Farmer Incentives for Improving Pangasius Quality at the Small-Scale Farming

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Abstract:- **This paper presented how to involve the small-scale Pangasius farmers in developing adequate quality management through the entire export-oriented supply chain. In practical, the processing firms are prefer to purchase fish from larger scale farms and reliable quality of products. The research results shown which incentives can be used to improved quality at the farm level. It is equally to create procedures for analyzing small-scale farmers attitudes toward export market and thus have the information required to decide whether the individual farmers, farmers's association or farmers clubs in order to penetrate export market successfully.**

Key words: **small-scale farmer, Pangasius, export supply chain, incentives**

I. INTRODUCTION

In Vietnam the situation is similar other developing countries for smallholders. The total area used for aquaculture in the MRD is around 600,000 hectares of which most belong to small-scale farmers producing for themselves and markets (FAO, 2016).

However, statistics on the amount of smallholders in the aquaculture sector in Vietnam are lacking. Accurate data on the amount of farmers, location of farms and their production capacity are not publicly available. However, are the so called smallholders in the Pangasius sector really smallholders? This is interesting to know, as often interventions are targeting to assist the so called smallholders.

In order to get an idea about which farmers are considered as small-scale farmers, a group discussion among Pangasius actors was conducted. The respondents were asked to separate farmers in different groups based on their own criteria. As a results, most of the respondents classified the farmers in three groups; small, medium and large (table 1).

Table 1 Perception of farm scale by respondent

Respondent	Small	Medium	Large
Farmers	<1 ha 2 ponds	1-10 ha 3-5 ponds	>10ha >5 ponds
Processing firms	1-2 ponds < 50 MT/crop	50-500 MT/crop	>500MT/crop
Fishery association	< 1 ha <100 MT/year	1-4 ha <1000 MT/year	>4 ha >1000 MT/year
Input suppliers	<50 MT/year	50-500 MT/year	500-1000 MT/year
Researchers	<1 ha	1-20 ha	>20 ha
Local authorities	<1 ha	1-10 ha	> 10 ha

The data shows small-scale farmers have the pond farm areas less than 1 ha. Therefore, most of independent farmers and fishery association members are small-scale ones. For example, Thot Not district in Can Tho province is one of the districts with high densities of Pangasius farms.

However, we can not call Pangasius farmers are smallholders. Taking the definition of a smallholder again: somebody who lives on the poverty line. What than is the poverty line? According to the UN, the poverty line is at 2 USD/day (32,000 VND/day) or 730 USD/year) (541 EUR/year). According to the Vietnamese Prime Minister's Decision No. 170/2005/QD-TTg since July 2005, the Ministry of Labour Invalids and Social Affairs (MOLISA) has adopted a new poverty definition, which defines poverty as an income of less than VND 200,000 per person per month (EUR 8.40 per person per month) in rural areas, which is around EUR 100 per year. Hence, do Vietnamese Pangasius farmers belong to the group of smallholders based on the above definitions and decision? The average profit margins of Pangasius farmers in April 2008 were VND 1,000/kg (Summernet, 2008). In this profit margin the already the labour cost of the farmer and his family has been discounted. A so called small-scale farmer in the Pangasius sector with a pond of 1,000 m^2 and a harvest of 20 MT/cycle makes a profit of VND 20,000,000/cycle. Assuming this farmer can have two cycles a year, his profit will be around 40 million per year, equalling EUR 1,680. This is 15 times more than somebody on the poverty line according to Vietnamese standards and 3 times more than the international poverty line (data calculation, 2018). Moreover, a Pangasius farmer earns 10-20 times more than a rice farmer (Chiem, 2018).

At the moment, Pangasius farmers are often well rewarded for the risks they take, but they are highly sensitive for shocks and stresses like disease outbreaks, market price fluctuations etc. When these risks could be reduced, Pangasius farming is generating a good income for the small-scale producers.

II. LITERATURE REVIEW

Pangasius small-scale farmers- who are they?

This analysis firstly addresses the definition of small-scale farmers. It then highlights the international debate around small-scale farmers and compares it with the Pangasius farmers situation. FAO (2012) noted that 90% of the world's aquaculture poroduction was coming from most small-scale producers in developing coutries. Small-scale fish farmers generally emphasize smaller technologies and household- or family-based social units, respectively, compared with larger-scale and industrial or company-based fishery (FAO, 2018). However, it should be emphasized that small-scale farms are relative to the particular farming industry. The most obviuos measures is farm size, skills and labor (Hazell et al., 2007). The bulk of aquaculture production in many countries in Asia is from small-scale family-owned and operated operations also called **small holders**. Smallholders can be defined as owners of small farms with primary reliance on family labourwith modest or only occasional use of hired labor who are at or below the poverty line. They can be subsistence or commercial farms or something in between.

Fish culture conditions

These issues are concerned the environmental pollution of water used for Pangasius farming. Particularly, the main environmental concerns in the Pangasius farming sector are the waste-water released from the farm to river. The water is the environment of the fish in the farm and therefore it has to be taken care of and constantly monitored.. At the moment, the Vietnamese Primister has just approved the project for development Pangasius sector to 2020. In this project, the government focused on the environmental pollution issues and cooperation among small-scale farmers (30% of Pangasius farmers). This project is the foundation for the small-scale farmers who want to be included in Pangasius export chain and they need to set up the water treatment system in order to reduce the environmental pollution.

Generally, they need to meet international export standards for environment or they will be exclusion from the Pangasius value chain. As a result, the building settlement treatment system is the most important issue that related to aquaculture environmental pollution.

This sector will discuss the willingness of constructing water treatment system that based on the perceptions and assessments by small-scale farmers.

One research conducted by Lang and Vinh (2007) to examine the environmental consequences arising from Pangasius pond farming. The results showed that the COD[1] concentration in effluent releasing from pond water was 34mg/l that exceeded the maximum allowable concentration of COD in surface water (<10mg/l) according to Vietnam standards (TCVN 5942 – 1995). Therefore, they proposed three technical water treatment systems, of which trickling filter technology proved to be the most cost-effective option (see appendix 1). However, this research calculated only cost-effectiveness analysis for a waste water treatment. It is lacking of a benefit-cost analysis to give the small-scale farmers the best option of their selection. In this research, we want to show some types of cooperation of small-scale farmers to save the cost they have to pay for water treatment.

III. RESEARCH RESULTS

Cost benefit analysis for this section focuses on financial perspective of building water treatment system. Financial analysis gives a greater hope for project feasibility as presented by the Net Present Values (NPV), and Internal Rate of return (IRR) in the outline of cost-benefit analysis below.

- Assumptions (Source: the results of Lang and Vinh research, 2007)

+ Pond water surface area: 5,000 m^2 (average pond area in the small-scale farms)

+ Pond volume: 20,000 m^3 (pond water depth of 4 meters)

+ Daily discharged wastewater: 6,000 m^3 (average discharged rate of 30%)

+ COD concentration needs treating/cubic meter of wastewater: 0.034 kg/m^3

+ COD load needs treating daily: about 200 kg (= 6,000 m^3 * 0.034 kg/m^3)

+ Pollution load rate (PLR): 0.098 kg of COD/kg of Pangasius produced

+ Life span of trickling filter system: 30 years

- Result

Table 2: Projected costs of the for trickling filter system

Unit: thousand VND

Case of one pond of 5,000m^2

Year	Investment cost	Annual cost	Benefit	Net cash flow
1	-975658	-3788040	0	-4763698
2	0	-3788040	4800000	1011960
3	0	-3788040	4800000	1011960
4	0	-3788040	4800000	1011960
5	0	-3788040	4800000	1011960
6	0	-3788040	4800000	1011960
7	0	-3788040	4800000	1011960
8	0	-3788040	4800000	1011960
9	0	-3788040	4800000	1011960
10	0	-3788040	4800000	1011960
11	0	-3788040	4800000	1011960
12	0	-3788040	4800000	1011960
13	0	-3788040	4800000	1011960
14	0	-3788040	4800000	1011960
15	0	-3788040	4800000	1011960
16	0	-3788040	4800000	1011960

[1] Chemical oxygen demand (COD) is a chemical measure of the amount of organic substances in water or waste-water

17	0	-3788040	4800000	1011960
18	0	-3788040	4800000	1011960
19	0	-3788040	4800000	1011960
20	0	-3788040	4800000	1011960
21	0	-3788040	4800000	1011960
22	0	-3788040	4800000	1011960
23	0	-3788040	4800000	1011960
24	0	-3788040	4800000	1011960
25	0	-3788040	4800000	1011960
26	0	-3788040	4800000	1011960
27	0	-3788040	4800000	1011960
28	0	-3788040	4800000	1011960
29	0	-3788040	4800000	1011960
30	0	-3788040	4800000	1011960
Total PV	-886,962	35,709,529	40,885,553	4,289,062
NPV	**4,289,062**			
IRR	**21%**			
BCR	**1.12**			

Source: Data survey, 2018

NPV gives the net present value of an investment by using a discount rate and a series of future payments (negative values) and benefit (positive values). This is a first decision criterion, it require that project NPV>0 in order to be feasible. Thus it reflects that the present value of incremental benefit exceeds the present value of all capital and recurrent costs. Objective is to maximize NPV, since appraisal in this case involve only one pond and it is seen as feasible for small-scale farmers to undertake.

IRR is the discount rate that will bring NPV of the project equal to zero. On the other hand, it is a return on investment such that the present value of measured benefit equals the present value of measured costs. The objective in this criterion is for the project to earn an IRR greater than opportunity cost of capital which in this case the IRR is 21% and therefore greater than 12% (interest rate). According to this criterion this project is accepted, otherwise if less than 12% it would be rejected.

BCR explains how much the farmer gets from every 1 VND expended in the project. Therefore the project seems to be feasible if for every 1 VND the farmer get more than oneVND. Referring to this case the project is feasible since the BCR is 1.12, however we can't say that it is the best since we don't have alternative project to compare with in order to select the optimal one.

In order to select the optimal settlement treatment system and encourage the copperation among farmers, we can continue to calculate the NPV, IRR, and BCR for the cases of larger pond scale than 5,000m^2. In addition, there is evidence that collective action can help small-scale farmers to secure access to new technologies in order to tap into the market.

After technical calculations, one group discussion was organized in An Giang province to collect farmers' opinions of the proposed technologies as well as other information. There were 20 people at the meeting, of which 12 people were fish farmers and the rest local officials of related agencies. At the meeting, study results of environmental consequences caused by Pangasius production were presented first, and then proposed technical options associated with their cost were described and explained by the technical expert. After that, the author asked the participants to assess the technical and financial feasibility of the options. Local officials were interested in those but fish farmers were reluctant to think of the perspective of having treated their wastewater with costly technologies.

There are some point of view of farmers on the proposed options: (1) These options depend heavily on electricity supply ability of the State while this supply has not met national demand. This is a big constraint to the options; (2) These are only suitable for concentrated fish culture planned zones, not for separate fish raising households, due to lack of extra land on which the treatment structures are built. Moreover, if only some households apply these systems to treat fishpond effluent while the others not, applied farmers still face unclean input water if they supplement pond water with the water in local canals which is now polluted not only by Pangasius effluent but also by other polluting sources; (3) The State should invest in a pilot project with these options for a few years for farmers to see its results before their making decisions; (4) due to relatively big investment, if these systems were invested by NGOs or private firms, fish farmers would be willing to pay this organizations for clean water input and treatment fees; (5) Pangasius prices often fluctuate, depending on export prices; when fish prices go down, the production costs includes treatment costs are high which may cause financial losses to farmers. Since farmers are now struggling with increasing operating costs, they cannot afford more significant investment for wastewater treatment. However, the farmers were also asked to rank their options of three settlement pond system. Table 10.4 shows their opinions

Table 3: Results of preference ranking of options

Option	N	Percent
1. Aeration system	5	41.7
2. Trickling filters	7	58.3
3. Wetlands	0	0
Total	12	100

Source: Farmers' interview, 2018

Table 3 shows that 41.7 % of participants chose the aeration system as their most preferred option, 58.3 % chose trickling filters, no percent chosen wetlands. They express the reasons for choosing or not choosing as following:

+ Choosing aeration systems:

- High treatment capacity

- Structure of high investment would mean high quality
- COD abatement cost is not significant compared to fish unit production cost

+ Choosing trickling filters:

- COD abatement cost is lowest
- Effective treatment
- Save money for not having to aerate wastewater

+ Not choosing constructed wetlands:

- Low treatment capacity
- Need a lot of labor to operate and clean the system whereas labor price is high and labor supply is short in the region
- COD abatement cost is highest

Generally, the perception of Pangasius farmers for buidling settlement pond related to finanancial issue and management in practice. This system is too costly in term of financial resources with uncertainty benefits that small-scale farmers can expect from market. The re-construction of Pangasius farms is particularly difficult for small-scale farmers with small land areas. We can recognize some positive outcomes of building settlement pond such as reduced disease problems, raising fish quality and productivity of farms (expert interivew, 2008). However, investment is required the wider adoption of small-scale farmers. My arguement is even the small-scale farmers invest in settlement pond, they need the support of local authority and processing firms. The intervention is necessary in the establishment and continued perfomance of farmers farming practices.

IV. CONCLUSIONS

In summary, the development of extension services and access to credit will be an essetial part of sustainability and widespread adoption for building settement pond. This will likely require substantial investment from government and as far as possible private finance. The local authority need to set up set up a specialize area for Pangasius farming with good wastewater treatment. The strictly regulation need to be established and management resposibilities assigned within the small-scale farms. There is a high enforcement for farmers who are not following the rules of building settlement ponds.

Generally, three options of settlement pond construction need extra land and considerable investment which are common constrains to small-scale Pangasius farmers. However, commercial Pangasius farmers are not smallholders and with average 2-3 ponds in their farms. Therefore, if the fish buying prices are secured with floor prices and they can get profits; the farmers can build settlement pond by re-construction their farms.

REFERENCES

[1]. Carballo, E., Eer van, A., Schie van, T., and Hilbrands, A., (2008), Small-scale freshwater fish farming, Agromisa Foundation and CTA, Wageningen

[2]. Lang and Vinh., (2007), Pond Tra fish production in the Mekong Delta: Environmental consequences and pollution control options, case study in Thot Not district, Can tho city, EEPSEA research report

[3]. Hazell, P., Poulton, C., Wiggins, S., and Dorward, A., (2007), The future of small farms for poverty reduction and growth, Discussion paper 42, International food policy research institute, Washington, DC.

[4]. Henson, S., Jaffee, S., Cranfield, J., and Siegel, P., (2008), Linking African Smallholders to high-value markets: practitioner perspectives on benefits, contrains, and interventions, Policy research working paper, the World bank.

[5]. Bijman, J., (2007), The role of producer organizations in quality-oriented agrifood chains; an economic organization perspective, Tropical food chains: Governance regimes for quality management, Wageningen academic publishers

[6]. Van Anrooy, R., (2003), Vertical cooperation and marketing efficiency in the aquaculture products marketing chain: a national perspective from Vietnam, FAO