Market Demand Analysis of Prawn and Milkfish for Cultivation Business development in Malaka Regency, West Timor-Indonesia

By:

Franchy Ch. Liufeto[1,2*], Nuddin Harahab[3], ArningWilujeng Ekawati[3], Soemarno[4]

[1]*Doctoral Program of Fisheries and Marine Science, Faculty of Fisheries and Marine Science, University of Brawijaya, Malang, Indonesia*
[2]*Faculty of Fisheries and Marine Science, University of Nusa Cendana, Kupang-East Nusa Tenggara, Indonesia*
[3]*Faculty of Fisheries and Marine Science, University of Brawijaya, Malang, Indonesia*
[4]*Faculty of Agriculture, University of Brawijaya, Malang, Indonesia*

Abstract: *This research was conducted to find out the market demand of prawnandmilkfish in West Timor and East Timor/Timor-Leste. The West Timor market demand survey was organized by involving 28 fish merchants/seafood restaurant managers which were spread across 6 cities in West Timor. Furthermore, the demand in East Timor was based on fish trade flows data at the Indonesia - Timor-Leste border post. The matrix tabulation method was employed for calculating the milkfish and prawn consumption per capita population of Timor-Leste, and the projection of milkfish and prawn demand in Timor-Leste region in the year of 2014-2025 which was based on the projected population growth of Timor region. The results indicated that prawn demand was spread within 6 urban markets in the region of Timor. Meanwhile, milkfish was highly demanded in the local market. East Timor's prawn market demand forecast in the year of 2014-2025 reached 1,359.87 tons. Milkfish demand on the local market was up to 1,274.45 tons. The number of prawn demand was much higher than the production at local level. Therefore, prawn could be considered as the main commodity choice for the development of aquaculture in Malaka.*

Keywords: *Market demand, milkfish, prawn, aquaculture development*

I. INTRODUCTION

Malaka Regency is one of the new autonomous regions in East Nusa Tenggara Province (NTT), which has direct borders with the Democratic Republic of Timor-Leste (RDTL) and Australia. Based on the written law number 43 in 2008, this area is responsible for conducting a socio-economic development for the welfare of its territory. To achieve this goal, the aquaculture sector is one of many sectors that can be developed, especially brackish water ponds (BPS NTT, 2013, BPP NTT, 2011, DKP Belu, 2012, Widiati, 2007; ATSEF, 2006 and Liufeto, 2006).

The effort to develop aquaculture in Malaka requires considerable attention due to the existence of various obstacles such as the low ability of human resources and technology in cultivation, as well as the limited market information related to market opportunity and the commodity information required by market. This condition should not be allowed since the development of prawn farming can support the growth and economic development of border areas, as stated by Nugroho and Dahuri (2012), Bappenas (2011); FAO (2006a); FAO (2006b); FAO (2004); FAO (2003); Barbier and Cox (2002); Tacon and Foster (2001) Forster (2000); Francisco (2007); Dey et al. (2003), and Okorie (2003). Cultivation can support the economic development of the border area because it can possibly become the backbone of the world's demand for seafood. Furthermore, it may also contribute in increasing public income and international trade for the welfare of the community.

II. LITERATURE REVIEW

2.1   Fishpond Cultivation

Fishpond is artificial pond-shaped wetland containing brackish water or seawater in coastal areas which is used to cultivate brackish water animals (Wibowo.et al., 1996). According to the Directorate General of Cultivation (2002), aquaculture is the raising activity and growing aquatic biota in fresh/brackish water pond within a certain period of time. It employs harvesting to get the results.

According to Anderson (2007), Francisco (2007) and Nash (1995), an important step in the development of cultivation is to identify species that meets the market demand. Leung et al. (2007) stated that in a cultivation development effort, the following economic aspects are important to be part of consideration, such as: the selection of species with a potentially strong market demand; the selection of species with strong domestic and export markets; the production of the species at a logical cost.

2.2   Cultivation Development

The factors affecting the development of cultivation are composed of internal factor and external factor. First, the internal factors include species selection and cultivation system. Second, the external factors deal with environmental factors (physical, chemical, biological), social factors and market demand for certain species at local, regional and national as well as international levels (Nash 1995).

Anderson (2007) mentioned that the phenomenon that arises in Asia as the leader of fish producers in the world is shown by the growth of fish production in Asia. The growth of the cultivation sector is accelerating in some countries (China, Thailand, and Malaysia) due to the abundance of aquatic environment and the rapid absorption of new cultivation technology. The fish demand and the presence of infrastructure and institutions in each country also contribute to the realization of potential cultivation in a particular region. The results of Tajerin and Mohammad's (2004) research indicate that the developed and newly industrialized countries such as South Korea, Taiwan, Hong Kong-China and Singapore can become a strong economic country due to the tight competition of fish exports. According to Barbier and Cox (2002), prawn exports significantly increase foreign exchange number for the countries that produce it.

Ahmed et al. (2004), Garcia et al., (2004), and Huang et al., (2004) explained that 54% of the total cultivation production in some Asian countries is contributed from freshwater cultivation which is followed by 24% of brackish water cultivation and last, the sea cultivation that reaches 22%. Nash (1995) divides the cultivation system into 3 basic systems categorizations when he considers the intensity of production. They are extensive, semi intensive and intensive system.

According to Boers (2001), an intensive prawn pond can provide a high production of prawn with shorter operational time than the extensive traditional pond cultivation. The criteria and technology applied in prawn culture can be seen in Table 2.

Table 2. Prawn Cultivation Criteria and Technology

Criteria	Cultivation Technology		
	Intensive	Semi Intensive	Traditional
Feed	Complete formula feed	Natural and additional feed	Natural
Water Management	Pumps and aerations	Tidal and pump	Tidal
Solid Distribution (tail / ha / Planting Season)	150,000-500,000	15,000 -150,000	1000-15,000
The size of the pond plot (ha)	0.1-1	1-5	3-20
Production (ton / Planting Season)	2-20	0.5-5	0.1-0.5
Length of Farming (month)	3-4	3-4	4-6
The Impact of Cultivation	Very high	Moderate – high	Insignificant

Source : CP Prima (2002)

2.3 Market Demand towards Aquaculture Commodity

The study of fish demand conducted in 9 Asian countries by World Fish Center from 2001-2004 (M.M. Dey and Garcia, unpublished report) reported that fish as a source of animal protein, constitutes 13% of total household expenditure after meat. In general, fish consumption in urban areas is found to be higher than in rural

areas. Fish buying expenses are higher within households that have higher incomes than those who have lower incomes, with an average of 15% and 13%.

According to Dey et al., (2003), one of the perks of the cultivation sector in Asia is the export orientation. According to Ahmed et al., (2003) countries that acquire food deficits such as Vietnam, Indonesia, Thailand and Malaysia contribute more than 20% to the total amount of fish trade. In these countries, fish exports are equivalent to approximately 42% of their food imports.

Theoretically, demand is derived from the consumption theory in which consumers want to ask for an item at a certain price because it is considered to be useful for them (Hanafie, 2010). The growth of cultivation sector within a state will remain constrained if the market is limited only at local level, mainly because it has little economic importance. On the other hand, the demand at regional, national and export levels stand for a much greater risk since it has to be able to maintain the stability of the volume of products sold. The producer's choice at this level can be in form of: producer cooperation, producer organization, or owners of core companies are forming an integrated company.

III. RESEARCH METHOD

This research belonged to explanatory research by utilizing survey method in which the survey was essentially a method to find out about what was happening in people's life specifically and realistically. Survey research method according widi(2010) was a research effort by collecting information or data through interview or questionnaire.

3.1 Data Collection

This research belonged to explanatory research by utilizing survey method in which the survey was essentially a method to find out about what was happening in people's life specifically and realistically. Widi's survey research method (2010) wan order to get an idea of the market demand for milkfish and prawn, market demand survey was conducted in seafood restaurants and fish and prawn collectors in East Timor's urban markets which were spread across Kupang, Soe, Kefa, Atambua, and Malaka. Meanwhile the milkfish and prawn data entered East Timor was collected from East Nusa Tenggara Fish Quarantine Station and Fish Quarantine Station data located at Motaain and Belu; the border between East Nusa Tenggara -East Timor.

The secondary data used in this research were as follows: (a) the trading flow of fishery commodities especially prawn and milkfish to East Timor for the last 4 years; (b) the data of prawn catching production in Malaka and Kupang Regency as the production areas of Timorese land prawn, and (c) the population of Timorese land for the last 5 years from various related institutions namely: the Office of Marine and Fisheries of Malaka, the Office of Marine and Fisheries of Belu, Belu and MalakaCentral Statistics Agency, Central Statistics Agency of East Nusa Tenggara Province, last the East Kalimantan Fish Quarantine Agency and Border.

The data of stakeholder support towards the development of aquaculture was carried out by conducting a stakeholder perception survey toward the cultivators, fishermen, collectors, bureaucrats and legislators, religious figures and community leaders in Malaka as well as those who were following the history of aquaculture activities in Malaka. Those respondents were asked to fill in the questioner data on cultivation development that also covered the level of education; the hope of cultivation development; the enforcement of rules in aquaculture; the role of aquaculture ponds; stakeholders' support toward the cultivation and safety of aquaculture products; the environmental concerns; market and consumer demand; the sustainable cultivation development; the comparative advantage of aquaculture in Indonesia with the neighboring counties, such as East Timor and Australia. The numbers of respondents involved in this survey were 71 people.

Data collection based on the questionnaire was done by performing in depth interview. Furthermore, field observation was applied to control the truth of data information. Selection of respondents was conducted for those who were considered to be really understood and deeply involved in conducting pond farming. The number of total respondents for cultivators / fishermen reached up to at least 20% of the total cultivators in Wewiku. Then, the sub-district community leaders, educators, regional leaders, and religious leaders from each region were selected only one person who had adequate competencies such as experience, reputation, position, and cultivation development knowledge.

3.2 Data Analysis

The analyses of Timor-Leste region's market demand for prawn and milkfish were including the amount of sold prawn and milkfish demand in Timor-Leste market through the utilization of data analysis and cross tabulation. Meanwhile, the projection of market demand for prawn and milkfish was calculated based on the projected population growth in the territory of Timor Region within the period of 2014-2025.

The analysis of minimum demand of West Timor market for prawn and milkfish was calculated based on the market demand survey of milkfish and prawn at seafood restaurants and markets which were spread across five urban areas of Kupang, Soe, Kefa, Atambua and Malaka located at mainland West Timor. Next, the supporting data on the number of milkfish and prawn traded to Timor Leste (from year 0f 2010 – 2014) was received from the Fish Quarantine Post at the Motaain Border.

The projection of East Timor market demand for milkfish and prawn was carried out through the following steps: describing milkfish and prawn production data from 2008-2013 in West Timor; calculating the possibility of milkfish and prawn demand in West Timor with the data supporting of milkfish and prawn trade flows to East Timor during 2010 -2014; predicting the rate of milkfish consumption and prawn per capita; and forecasting the demand of milkfish and prawn market for the year of 2014-2025 based on projected population growth of Timor region with geometric population growth rate calculation $P_t = P_o (1 + r)^t$.

IV. RESULT AND ANALYSIS

4.1 Real Demand and Prawn Production in Malaka

A market demand survey was conducted for 28 seafood restaurants, and prawn and fish sellers in the urban market which were spread across the mainland of Timor. The data are presented as in Table 1.

Table 1. The Demand Overview of West Timor and East Timor Regional Market in 2014

Location	Fulfilled Demand (ton)	
	Prawn	Milkfish
Kupang	9.144	-
SoE	0.72	-
Kefa	1.56	-
Atambua	36.127	-
Malaka	9	576.8
Timor Leste	1.132	0.563
Total Demand	57.683	
Average Production Per Year	52	577.5
Lack of natural production (tons)	5.68	-

Table 1 showed that prawn demand in West Timor land reached 57.68 tons or 98% of the total market demand for prawn market. It consisted of the region of Timor up to East Timor. Meanwhile, there was no demand for milkfish in the restaurant or the Timorese mainland market. These results indicated that prawn demand was stronger and more prevalent in cities in West Timor than the milkfish demand that was indicated only by the local market of Malaka as a producer of milkfish cultivation.

The results of interviews with the managers of seafood restaurants and sellers of prawn and fish marketed informed that the amount of natural prawn production was very limited between July-December, while the needs and consumer demand tend to be stable for each week of every month with the price reached IDR 100,000, - per kg. Referring to the above assumptions, the minimum demand for prawn in the market of the Timor region for one year was calculated 2 times of the fulfilled prawn demand, which was about 115.37 tons of prawn per year.

The production data in Table 2 displayed the total average of milkfish production in 2014 was 577.5 tons. The demand for milkfish in Malaka local market was 0.998 times of the average milkfish production in Malaka. Prawn production in Malaka was 52 tons / year, while the demand met for the Timorese market within one year was 115.37 tons. The figure represented 2.21 times of the average prawn production from Malaka. The number of prawn and milkfish production in Malaka Regency can be seen in Table 2 and Figure 1.

Table 2. Prawn and Milkfish Production from Malaka Regency in 2008-2013

Year	White Prawn (ton)	Giant Tiger Prawn (ton)	Number of Prawn (ton)	Total Capture Production (ton)	Milkfish (ton)	Total Cultivation Production (ton)
2008	72.5	11.8	84.3	1592.7	345.1	353.7
2009	36	4.3	40.3	1762	350.3	627
2010	30.4	4.5	34.9	1845	627	654
2011	44.9	5.1	49.9	2580.3	626.5	644.2
2012	45.8	5.2	50.9	1914.2	722	766.8
2013	46.7	5.3	52	1952.5	794	832.2
Total	340.4	117.4	312.3	11646.6	3464.8	3877.9
Max	72.5	60.5	84.3	2580.3	794	832.2
Min	21.9	4.3	34.9	1592.7	345.1	353.7
Mean	41.8	13.5	**52**	1941.1	**577.5**	646.3
Standard Deviation	14.5	2.9	17.2	338.2	188.8	164.4
% Production	2.2	0.7			89.3	

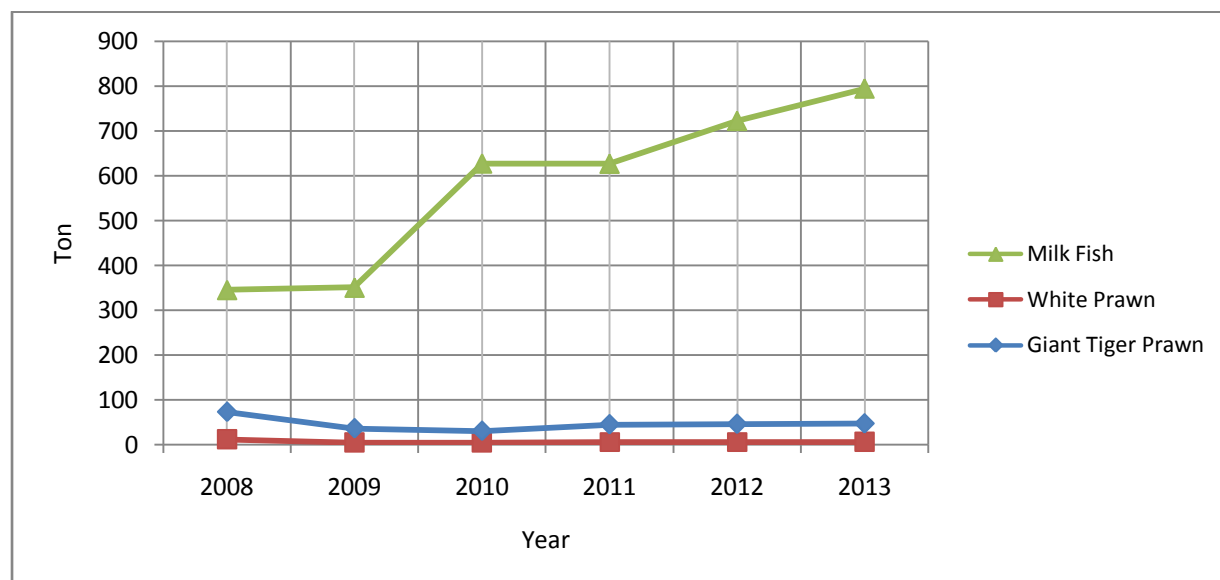Source   : BPS Belu (2008-2013); BPS Malaka (2014)

Figure 1. Prawn and Milkfish Production in Malaka in 2008-2013

4.2 The Milkfish and Prawn Trade Flow to East Timor during 2010-2014

The data on trade flows of prawns and milkfish to Timor-Leste during 2010-2014 exhibited that the average of prawn and milkfish supply decreased by 0.03% and 0.001% per year respectively. Although the supply of milkfish and prawn to Timor-Leste had been decreasing, in Table 3 and Figure 2, it was also disclosed the amount of prawn trade to Timor- Leste which was much greater than the number of milkfish trade.

Table 3. Trade Flows Data of Prawns and Milkfish Trade to Timor-Leste

Year	Milkfish (ton)	Prawn (ton)	Milkfish Expansion (%)	Prawn Expansion (%)
2010	1.548	17.262	0	0
2011	3.157	10.727	-0.065	0.016
2012	1.205	10.521	-0.002	-0.001
2013	1.377	2.261	-0.082	0.001
2014	0,.563	1.132	-0.011	0.008
Total	7.85	41.903		
Average	1.57	8.381	-0.0322	-0.001

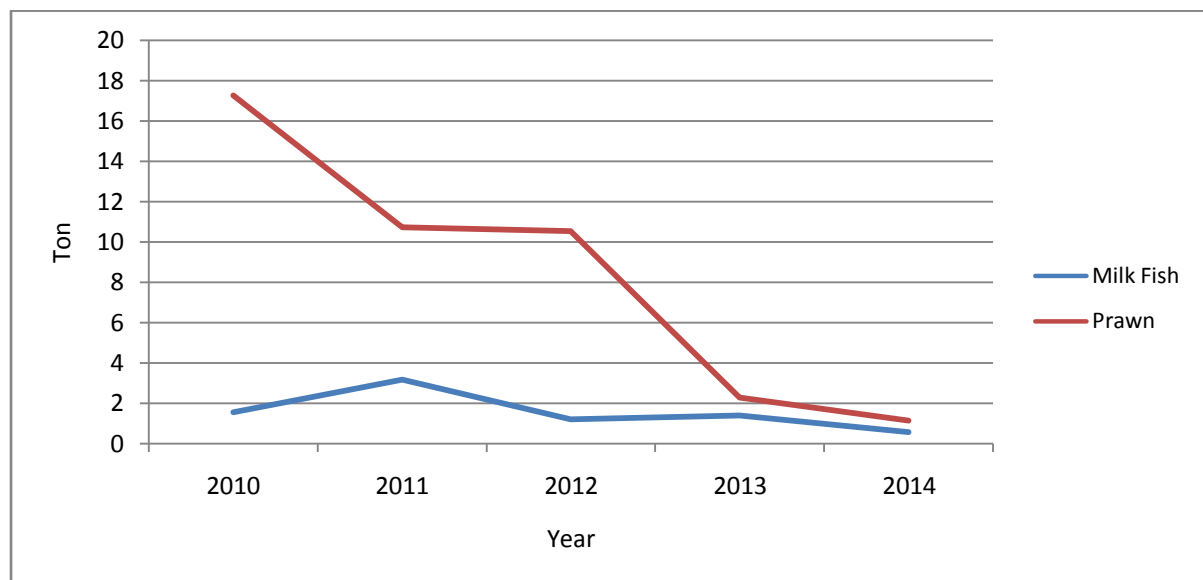Source: Fish Quarantine Center Motaain (2015)

Figure 2. Graph of Milkfish and Prawn Supply to Timor-Leste

4.3 The Prediction of Milkfish and Prawn Demand through the Timor's Population Projection

The data of milkfish and shrimp trade flows to Timor-Leste from the Border Fish Quarantine Post in Motaain revealed that the origin of shrimp traded to Timor-Leste was not solely from Malaka but also from Kupang Regency as one of the shrimp producers in the region of Timor.

Based on this information, the projection of shrimp demand in the territory of Timor Region was completed by calculating the production of white shrimp and tiger shrimp originating from Kupang and Malaka Regency, as shown in Table 4 below.

Table 4. Giant Tiger Prawn and White Prawn Production from KupangandMalakaduring 2008-2013

Year	Giant Tiger Prawn		White Prawn	
	Kupang	Malaka	Kupang	Malaka
2008	1.75	11.82	59.8	72.45
2009	1.75	4.3	59.8	35.99
2010	1.85	4.45	61.74	30.43
2011	1.63	5.06	53.31	44.86

Year				
2012	1.54	5.16	50.62	45.76
2013	0.36	5.28	1	46.69
Production Growth Rate (%)	0.041	0.089	0.003	0.129

Source: BPS KupangdanBelu (2009-2014)

The calculation of projected white prawn and giant tiger prawn production in 2014-2025 was based on development data of giant tiger prawn and white prawn production from Kupang and Malaka Regency as shown in Table 4. The results of the calculations are presented in Table 5 and 6.

Table 5. Projection of Giant Tiger Prawn Production in Kupang and Malaka for Year 2014 - 2025

Regency	Average Production Year 2013 (ton)	Production Growth Rate of Giant Tiger Prawn	Year of Projection (ton)							
			2014	2015	2016	2017	2018	2019	2020	2025
Kupang	1.48	0.041	1.421	1.364	1.309	1.257	1.207	1.158	1.112	0.907
Malaka	6.01	0.089	5.475	4.988	4.544	4.140	3.771	3.435	3.130	1.964
Total	7.49		6.896	6.352	5.853	5.397	4.978	4.594	4.242	2.871

Source : Kupang and Malaka Regency in Numbers (2009-2014) (processed data)
Notes : Calculation of Prawn Production Projection was from:
Base Year Production 2013 * (1 – growth rate)

Table 6. Projection of White Prawn Production in Kupang and Malaka for Year 2014 - 2025

Regency	Average Production Year 2013 (ton)	Production Growth Rate of White Prawn	Year of Projection (ton)							
			2014	2015	2016	2017	2018	2019	2020	2025
Kupang	47.71	0.003	47.57	47.42	47.28	47.14	47.00	46.86	46.72	46.02
Malaka	47.38	0.129	41.22	35.86	31.20	27.14	23.62	20.55	17.87	5.10
Total	95.09	0.13	88.79	83.29	78.48	74.28	70.61	67.40	64.59	51.12

Source : Kupang and Malaka Regency in Numbers (2009-2014) (processed data)
Notes : Calculation of Prawn Production Projection was from:
Base Year Production 2013 * (1 – growth rate)

The projected number of white prawn and giant tiger prawn production from Kupang and Malaka in 2013-2025 is presented in Table 7.

Table 7. Projection of Prawn Production (White and Giant Tiger) in Kupang and Malaka Year 2014 - 2025

Data	Year								
	2013	2014	2015	2016	2017	2018	2019	2020	2025
Prawn Production (ton)	102.58	95.68	89.64	84.34	79.68	75.59	72.00	68.83	54.00

The prediction of market demand for milkfish and prawn during the year of 2014-2025 was based on the calculation of prawn and milkfish per capita numbers multiplied by population of Timor region. To calculate the population growth of Timor region, the projected population growth of Timor region was based on the geometric population growth formula $Pt = Po (1 + r) t$ with the basic data of Timor's region population year of 2009-2013 as presented in Table 8.

Table 8. Average of East Region Population Growth Rate in 2009-2013

Year	Total Population				
	Kupang City	Kupang	TTS	TTU	Belu/Malaka
2009	291.749	297.402	435.039	227.147	382.375
2010	336.239	304.548	441.155	229.803	354.676
2011	342.892	310.573	448.693	232.051	357.650
2012	365.348	321.384	449.881	234.645	362.610
2013	378.425	328.688	451.922	240.686	374.381
Population Growth Rate	0.324	0.276	0.260	0.265	0.245
Average	0.274				

Source: Statistics Indonesia of East Nusa Tenggara, 2010-2014

The calculation of the average rate of prawn consumption per capita population of the West Timor region was achieved by determining in advance the amount of prawn demanded by the West Timor region market. In this case, the average natural prawn production in 2014 which was 95.68 tons / year minus the average of trade flowof prawn to Timor Leste of 8.381 ton / year so that the average of prawn demand reached by population of West Timor region was 87,299 ton.

The rate of prawn consumption per capita of West Timor population was made by dividing the fulfilled prawn demand (for 6 months natural prawn production) in 2014. It meant that 87.299 tons divided by population of East Timor region in 2013 which was 1,774,102 people so that the average prawn consumption rate of West Timor was 0.0492 kg / capita / 6 months. Meanwhile, the number of prawn trade flows to East Timor was calculated at 8.381 tons. Then, the number would be divided by the total population of East Timor in 2013 which was 1.17 million so that the demand for prawn to Timor-Leste from NTT met 0.00071 kg / capita / 6 months.

In order to obtain a description of prawn demand in the region of Timor for 1 year, the calculation of prawn demand per capita for 6 months was multiplied by the number of prawn demand for the region for a year (2.21 tons). The number was obtained from the sharing number of prawn demand in 2014 (115.37 tons) that later on would be divided with the average production of Malaka's prawn (52 tons). This consideration took place due to the dominant existence of Malaka's prawn than the Kupang's Prawn on the market.

Table 9 presented the projection of population growth; the prediction of prawn needs; and the probability of the prawn number that could be cultivated.

Table 9. Projection of Prawn Demand based on the Numbers of Regional and Timor Population

Projection	Base Year 2013	Year							
		2014	2015	2016	2017	2018	2019	2020	2025
Regional Citizen (inhabitant)	1,774,102	2,255,666.05	2,864,695.884	3,638,163.772	4,620,467.99	5,867,994.348	7,452,352.822	9,464,488.084	31,269,125.36
Fulfilled prawn demand (kg)	87029.64	110527.64	140370.10	178270.02	226402.93	287531.72	365165.29	463759.92	1657263.64
Prawn demand in 6 months (ton)	87.03	110.53	140.37	178.27	226.40	287.53	365.17	463.76	1657.26
Prawn demand in 1 year (ton)	**191.47**	**243.16**	**308.81**	**392.19**	**498.09**	**632.57**	**803.36**	**1020.27**	**3645.98**
Timor-Leste Citizen (inhabitant)	1172390.00	1206389.31	1241374.60	1277374.46	1314418.32	1352536.45	1391760.01	1432121.05	1652177.12
Timor-Leste demand (kg)	8323.97	8565.36	8813.76	9069.36	9332.37	9603.01	9881.50	10168.06	11730.46
Prawn demand in 6 months (ton)	8.32	8.57	8.81	9.07	9.33	9.60	9.88	10.17	11.73
Prawn demand in 1 year (ton)	**18.31**	**18.84**	**19.39**	**19.95**	**20.53**	**21.13**	**21.74**	**22.37**	**25.81**
Regional demand and Timor-Leste (6 months)	95.35	119.09	149.18	187.34	235.74	297.13	375.05	473.93	1668.99

Regional demand and Timor-Leste (1 year)	209.78	262.00	328.20	412.15	518.62	653.70	825.10	1042.64	3671.79
Prawn production (ton)	102.58	95.68	89.63	84.33	79.68	75.59	71.99	68.83	53.99
Production shortage (ton/6 months)	7.23	23.41	59.55	103.01	156.06	221.54	303.06	405.10	1615.00
Production shortage (ton/year)	107.20	166.32	238.57	327.82	438.94	578.11	753.11	973.81	3617.80

Notes:

*1). Projection of Regional Citizens = Citizens in Base Year 2013 * $(1+0.27)^n$

2). Prawn Demand from TB Region= Prawn consumption average 0.0492 citizen (inhabitant)

3). Prawn Demand from Timor-Leste = Prawn consumption average 0.039 Timor-Leste citizens

*4). 1 year demand= 2.2 x demand for 6 months

*5) Production shortage = Demand − nature production

Based on data from Table 9 above, the recapitulation of demand and prawn production opportunities was shown in Table 10 below.

Table 10. Prediction of Prawn Demand from Regional and Timor-Leste in 2013 - 2025

	Prawn Demand (ton)		Total Demand(ton)	Nature Supply (ton)	Production Shortage (ton)
Year	Regional	Timor-Leste			
2013	191.46	18.31	209.77	102.58	107.19
2014	243.16	18.84	262	95.68	166.32
2015	308.82	19.39	328.21	89.63	238.58
2016	392.19	19.95	412.14	84.33	327.81
2017	498.09	20.53	518.62	79.68	438.94
2018	632.57	21.13	653.7	75.59	578.11
2019	803.36	21.74	825.1	71.99	753.11
2020	1020.27	22.37	1042.64	68.83	973.81
2025	3645.98	25.81	3671.79	53.99	361.8

Meanwhile, the projection of milkfish production in Malaka regency was obtained by calculating the average growth of milkfish production in Malaka over the period of 5 years from 2008-2013 as in Table 11.

Table 11. Milkfish Production and Production Average in Malaka during 2008-2013

Year	Total Production		Production Increase (ton)
	Milkfish	Cultivation	
2008	345.05	353.73	0
2009	350.25	627	5.2
2010	627	654	276.75
2011	626.5	644.2	-0.5
2012	722	766.81	95.5
2013	794	832.2	72
Total	3464.800	3877.940	448.950
Mean	577.467	646.323	64.136
Standard Deviation	188.828	164.387	107.070
Average of Increase (%)			0.111

Table 12 depicted the average of milkfish export increase to Timor Leste based on the trading growth rate.

Table 12. Average of Milkfish Export Value from East Nusa to Timor-Leste in 2010-2014

Year	Average of Milkfish Export (Ton)	Production Increase
2010	1.548	0
2011	3.157	1.609
2012	1.205	-1.952
2013	1.377	0.172
2014	5.749	4.372
Mean	2.6072	0. 8402
Production (%)	0.00145	

The production and demand for milkfish based on the projected population growth of Malaka was presented in table 13 below by looking at local milkfish demand with milkfish production growth rate that reached 0.111% and also the milkfish trade rate to Timor-Leste (0.8402%).

Table 13. Average Prediction of Milkfish Production in Malaka Year 2015 - 2035

Demand Projection / Year	2013	2014	2015	2016	2017	2018	2019	2020	2025
Milkfish Production (ton)	577.5	641.6	712.8	791.9	879.8	977.5	1086	1206.5	2042.2
Export Demand (ton)	2.6072	2.611	2.6148	2.6186	2.6224	2.6262	2.63	2.6338	2.6529
Demand from Malaka (version 1) (ton)	575.0	639.0	710.0	789.0	877.0	975.0	1083.0	1204.0	2040.0
Malaka Citizens	171079.0	173033.0	175009.0	177007.0	179029.0	181073.0	183141.0	198293.0	209877.0
Prediction of Milkfish Demand based on Population (Kg)	577460.1	584055.6	590725.4	597469.4	604294.5	611193.8	618174.1	669318.2	789960.2
Prediction of Milkfish Demand based on Population (ton)	577.5	584.1	590.7	597.5	604.3	611.2	618.2	669.3	790.0
Local Demand from MalakaCitizens (version 2)	574.9	581.4	588.1	594.9	601.7	608.6	615.5	666.7	787.3

Notes:

Milkfish Production	= Average of production increase 0.111 x milkfish production in 2013
Average of Milkfish Export	= 0.00145 * milkfish production in 2013
Local Consumption Version 1	= Milkfish Production – Export Average
Malaka Citizens	= base year of 2013 was 171,079 with growth rate by 0.01142/year
Prediction of Milkfish Demand	= Average of Milkfish Consumption from Malaka (3.375 kg/capita/year) x total population
Local Consumption Version 2	= Demand Prediction based on Population – average of export

The factual information regarding prawns and milkfish demand in the region of Timor has not existed yet, so this data is expected to be able to provide preliminary information in seeking the priority opportunities in the development of aquaculture fishpond especially for prawn and milkfish commodities in Malaka. Diana (2009) said that population growth and increasing individual consumption rate indicate that seafood products are gradually becoming more important than just as an additional food source. It is in relation to what Zainal et al.(2017), FAO (2006) has shown that world seafood demand is projected to be multiplied. It is due to the drive of population growth, intense urbanization (often associated with increasing number of animal's protein consumption) and rising incomes.

The fact revealed that milkfish demand which was only favored in Malaka's local market was not significant. It was only IDR 30,000 / kg with a small risk because not all commodities were harvested at the same time and yet harvesting was not organized at any time. On the other hand, prawns create an opportunity to be developed as a leading commodity for the development of aquaculture in Malaka since it has high selling

value with high demand rate dispersed across all regency cities in the Timor region. Nash (1995) explained that in remote rural areas, the structure of product marketing is often very traditional and the farmers simply adapt to existing local market systems by providing cheap fish to keep them available to local people with low purchasing power. This situation can still be found in Malaka in which milkfish marketing only meets the local market need and sometimes, the trading process even employs barter system.

Furthermore, Nash (1995) said that the cultivation development in a region or country will always be limited if its development is constrained to local level with little economic interest. To meet the needs of the regional market, all cultivated organisms must be harvested at the same time, for immediate processing and sale. Consumers are centrally located in larger urban centers or into institutional markets with large volumes of potentially feasible products. Consumers in this market have more purchasing power and demand more choices, so the consequence is the cultivators should be able to produce products with additional value and to provide a variety of species according to local technical skills and environmental resources.

Leung et al. (2007) explained that the economic aspect required to be considered in the development of cultivation is to select the correct species. It should have large market potentials with strong demand in the available market segments. It is expected also on the following aspects: financially feasible to be cultivated; having potential domestic and export markets; open to an opportunity of a value-added product; having a high selling price; and can be produced at a logical cost. FAO (2006) assures that many policies aimed at the employment of cultivation in the role of improving food security, in addition to the concentration and attention to bring in foreign exchange and encourage economic growth.

Moreover, Anderson (2007) also implies that the development of sustainable cultivation is also an economical sustainable cultivation. The other type of sustain abilities, such as socio-political sustainability and environmental sustainability, will not be relevant if there is no economic sustainability. According to FAO (2010), the forces that drive prawn cultivation are: the limited and unstable of natural prawn production; the value of profits from prawn farming; and the high demand of prawn in global markets. Next, the international trade in fishery products in most developing countries aims to promote economic growth and poverty alleviation (Diana, 2009). According to Rivera-Ferre (2009) prawn is the most widely traded seafood products in the international market. In 2008, prawn farming is ranked 2nd in the world for production value category and is placed as 4th for the worldwide production number (FAO, 2010b).

V. CONCLUSION

Market demand of prawn and milkfish in West Timor and East Timor/Timor-Leste has been predicted very high.The results indicated that prawn demand was spread within 6 urban markets in the region of Timor. Meanwhile, milkfish was highly demanded in the local market. East Timor's prawn market demand forecast in the year of 2014-2025 reached 1,359.87 tons. Milkfish demand on the local market was up to 1,274.45 tons. The number of prawn demand was much higher than the production at local level. Therefore, prawn could be considered as the main commodity choice for the development of aquaculture in Malaka.

REFERENCES

[1]   Abidin, Z. NuddinHarahab, Boimin. (2017). Analysis of Marketing Mix on Purchase Decision of Softboned-Milkfish "Mrs. 30 Jeni" in Malang City of East Java. *ECSOFiM: Economic and Social of Fisheries and Marine Journal.* Vol.5 (1): 30-41 Available online at http://ecsofim.ub.ac.id/

[2]   Ahmed M., M.A.Rab., M.M. Dey,2003. Changing structure on fish supplydemand and trade in developing countries *in*Mahffuzudin Ahmed, Madan M. Dey., Yolanda Garcia, 2007. The role of species and growth of aquaculture in Asia : Need and prospect In Leung *et al.,.,* 2007. *Species and system selection for sustainable aquaculture*, Blacwell Publishing IOWA USA.

[3]   Ahmed M., M.M. Hossain, N.M Humayun., M.B Hossain., M.S Haque., R.K Talukder., dan S. Alam, 2004. Final country report :Bhangladesh. Strategies and options for increasing and sustaining fisheries and aquaculture production to benefit poor household in Asia. Project *in*Mahffuzudin Ahmed, Madan M. Dey., Yolanda Garcia, 2007. The role of species and growth of aquaculture in Asia : Need and prospect In Leung *et al.,.,* 2007. *Species and system selection for sustainable aquaculture*, Blacwell Publishing IOWA USA.

[4]   Anderson 2007. Sustainable aquaculture : what does it mean and How do we get there ? *In* Leung *et al.,.,* 2007. *Species and system selection for sustainable aquaculture*, Blacwell Publishing IOWA USA Anderson

[5]   BPS- *Central Bureau Statistics Belu Regency*, 2012. Belu Regency in Figure.

[6]   Barbier, E.B danCox,M. 2002. *Economic and demography factors affecting mangrove lloss in the coastal provinces of Thailand,* 1979-1996. Ambio, (31) : 351-357.

[7]   Boers, 2001. *Sustainable coastal aquaculture. The economic and environmental rehabilitation of traditional aquaculture ponds at Sinjai, South Sulawesi, Indonesia.* Collaborative Environmental Project In Indonesia, Jakarta Indonesia. 64 pp.

[8]   Dey and Ahmed, 2005. *Aquaculture – Food and livelihood for the poor in Asia : A brief overview of the issues.* Aquaculture economic and management 9(1-2) : 1-10 *in*Mahffuzudin Ahmed, Madan M. Dey., Yolanda Garcia, 2007. The role of species and growth of aquaculture in Asia : Need and prospect In Leung *et al.,* 2007. Species and system selection for sustainable aquaculture, Blacwell Publishing IOWA USA.

[9]   Department of Marine and Fisheries Belu, 2012. *Report on Assessment and Determination of Minapolitan Area of Belu Regency.*

[10]   Diana, J.S., 2009. *Aquaculture production and Biodiversity Conservation. BioSciense* (59) : 27-38.

[11]   Directorate General of Aquaculture, 2002. *Principal thoughts of Coastal Management's draft law*. Jakarta

[12]   FAO, 2003. *Fisheries statistic. Food and Agriculture Organization of the United Nations, Rome Italy*. ftp://ftp.fao/org/docrep/fao/009/a0597e/a-597e.pdf*in*Mahffuzudin Ahmed, Madan M. Dey., Yolanda Garcia, 2007. The role of species and growth of aquaculture in Asia : Need and prospect *In* Leung *et al.,*., 2007. Species and system selection for sustainable aquaculture, Blacwell Publishing IOWA USA.

[13]   FAO, 2004. *The State of world Fisheries and Aquaculture* 2004. Fisheries Departement, Food and Agriculture Organization of the United Nations. Rome Italy

[14]   FAO, 2005. *Fish Statplus. Food and AgroicultureOrganiation of The United Nations Rome Italy*. Http: www.fao,org/fi/statist/FISOFT/FISHPLUS.asp

[15]   FAO, 2006a. *FishStat. Fisheries Departement, Food and Agriculture Organization of the United Nation. Rome Italy.*

[16]   FAO, 2006b. *Production : Environment, species, quatities and values*. Chapter 2 in Expert Workshop on Global Review on Status and Trens in Aquaculture and Prospective analysys of Future Aquaculture Development. Guangzhou City, Guangdong, China.12-15 March 2006. Food and Agriculture Organization of the United Nations, Rome Italy.

[17]   FAO, 2010., *Yearbook of fishery statistics*, htpp : //www.fao.org. Retrieved on 1 March 2011.

[18]   Francisco, 2007. *Socioeconomics Aspects of Species and System Selection For Sustainable Aquaculture Development in Mexico* : Historic Overview and Current General Trends *In* Species and System Selection by Leung Ping Sun, Cheng Sheng Lee and Patricio J O'Brian. Blackwell Publishing, IOWA USA

[19]   Fragedous, K. 2002. *Shrimp Farming in The Mekong Delta. Its develompent and impact on the economy and local society*. OIKOS Environmen Resouces. A report submitted in partial fullfilment of the GAMBAS Project Contract 99/362-B7/6200 Ifremer/European Commission DG Development, 19 pp

[20]   Hanafie, R. 2010. *Introduction to Agricultural Economics*. Publisher CV ANDI.

[21]   Ministry of Marine Affairs and Fisheries In Figures, 2012.

[22]   Leung., P.S., C.S. Lee and P.J. O'Bryen., 2007. *Species and system selection for sustainable aquaculture*.Blackwell publishing, IOWA-USA.

[23]   Liufeto, F. 2006. *Fishery Feasibility Survey Report in NTT Province*. Cooperation Team IPB and Ministry of Marine Affairs and Fisheries RI. Not Published.

[24]   Nash, C., 1995. *Aquaculture Sector Planning and management*. The University Press, Cambridge.

[25]   Nash, C. 2004. *Achieving Policy Objectives to Increase the Value of The Seafood Industry In The United States* : The Technical Feasibility and Associated Constraints. Food Policy, 29 (6) : 621-641

[26]   Nugroho I and R. Dahuri, 2013. *Regional Development: Economic, Social and   Environmental Perspectives*. Jakarta - LP3ES.

[27]   Okorie, 2003. *Nigeria Fisheries at the time of economic paradigm shift*. AA Eyo (ed). IsheriesSocietty of Niger, FISON. In Proceeding of 18th Annual conference of fisheries society of Nigeria . pp 16-21

[28]   Tacon, AGJ. 2001. *Increasing the Contribution od Aquaculture for Food Security and Poverty Alleviation . In A Tacon (ed) Aquaculture in third millennium*. Bangkok, Thailand, 20-25 Februari 2000. NACA, FAO, Rome pp 66-71

[29]   Tajerin and Mohammad. Noor, 2004. *Indonesia Shrimp Competitiveness in the international market*: An analysis with market share approach using econometric model. Economic Journal of Development, State Economic Review, p. 187-191.

[30]   Wibowo, P., Ch.E. Nirarita, S. Susanti, D.Padmawinata, Kumarini, M.Syarif., Y. Hendriani, Kusniangsih, L. Br Sinulingga. 1996. *Indonesia Wetland Ecosystem*: A Guide Book for Teachers and Educational Practitioners. Wetlands International-Indonesia Program Bogor.

[31]   Widiati, A. 2007. Policy and strategy of spatial planning of border areas between countries in NTT Province.*Journal of Science and Technology Indonesia* Vol 9 No. 3 December 2007. P 110-119.

[32]   Widi, R.K. 2010. Principles of Research Methodology.