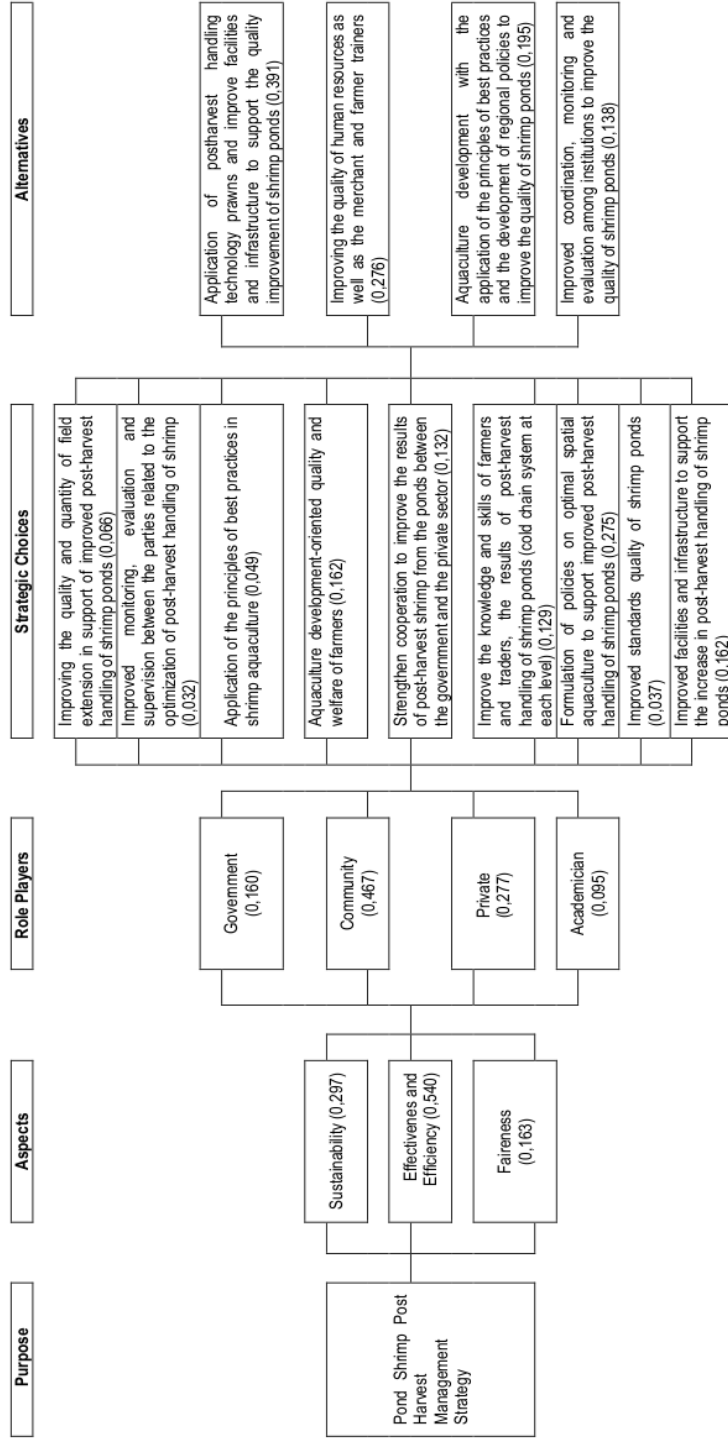Laporan Penelitian. Fakultas Perikanan dan Ilmu Kelautan Unmul. Samarinda.

Figure 2. Flowchart and results of AHP Analysis, Strategies for Quality Improvement of Post-harvest shrimp farms in Mahakam Delta.

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