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Economics Scale of Zero Waste Processing of Pangasius

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ABSTRACT

Pangasius is one of the fastest growing aquaculture commodities in Indonesia which in turn requires more appropriate processing technology. The processing of *Pangasius* will economically be more beneficial if the processing is targeted to produce Pangaqsius fillet as the main product. Other part of the fish such as fish head, bones, and skin commonly known as a waste,reaching 60% of the total weight of the fish, can be processed into other valuable products such as fish meal, crackers, and fish crunchy product. Such products can be commercially produced as single products separately and will even be more beneficial if the products are produced as additional products to *Pangasius* fillet as the main product. This total utilization strategy of *Pangasius* processing leaving no waste can be considered as the implementation of the blue economy of zero waste concepts. From quantitative financial study there several recommendation are proposed, i.e. integrated processing units to get more profit, establishment of a model of integrated processing which implemented GMP rule to get qualified product, culture system development to get sustainable raw material supply for processing unit, and a better system of export mechanisms so that *Pangasius* product can be absorbed maximally by any market.

Keywords: *Pangasius, zero waste concept, total utilization, economic scale*

INTRODUCTION

Pangasius fish, is one of main aquaculture commodity and widely develop in Indonesia according to fulfill market demand, domestic and export. Aquaculture technology of Pangasius is relatively simple, fisical characteristicof Pangasius are fast growing and adaptive in any environment, i.e. river, lake, cistern, or pond. National aquaculture production of Pangasius in 2007 achieve 47.594 tones, about 5 times more higher in 2011 about 243.419 tones (figure 1), and its targeted more in 2014 about 1,8 juta tones (Anon., 2013a). The sigsignifficat ascent needs accurate implemeneted regulation, especially to utilized a maximum value added product for market demand and even export demand, i.e EU and US markets. To get more profit from export trading, Indonesia should consolidate regulation wich related to marketing and guarantee the sustainability of fresh fish in order to rival Vietnam product price. Pangasius fresh product Vietnam dominate about 80% in international market.

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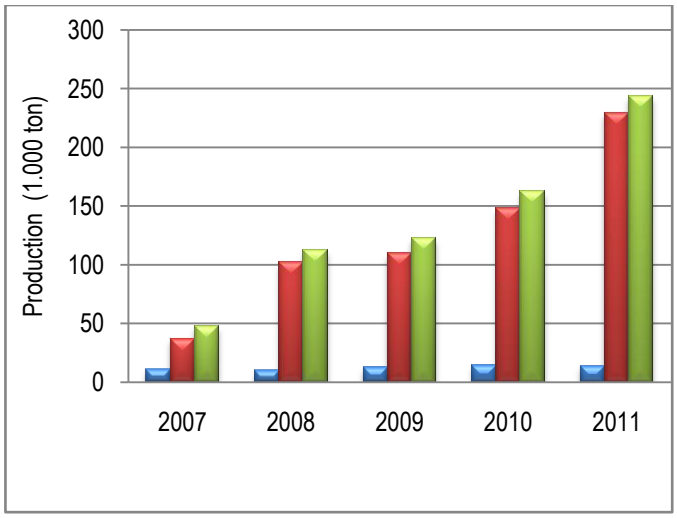

Figure 1. Production of fresh pangasius (anon, 2012)

Other issues that support Pangasius product from Indonesia can entered international market are US start to closed Pangasius import during an issues about dangerous compound in Vietnam product and ban to consumpt Cod fish in EU. US import Pangasius product about 1,1 millyon per year especially fillet dominatelly from Vietnam. UE market predicted more higher than US (Anon., 2013b) and still dominatelly by Vietnam product and by prohibition during rehabilitation of Cod population, Indonesia has opportunity to take a part fulfill "Cod likes" demand. Other potential internationall market is meiidle-east, i.e. Dubai (Uni Emirat Arab) which request Pangasius with specification ± 500 g (Anon., 2013b).

Good management in Pangasius base product from aquaculture until post-harvest side will develop Indonesia become one of biggest Pangasius exporter in the world. Major problem in Pangasius trading is high price of product and how to increase its value added. Second problem can be observed in Table 2, increasing in aquaculture side not directly compare to market sorption. Its shows that post-harvest technology be requaried. If this two major problems solved, Indonesia product can complete in international market. Fillet product of Pangasius for domestic and international market is profitable industry. But its only 40% from total raw material, if 60% of its waste, industry can get more profit. This is implementation of zero waste consept which is one of blue economy principle.

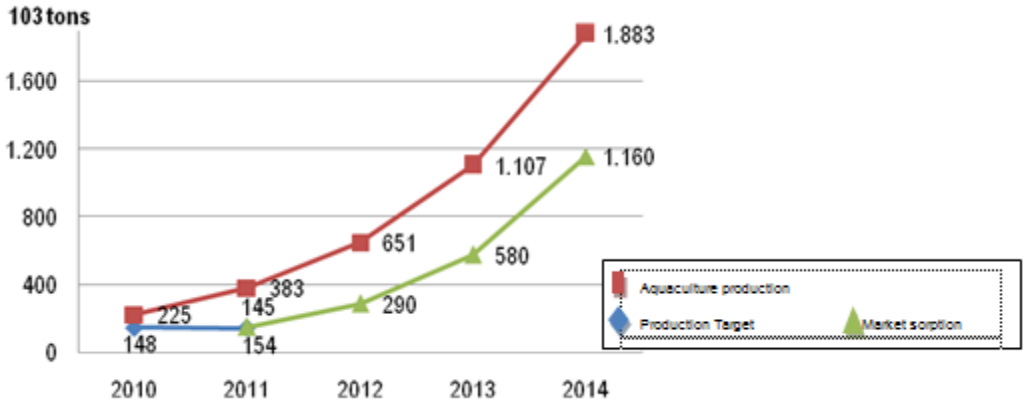

Figure 2. Aquaculture productivity and market sorption of pangasius product.

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METHODOLOGY

The aim of this study is to get several recomendation to support fiheries stakeholders maintain the ascent of Pangasius aquaculture production as raw material of diversification Pangasius product base industry. First step of study was desk study about Pangasius aquaculture, processing development of Pangasius, and production cost calculation of each diversification product. Then, focus group discussion (FGD) was done involving resource persons as key speakers and participants as well. FGD key speakers consisted of some person who has expertise on handling and post-harvest of Pangasius. As FGD participant were researcher which has background in post-harvest fisheries. The result of FGD will cover in three subtances namely: (1) logic estimation for production cost quantitative analisys of Pangasius diversification product; (2) SWOT analisys of ecxisting Pangasius base industry, and (3) ideal integrated Pangasius base industry according to cost production analysis and its implication.

RESULTS AND DISCUSSIONS

Zero waste concept in processing industry can provide profit bigger than main product industry. In Pangasius processing, fillet is main product and solid fase as excess of processing became waste, such as fish head, bones, and skin. The amount of waste ±60% total weight raw material, during zero waste concepts implementation those waste can be by product then processed as fish meal, crackers, and crispy. Products from parcial processing of Pangasius waste in micro and macro scale industry can provide profit and its became more bigger if produced in integrated system with main product (Pangasius fillet). BBP4BKP has been released some processing technologies base on Pangasius as raw material, there are Pangasius bones crackers which bones powder fortificated in crackers formulation as Calsium resources, Pangasius skin crispy, and fish meal (Suryaningrum *et al.*, 2012).

Production cost quantitative analisys of pangasius diversification product.

Pangasius base processing provide intermediet product and ready to eat product as value added of Pangasius base product. It would open a larger market inside or outside Indonesia during fulfill market demand for attractive and efficient product. If all of Pangasius part became raw material for many product, those demand will be completed, especially if each processor integrated. The profit wouldn't be parsial income.

Pangasius processing has been done in Indonesia for some decades, for example Pangasius smoked centre in Kampar – Riau Provence, and it was kind of product that has a minimum waste. This product produce to suplly local market and its financially provide a large of profit. To supporting its development, some standard should been done sich as GHP, GMP, and HACCP approach. Unfortunately it hasn't been done yet, the understanding about implementation of processing standard still minimum and its become a major problem in order to export product. The implementation of those standard can open a larger market including for export to countries that have a similar taste to smoked fish product, i.e. Malaysia and Singapura which noted import Pangasius smoked about 3 tones in 2010 – 2012 (Anon., 2013b).

Tabel 1. Profit Analisys of Pangasius Processing

Product	Raw Material (Tons/Year)	Production (Tons/Year)	Investment (10^6 Rp.)	Bep (Tons)	Roi (Year)	Profit/Year (10^6 Rp.)
Fillet	1.200,0	480	3.000	49,7	1,9	1,6
Fish Meal	668,1	133	2.000	70,6	1,5	1,5
Fish Crispy	49,5	49	345	2,3	1,9	141,0

Fish Bone Crackers	2,4	28	253	7,7	1,1	232,0
Smoked Fish	72	22	1.195	1,3	1,2	71,0

Smoked fish produce in local processor, collected by buyer then distributed the product to many local market around, i.e. Jakarta, Medan, Pekanbaru, Aceh, Padang, dan Batam. Smoked fish processor used traditional technology so its will become a chance to develope the technology with good sanitation and hygiene system which follow food processing standard. Commercial scale of Pangasius smoked industry with 22 tines raw material need Rp. 87.000.000,- and has rate of investment (ROI) in 1,25 years and Rp. 71.000.000,- per years profit (Table 1).

Pangasius fish meat can be raw material for many diversification product, i.e. fillet, surimi, crackers, or shredded. Fresh Pangasius produced 40% yield of fillet, it can processed in parsial industry and 60% waste unprocessed or in integrated industry which fillet become main product and 60% others become byproduct i.e crackers, crispy, and fish meal. Indonesia has 8 units of Pangasius fillet processor in 2012 at Jakarta, Surabaya, and Banjarmasin. In 2013, MMAF built 6 others with vabrication facilities and fishmeal processor at Muaro Jambi, Kampar, Tulung Agung, Banjar, Karawang, and Purwakarta (Anon., 2013c). Fillet industry of pangasius need Rp. 1.000.000.000,- investment in 480 ton/tahun scale of production, it has 1,9 years of rate of investment (Table 1). According to the ascent of aquaculture production and the low market sorption of Pangasius base product, development of integrated Pangasius processing still largely open.

Fishmeal need 93% of fish processing solid waste, more profit will available if skin and bones of Pangasius processing separated and used as raw material of crackers and crispy, the other solid waste still can be used as fish meal raw material. Fishmeal production in Indonesia increasing, 64 tones in 2012, 3.305 tones in 2013, and production number prediction in 2014 is more (Anon., 2012b). in prouction scale estimation about 133 tones waste, fishmeal processing needs Rp. 800.000.000,- investment with rate of investment (ROI) is 1,5 year (Table 1).

Fish skin from the fresh waste can used as raw material of crispy product and fish bones can used as raw material of crackers product for ectra calcium recources. Before those product fried, it has long time to storage because it already dry enough. Those product commonly for local market, if fine packaging and standard of HACCP and GMP followed consistently and legally noted in packaging, export market will largely opened, i.e. Asia, middle-east, US, and EU market. Calculation for crispy product need Rp. 260.000.000,- investment for 49 tones per year production scale and it has rate of investment (ROI) 1,9 years with Rp. 141.000.000,- per year profit (Table 1). Pangasius bones crackers in 28 tones per year scale production need Rp. 238.000.000,- investment. It has profit about Rp. 232.000.000,- per year and rate of investment 1,1 years (Table 1).

Other product made from Pangasius meat are surimi and surimi base. Surimi is intermediet product that commonly produce in home scale production and pangasius meat still not widely used as surimi raw material. Surimi is clean pressed fish meat and washed in few times until a large amount of smell, blood, fat, and pigments minimized. Surimi based product such as nugget, meatballs, sosis, fish cake, and kamaboko can give more value added Pangasius product. Marketing for those product base on Pangasius meat not develop yet in Indonesia. BBP4BKP has develop post-harvest technology of surimi and surimi base product in small scale production (Suryaningrum *et al.*, 2012).

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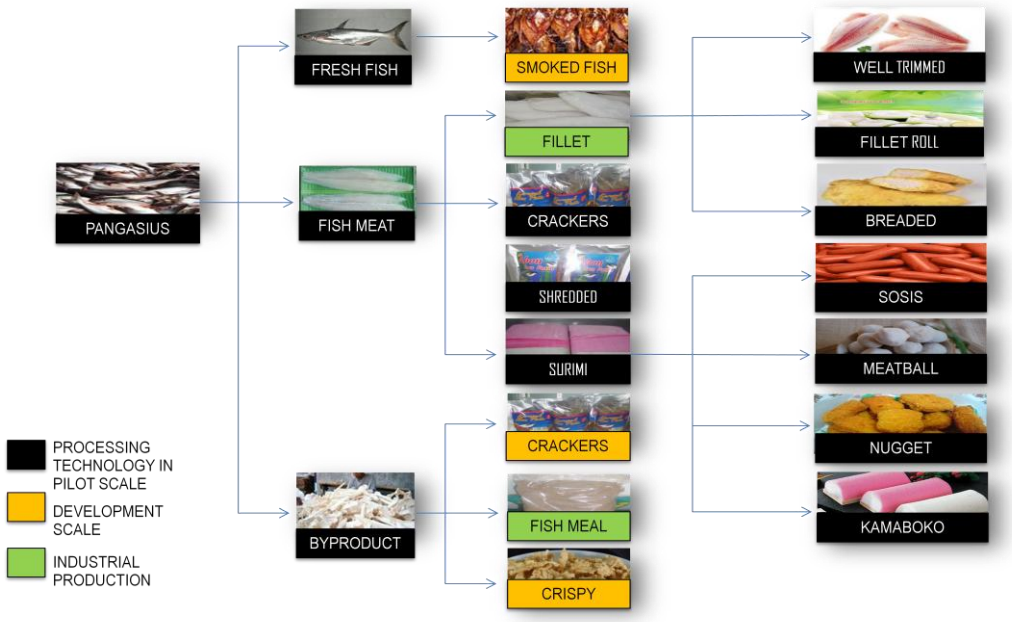

Figure 3. Tree Diagram of Pangasius Processing

Table 2. SWOT analisys resume of pangasius processing.

CATFISH BASE PRODUCT	SWOT INDICATOR	SWOT RESULT
Fillet	Potency	Raw material supply ± 1.100 106 tons/year (2013)
		Simple processing procedure
	Opportunity	Export market: USA, EU, Japan, and UEA for fillet & diversification product
		Aquaculture development
	Weakness	Availability of fillet processing
		Cost production à high selling price compare with Vietnams fillet price
		Capability of human resources
		Regulation support to develop Pangasius industry
		Product quality competitiveness
		Sustainability of raw material as product of aquaculture
Smoked Fish	Potency	R aw material supply
		Simple and applicable processing technology
	Opportunity	Domestic demand relatively high
		Export chance for Malaysia and Singapore market

		Alternative/new job à more employment
	Weakness	More improvement in sanitation & hygiene at smoked fish processor
		Sustainability of raw material as byproduct of fillet industry
		Common packaging
		No standard for product and packaging
		Limitedness on processing infrastructure
		Traditional market system for product export
		Slow movement in market enlargement
Crispy	Potency	+ 5% of total byproduct
		5 aquaculture area with fillet processing development
	Opportunity	Large market
		Similar product still narrow
		Processing technology is available
	Weakness	Sustainability of raw material as byproduct of fillet industry
		Common packaging
		No standard for product and packaging
Fish Bone Crackers	Potency	10 – 20% of total fillet by product
		5 aquaculture area with fillet processing development
	Opportunity	Large market
		Similar product still narrow
		Processing technology is available
	Weakness	Sustainability of raw material as byproduct of fillet industry
		Common packaging
		No standard for product and packaging
Fish meal	Potency	60% of total raw material on fillet processing
		Simple technology processing
	Opportunity	Supply for fish feed material for local formulation
		Fish feed demand increase
		Availability of fresh meal technology
	Weakness	More improvement in human resources capability
		Regulation support for quality and industrial scale production
		No standard for product and packaging

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Another product from Pangasius processing waste is fish oil. Pangasius oil has uniqua characterstic, there are has no hard odor and no strong fish smell, clear colour, contain a number of omega-3 and omega-6 if extracted from fresh waste and well treatment. BBP4BKP still develop the extraction and purification of Pangasius fish oil with Pangasius processing centre at Kampar – Riau province. Hopefully, it will be the first fish oil processing unit in Indonesia used the waste of smoked Pangasius fish processing. Product target is fish oil for ingridient food but calculation for profit analisys still cannot estimated during on going research.

Swot analisys of ecxisting pangasius base processing. SWOT analisys about Pangasius base processing, i.e. fillet, smoked fish, crispy, crackers, and fishmeal, shows that several common problem in developing Pangasius processing in Indonesia. There are sustainability of raw material supply, minimum level in processor capacity building, product competitiveness, uncompleted regulation to support production factors and produk marketing. Potential factor to developing Pangasius processing has strong relation with aquaculture production and simplicity in processing prosedur (Tabel 2). If those problem solved and the industry can designed in integrated system, the opportunity to get a larger market will open, not only for domestic market. Another positif effect of integrated industry is more employement and a better welfare.

Implication of pangasius integrated industry development. There are several implication if Pangasius industry built in integrated system, i.e: Pangasius value added can provide welfare in domestic area, especially micro - middle scale processor; Weather clear and explicit should implemented in order to high efficiency of Pangasius aquaculture and ensure continuously and enough supply of raw material for any diversification product base on Pangasius with affordable price; Minimizing potential lost in parcial production of Pangasius by integrated system production implementation; Minimazing environmental contamination from parcial production of Pangasius fillet industry. Export opportunity for Pangasius diversification products; Human resources enforcement and porst-harvest dissemination of Pangasius with GMP implementation. Corporation enforcement to support wide area of marketing (local and export).

CONCLUSIONSS

Quantitative financial study shows that there several recommendation are proposed, i.e.:
culture system development to get sustainable raw material supply for processing unit, establishment of a model of integrated processing which implemented GMP rule to get qualified product, integrated processing units to get more profit, a better system of export mechanisms so that *Pangasius* product can be absorbed maximally by any market.

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