FISHERIES BUSINESS PLAN IN MERAUKE AND ARU REGENCIES

This report is prepared by Alexander M. A Khan for the Arafura and Timor Seas Ecosystem Action phase 2 (ATSEA-2) Project, July 2021

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EXECUTIVE SUMMARY

The field survey was conducted to identify fisheries business plan in Aru Islands and Merauke regencies which are located in the eastern part of Indonesia. Face-to-face interviews and Forum Group Discussion were carried out for this survey.

This survey involved 202 respondents in 11 villages in Merauke and 408 respondents in 11 villages in Aru Regency. It was found that the majority respondents from both areas was in 26-35 years old's age group with 31 percent and education level in both areas was dominated by graduated from primary school (55 percent in Merauke and 48 percent in Aru).

This study found most of respondents in both areas were choose fish capture as their venture with fresh fish as their product and salted fish as the second highest responses. **This study highly recommends into aquaculture business due to its potential sustainability reason and environmentally friendly aquaculture practices**. This study found that respondents would receive variated revenue from fish selling prices and from number of fish productions. For **Snapper's aquaculture, Aru Regency had the highest revenue due to its selling price [Rp. 36,898] while in Merauke [Rp. 27,683], then from Banana Shrimp's aquaculture, in Aru Regency [Rp. 55,556] respondents will get better revenue than in Merauke [Rp. 26,714].** This study also found that from both area the aquaculture payback period would be turned in within less than a year.

The present study could serve as a reference for future investigations relating to potential fishery business plan in Merauke and Aru regencies.

LIST OF ABBREVIATIONS

ATSEA	Arafura and Timor Sea Ecosystem Approach
BPS	*Badan Pusat Statistik*/ Statistic Office
EPA	Environment Protection Agency
FGD	Focus Group Discussion
GRDP	Gross Regional Domestic Product
IUU	Illegal Unreported Unregulated
NGO	Non-government Organization
Rp	Rupiah
WPP	*Wilayah Pengelolaan Perikanan*/ Fisheries Management Area
VCA	Value Chains Analysis

CHAPTER 1. INTRODUCTION

1.1 Background

Aru Islands and Merauke regencies are located in the eastern part of Indonesia. Dobo is the capital city for Aru Islands Regency (BPS, 2019d) within the Maluku Province while Merauke is the capital city for Merauke Regency (BPS, 2019c) within Papua Province. Aru Islands Regency had 59 [fifty-nine] inhabited and 778 [seven hundred and seventy-eight] uninhabited islands with 10 [ten] of administrate sub-districts and consist with 117 [one hundred and seventy] villages and based on population census in 2010 and had population of 84,138 (BPS, 2019a). Furthermore, Merauke regency is the largest regency area in Papua Province [approximately 15% [46,791.7 km2]] out of Papua Province's total area] with 20 [twenty] of administrate sub-districts, according to 2018 government's data, total population in Merauke was 225,714 and directly bordered with neighboring country, Papua New Guinea (BPS, 2019b).

Based on latest data from statistics office of Aru Islands in 2018, there was 82,749 tons of fish production came from dominated fishing gears that consist of 891 of hook-and- lines, 375 gillnets, 291 fish traps and majority of 2,359 non-powered fishing fleets and consist of 25,063 fishers as their main livelihood(BPS, 2019b). Most of fish caught from capture fisheries in 2018 were mackerel [*Scomberomorus spp*] 4,303,9 tons; barramundi [*Lates calcalifer*] 2,294.3 tons; followed with red snapper [*Lutjanus campechanus*] and also tiger prawn [*Penaeus monodon*] 1,103.2 tons and banana prawn [*Fenneropenaeus merguienesis*] 1,180.2 tons (BPS, 2019b). While in Merauke, in 2017 there was 81,000 tons of fish production recorded by local fisheries authority (Pacific Pos, 2017). Gross regional domestic product [GRDP] is the gross value added of all goods and services that are created or produced in a domestic level within a country as a result of varieties economic activities (BPS, 2018c). The fisheries sector [including agriculture and forestry sectors] contributed more than half [56% or equal to Rp. 1.824 trillion] to the Aru Islands Regency's gross regional domestic product [GRDP] while the lowest [0.03% or equal to Rp. 1.2 billion] came from electricity and gas in 2018 (BPS, 2018a). Followed with Merauke Regency, with total fisheries [including agriculture and forestry] contributed approximately 23.6% [equal to Rp, 3.4 trillion] as the highest among other sectors while the lowest was from electricity and gas of 0.06% [equal to Rp. 8.4 billion] to the GRDP in 2018 (BPS, 2018b).

Average fish consumption per capita in Maluku Province has the highest level compare to National and Papua Province levels. Trends also showed the increase trends over the years for both National and Maluku Province of fish per capita consumption levels. The per capita consumption of fish stood at 61,87 kg in 2016 and slightly decrease to 60.91 kg in 2017 (Nainggolan *et al.*, 2019) representing approximately more than three-quarter of total animal protein intake, such as total of 0.76 kg for cow meat and 6.36 kg for chicken meat in Maluku Province (BPS, 2018c). Furthermore, the per capita consumption of fish reach at 45.74 kg in 2016 and increased to 46.99 kg in 2017 (Nainggolan *et al.*, 2019), showing that the source of protein from fishes was the highest of total animal protein intake (0.94 kg for cow meat and 8.76 kg for chicken meat (BPS, 2018b)) in Papua Province. Per capita consumption rates are estimates derived from the entire population, includes of both consumers and non-consumers, thus per capita rates are primarily useful for trend analysis rather than actual consumption condition (Fishermen Investment Trust, 2013). It should be understood that there are no sophisticated methodologies that can provide an accurate depiction of all people in a population that consume fish (Fishermen Investment Trust, 2013).

1.2 Objective

The objective of the survey was to identify potential fisheries business plan for local sustainable livelihood in Aru Islands and Merauke regencies.

1.3 Output

The output from this survey is the publication of a report highlighting for potential small-scale fisheries business plan for local sustainable livelihood and considering environment protection and resources sustainability for future generations in Aru Islands and Merauke regencies.

1.4 Structure of the report

The report consists of five distinct sections:

1. Introduction including the background, objective, output and report structure;
2. Methodology;
3. General demographic features of the survey respondents;
4. Result of the survey with comments and analysis;
5. Conclusions and recommendations.

CHAPTER 2. METHODOLOGY

The survey was a formal type of questionnaire survey involving face-to-face interviews with consumer at key locations.

2.1 Questionnaire design process

The questionnaire was designed based on previous relevant surveys carried out in Indonesia and other countries (Montalbano *et al.*, 2015; Khan *et al.*, 2019; Suadi and Kusano, 2019). Both open-ended and closed questions were included in the questionnaire. The open-ended questions allowed the respondents to freely express themselves while the closed questions consisted of Likert scaled questions to assess the attitudes of respondents (Khan *et al.*, 2020).

The questionnaire was divided into two major sections as shown in Figure 1 (the full questionnaire can be found in Annex 2).

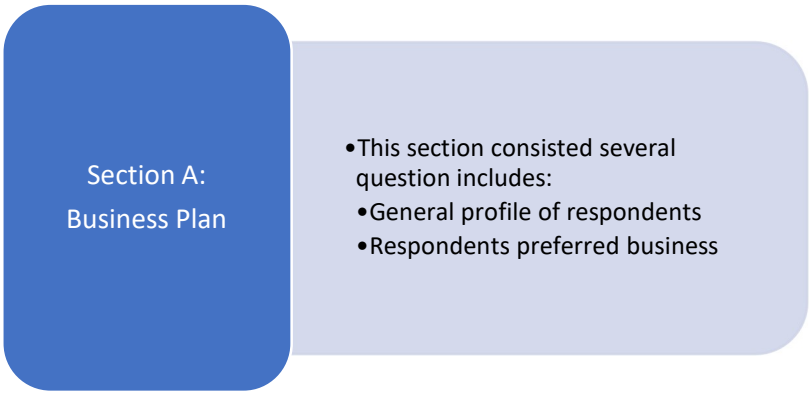

Figure 1. Two sections in the consumer questionnaire

2.2 Location

Twenty-one different villages were selected around the survey area. Table 1 provides a summary of the locations in both Aru and Merauke where consumers were interviewed for the survey

Table 1. Location of sites

No.	Location	Subdistrict	Village
1.	Merauke	Waan	Konorau
2.			Tor
3.			Sabon
4.			Kladar
5.			Waan
6.		Tabonji	Iromoro
7.			Kawe
8.			Yeraha
9.			Suam
10.		Ilwayab	Wogekel
11.	Aru	Aru Island	Dobo
12.		South-Center Aru	Longgar
13.			Afara
14.			Gomogomo
15.			Bemun
16.			Masiang

17.		South-East Aru	Karey
18.			Siya
19.			Batugoyang
20			Beltubur
21.			Meror

2.3 Data Collection

Face-to-face interviews and Forum Group Discussion were carried out for this survey. Initially, respondents were briefed as to purpose of the interview and were assured of the confidentially of their responses. The open-ended questions were asked in a probing, unbiased manner to encourage the respondents to voice their opinions.

2.4 Data Analysis

The data collected were evaluated using Microsoft Excel 2019. In business plan, the outputs were presented by means of charts and frequency distributions tables (see Annex).

CHAPTER 3. BUSINESS PLAN

This chapter relate to general information, preferred business, preferred products and preferred locations to sell products. The results also provide an insight into the aquaculture business plan.

3.1 Merauke Regency

A. General Information

The target locations for the business plan were conducted in 3 subdistricts consisting of 10 villages with a total of 220 respondents (209 male/ 11 female) (Table 2).

Table 2. Details of the business plan assessment respondents in Merauke District.

No	Subdistrict	Village	Male	Female	Total
1	Waan	Konorau	24	3	27
2		Tor	18	2	20
3		Sabon	19	-	19
4		Kladar	25	1	26
5		Waan	17	-	17
6	Tabonji	Iromoro	17	3	20
7		Kawe	28	2	30
8		Yeraha	19	-	19
9		Suam	17	-	17
10	Ilwayab	Wogekel	25	-	25
Total			**209**	**11**	**220**

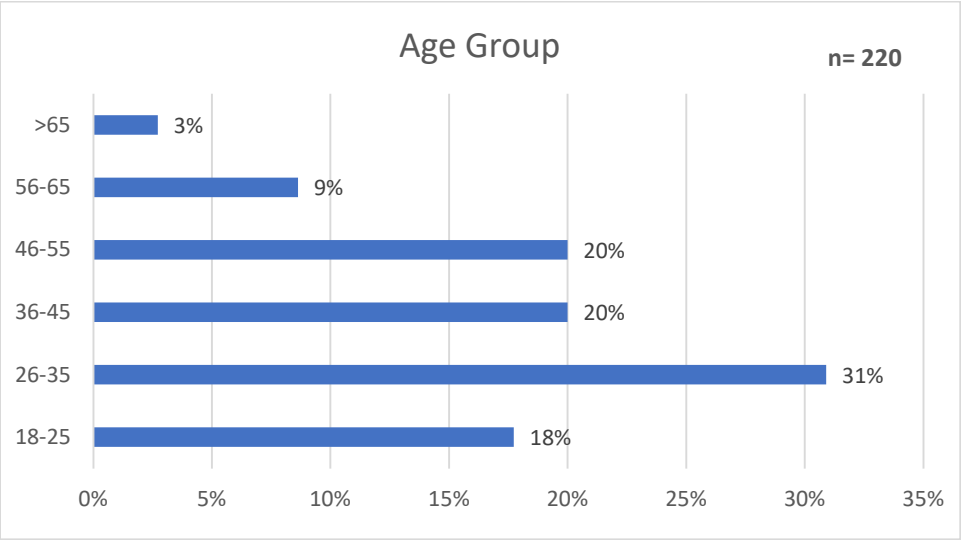

Figure 2. Age grouping of respondents in Merauke

Figure 2. shows that 31 percent of the respondents (n=220) were dominated by 26-35 years old group age and followed by 36-45 years old. Meanwhile, the respondents' educational level was dominated by graduated from primary school with 55 percent out of 220 person and followed by secondary school (22 percent) (Figure 3).

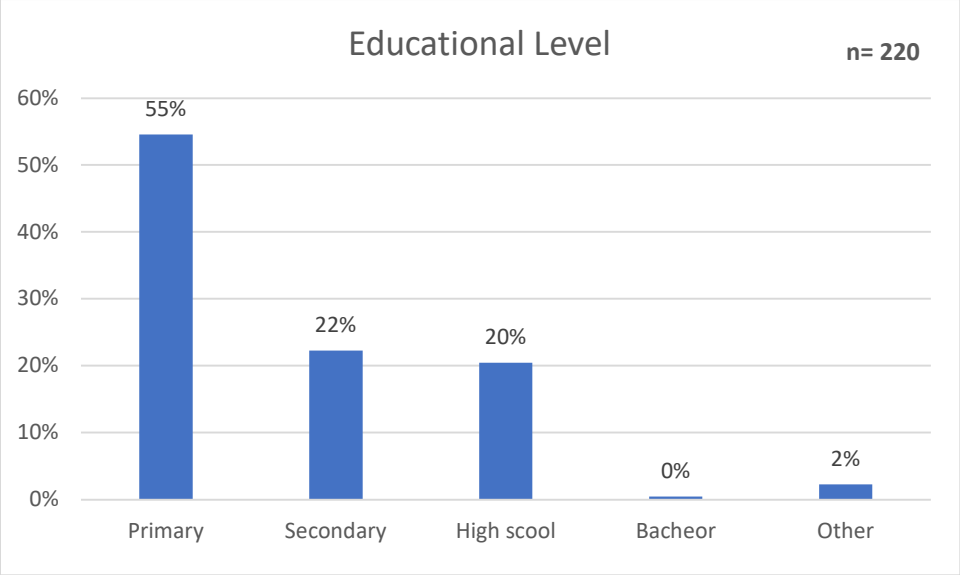

Figure 3. Education level of respondents in Merauke

Out of 220 respondents, 95 percent were identified as workers such as fishers, farmers, teacher, stakeholder and fishers and farmers. While the rest were students (4 percent) and non-worker (1 percent) (Table 3).

Table 3. Occupational grouping of respondents in Merauke

Occupation	Total
Working	210
Fishers	166
Farmer	30
Teacher	1
Stockholder	1
Fishers & Farmers	12
Not working	1
Student	9
Total	**220**

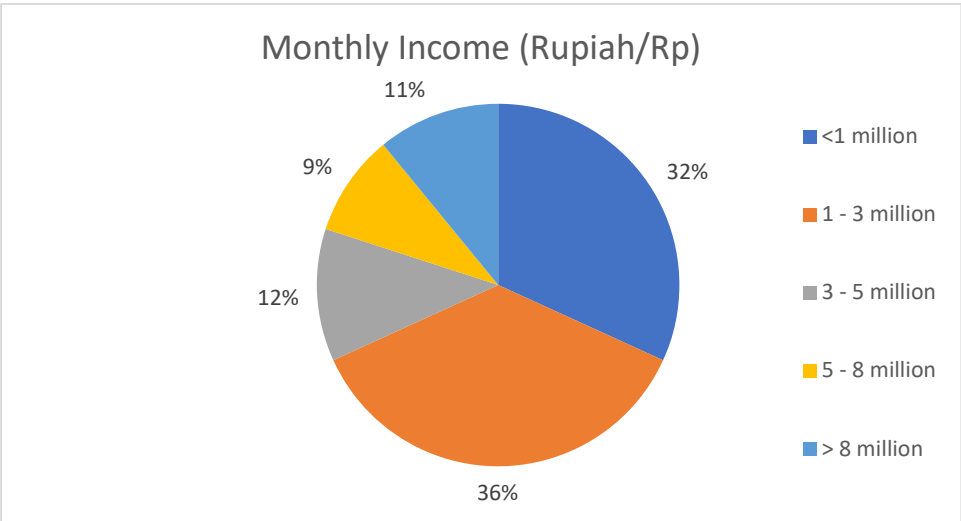

Figure 4. Income grouping of respondents in Merauke

Figure 4 shows the range of monthly income of the respondents; the results were dominated with respondent group had Rp. 1.000.000,00 – Rp. 3.000.000,00 as their monthly income (36 percent), the second one is under Rp. 1.000.000,00 (32 percent) and least of all is Rp. 5.000.000,00 – Rp. 8.000.000,00 (9 percent).

B. Business Plan

Figure 5 below showed respondent's (n= 211) preferred business that they will do in Merauke. Most of responses (51,18 percent) were consist to choose capture fisheries as their activity. Rest of responses were consisted of fish processing (18,96 percent), fish trade (9 percent), aquaculture (3,79 percent) and their optional answer which consist of not interested and state government as much as 17,06 percent.

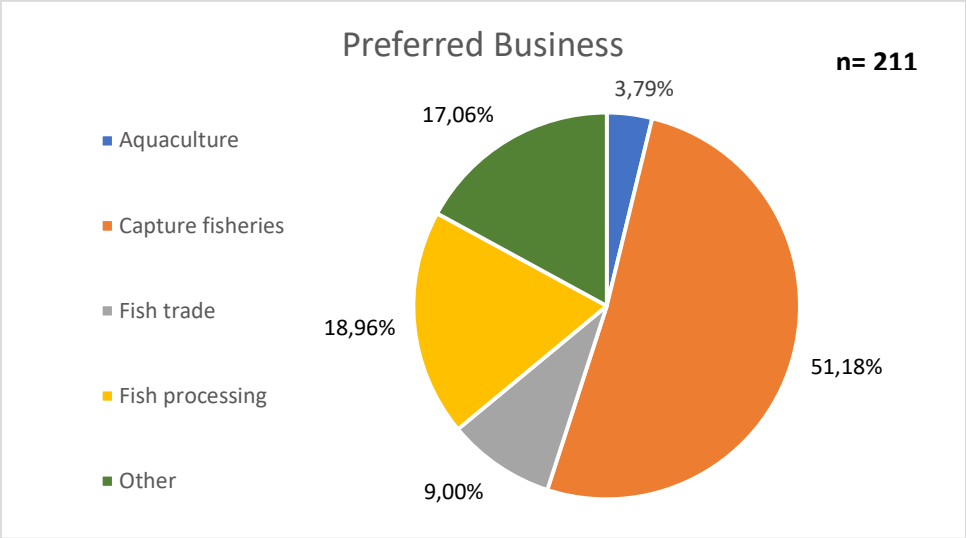

Figure 5. Respondent's preferred business in Merauke

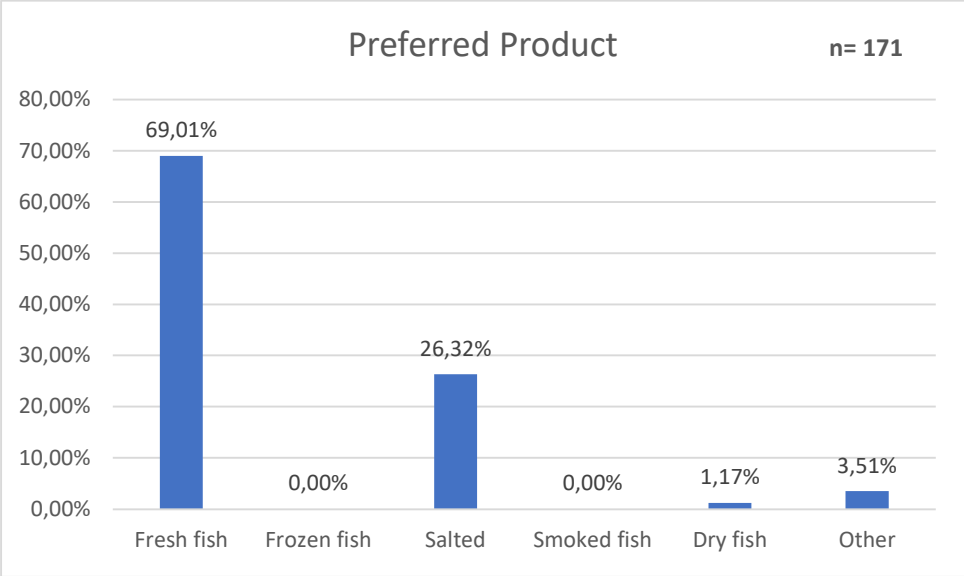

Figure 6. Respondent's preferred product in Merauke

A huge response (n= 171) showing that respondents were choosing fresh fish as their main products with 69 percent of responses, followed by salted fish with 26,32 percent and the rest were just under 5 percent responses. It should be known that their additional answers were fermenting fish. Most of respondents were chosen to sell their product in center of regency with 47,62 percent followed by center of sub-district with 38,10 percent and in their current location with 11,90 percent while the rest option was just had responses under 5 percent (Figure 7).

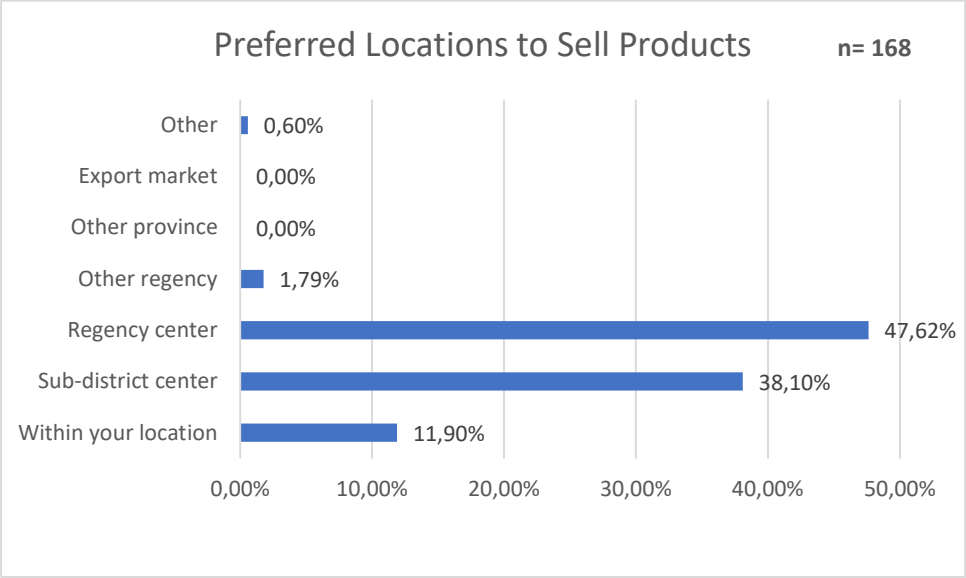

Figure 7. Respondent's preferred location to sell products in Merauke

Table 4. Barramundi's aquaculture business plan in Merauke

Investment				
Items*	**Unit price [Rp]**	**Quantity**	**Unit**	**Total price [Rp]**
Floating Cage (3x3x3 m)	11,000,000	8	unit	88,000,000
Guard house	30,000,000	1	unit	30,000,000
Nets	1,000,000	32	unit	32,000,000
Boats	13,000,000	1	unit	13,000,000
Equipment	2,500,000	1	packet	2,500,000
Total Investment				**165,500,000**
Costs				
Variable Cost				
Items*	**Unit price [Rp]**	**Quantity**	**Unit**	**Total price [Rp]**
Fish seeds	5,000	12,150	tails	60,750,000
Fish feed	4,000	9,477	kg	37,908,000
Supplement			pcs	0
Total				**98,658,000**
Fixed Cost				
Wages @ Rp. 1.000.000/person/month	1,000,000	8	month	16,000,000
Total				**16,000,000**

Total Cost of Production				**114,658,000**
Revenues				
Items**	**Unit price [Rp]**	**Quantity**	**Unit**	**Total price [Rp]**
Sales / 8 months	27,683	7,290	kg	201,810,745
Total				**201,810,745**
Net Income (Total Revenues - Total Cost of Production)				**87,152,745**
Return of Investment (Total income/Total investment)				**1.22**
Payback Period				**0.82**

PS:
*: obtained from (WWF, 2015)
**: obtained from survey's questionnaire

Table 5. Banana shrimp aquaculture's business plan in Merauke

Investment				
Items*	**Unit price [Rp]**	**Quantity**	**Unit**	**Total price [Rp]**
Land rent (2 cycles/1 year)	6,000,000	1	Ha	6,000,000
Water pump	5,000,000	1	package	5,000,000
Windmill	10,000,000	2	unit	20,000,000
Guard house & warehouse	3,000,000	1	unit	3,000,000
Total Investment				**34,000,000**
Costs				
Variable Cost				
Items*	**Unit price [Rp]**	**Quantity**	**Unit**	**Total price [Rp]**
Shrimp's seeds	30	60,000	tails	1,800,000
Shrimp feed	15,000	672	kg	10,080,000
Fertilizer	1,000	5,000	kg	5,000,000
Total				**16,880,000**
Fixed Cost				
Wages @ Rp. 1.000.000/person/month	1,000,000	8	months	16,000,000
Total				**16,000,000**
Total Cost of Production				**32,880,000**
Revenues				
Items**	**Unit price [Rp]**	**Quantity**	**Unit**	**Total price [Rp]**
Sales (2 cycles/year)	26,714	1,344	kg	35,904,000
Total				**35,904,000**
Net Income (Total Revenues - Total Cost of Production)				**Rp3,024,000**
Return of Investment (Total income/Total investment)				**1.06**
Payback Period				**0.95**

PS:

*: obtained from WWF (2014)
**: obtained from survey's questionnaire

Table 4 above showed Barramundi's aquaculture business plan that had been created for respondents. Regarding to investment, respondent have to spent Rp. 165,500,500 for main equipment (floating cage, guard house, boat & equipment). Meanwhile in variable cost, consist of their daily operational cost which linked to raw materials (fish seeds, fish feed & supplements) and it took approximately Rp. 98,658,000. Furthermore, respondents also have to spent about Rp. 2,000,000 per month for technician's wages. Regarding to revenue, respondents could receive Rp. 201.810.745 per 8 months if they could harvest the fish approximately 7,290 kilograms. Thus, respondents could receive approximately Rp. 87,152,745 as their net income and its payback would be turned in 0.82 years (less than a year).

Table 5 showed Banana Shrimp's aquaculture business plan which contains investment, costs, revenues and its net income and payback period. Respondents have to spent Rp. 34,000,000 for investment (land rent, water pump, windmill and guardhouse & warehouse). Regarding to costs, it is divided into two kinds of costs. Variable costs contain their operational costs which consist seed, feed and fertilizer and it took up to Rp. 16,880,000, while fixed costs consist wages with Rp. 16,000,000, thus respondents have to spent Rp. 32,880,000 for their costs on this aquaculture. Its revenues would be as much as Rp. 35,904,000 in one year (2 cycles), thus its net income would be at Rp. 3,024,000 and its payback same as Barramundi's business plan, less than a year (0.95).

3.2 Aru Regency

A. General Information

The target locations for the business plan were conducted in the capital of subdistrict, capital of district, and rural area with a total of 408 respondents (317 male and 91 female) (Table 10).

Table 6. Details of the business plan assessment respondents in Aru Regency

No	Subdistrict	Village	Male	Female	Total
1	Aru Island	Dobo	163	45	208
2	South-Center Aru	Longgar	20	10	30
3		Afara	15	5	20
4		Gomogomo	12	6	18
5		Bemun	14	3	17
6		Masiang	14	1	15
7	South-East Aru	Karey	21	16	37
8		Siya	9	5	14
9		Batugoyang	22	0	22
10		Beltubur	15	0	15
11		Meror	12	0	12
Total			**317**	**91**	**408**

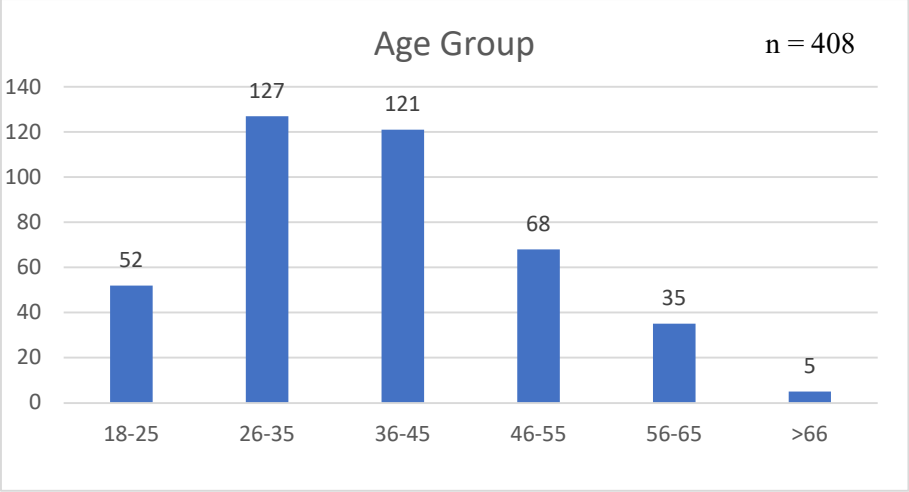

Figure 8. Age grouping of respondents in Aru Regency

Figure 18 shows that 127 of 408 respondents were dominated by 26-35 years old group age (31 percent) and followed by 36-45 years old group. In education level, most of the respondents were graduated from primary school with 196 of 408 respondents (48 percent) and followed by high school with 105 of 408 respondents (26 percent) (Figure 19).

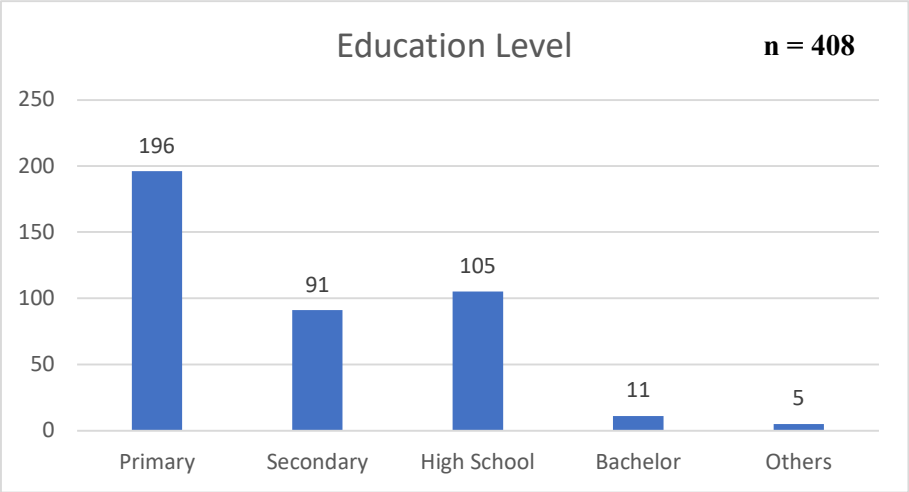

Figure 9. Education level of respondents in Aru Regency

Based on occupation, 316 of 408 respondents were identified as worker from several fields, mostly worked as fishers (77,5 percent). 21 people (5,1 percent) were identified as non-worker and the rest were students (0,5 percent) (Table 11).

Table 7. Occupational grouping of respondents in Aru Regency

Occupation	Total
Working	385
Fishers	316
Fisher & Farmers	9
Government Employee	5
Private employee	1
Seller	15
Ship seller	2
Shipbuilder	2

Tooth specialist	1
Housewife	30
Pastor	1
Teacher	3
Not working	21
Student	2
Total	408

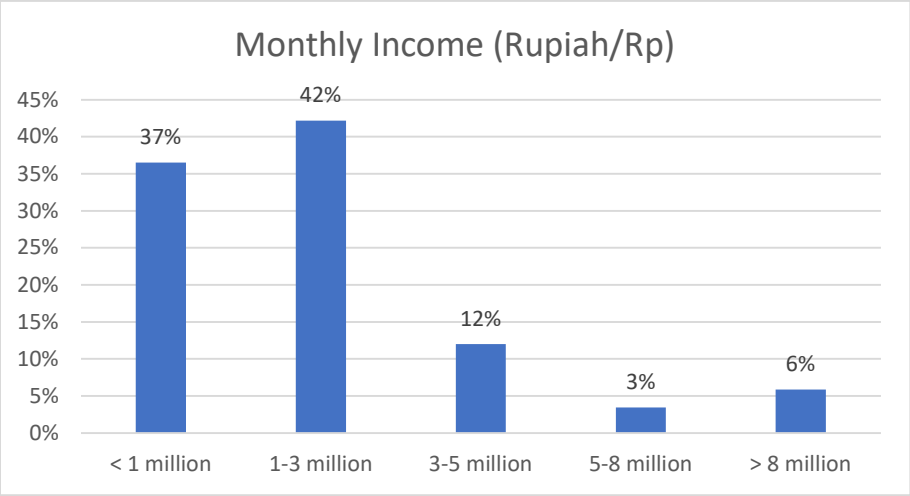

Figure 10. Income grouping of respondents in Aru Regency

Figure 20 above, shows the range of monthly income of the respondents. The result was dominated with respondent group who had income between Rp.1.000.000,00 – Rp.3.000.000,00 (42 percent), and followed by respondent group who had income under Rp.1.000.000,00 (37 percent).

B. Business Plan

Figure 11 below showed respondent's (n= 303) preferred business that they will do in Aru Regency. Majority of responses (48,84 percent) were chosen capture fisheries as their future activity followed by fish processing (19,47 percent), fish trade (7,92 percent), aquaculture (3,96 percent) and their optional answer which consist of not interested and non-fishery activity as much as 19,80 percent.

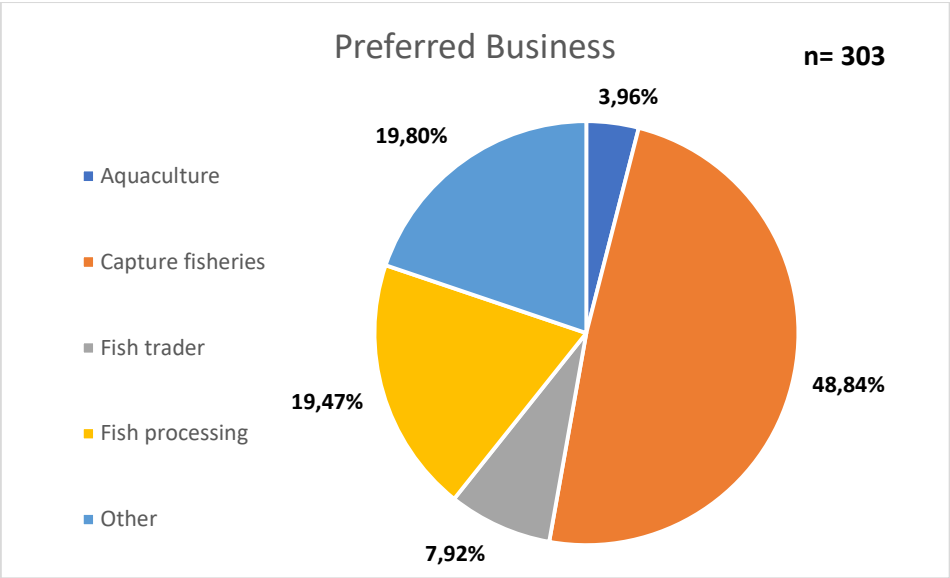

Figure 11. Respondent's preferred business in Aru Regency

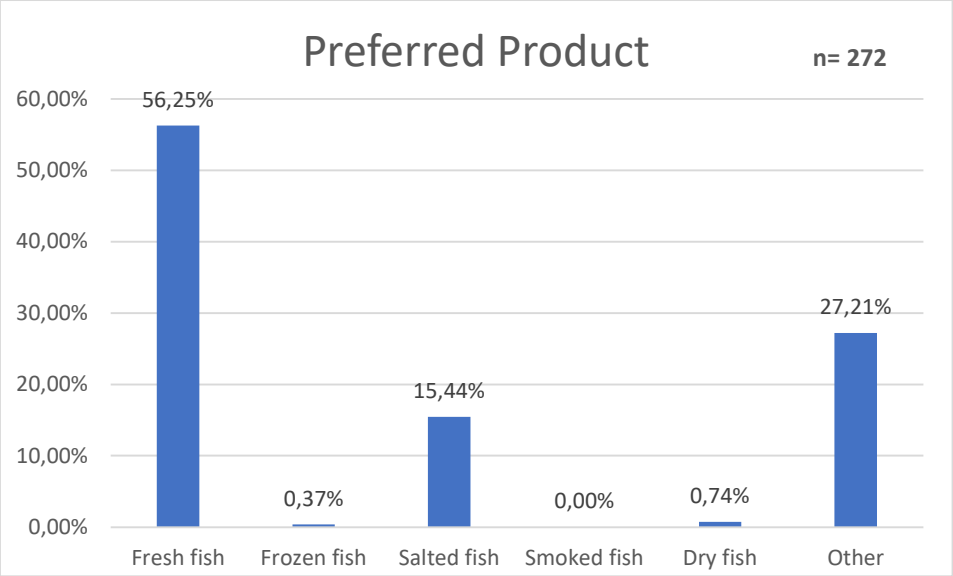

Figure 12. Respondent's preferred product in Aru Regency

Large responses (n= 171) in Figure 12 showing that respondents were choosing fresh fish as their main product with 56,25 percent followed by salted fish with 15,44 percent and the rest of optional answer were just under 5 percent responses. It should be known that their additional answer (27,21 percent) was consist of selling boat & equipment and crustacea. Most of respondents (n= 191) were choose to sell their product in their current location with 52,88 percent followed by in center of regency (26,70 percent) and their additional answer (8,90 percent) which consist of selling it to wholesaler wherever it is (Figure 13)

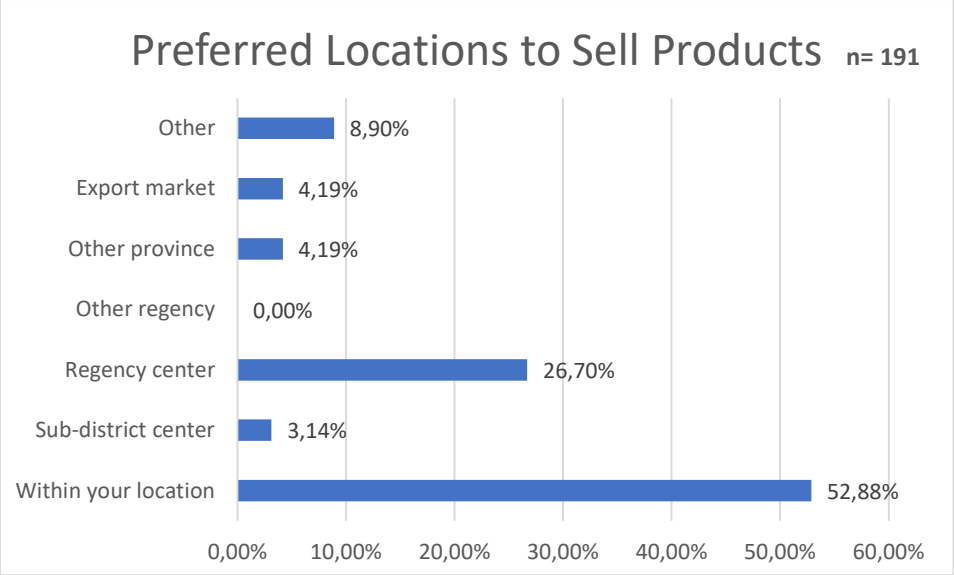

Figure 13. Respondent's preferred location to sell products in Aru Regency

Table 8. Red snapper aquaculture business plan in Aru Regency

Investment				
Items*	**Unit price [Rp]**	**Quantity**	**Unit**	**Total price [Rp]**
Floating Cage (3x3x3 m)	11,000,000	8	unit	88,000,000
Guard house	30,000,000	1	unit	30,000,000
Nets	1,000,000	32	unit	32,000,000
Boats	13,000,000	1	unit	13,000,000
Equipment	2,500,000	1	package	2,500,000
Total Investment				**165,500,000**
Costs				
Variable Cost				
Items*	**Unit price [Rp]**	**Quantity**	**Unit**	**Total price [Rp]**
Fish seeds	5,000	12,150	ekor	60,750,000
Fish feed	4,000	9,477	kg	37,908,000
Supplement			pcs	-
Total				**98,658,000**
Fixed Cost				
Wages @ Rp. 1.000.000/person/month	1,000,000	8	orang	16,000,000
Total				**16,000,000**
Total Cost of Production				**114,658,000**
Revenues				
Items**	**Unit price [Rp]**	**Quantity**	**Unit**	**Total price [Rp]**
Sales/ 8 months	36,898	7,290	kg	268,988,644
Total				**268,988,644**
Net Income (Total Revenues - Total Cost of Production)				**154,330,644**

Return of Investment (Total income/Total investment)	1.63
Payback Period	0.62

PS:
*: obtained from (WWF, 2015)
**: obtained from survey's questionnaire

Table 9. Banana shrimp aquaculture business plan in Aru Regency

Investment				
Items*	**Unit price [Rp]**	**Quantity**	**Unit**	**Total price [Rp]**
Land rent (2 cycles/1 year)	6,000,000	1	Ha	6,000,000
Water pump	5,000,000	1	package	5,000,000
Windmill	10,000,000	2	unit	20,000,000
Guard house & warehouse	3,000,000	1	unit	3,000,000
Total Investment				**34,000,000**
Costs				
Variable Cost				
Items*	**Unit price [Rp]**	**Quantity**	**Unit**	**Total price [Rp]**
Shrimp's seeds	30	60,000	package	1,800,000
Shrimp feed	15,000	672	kg	10,080,000
Fertilizer	1,000	5,000	kg	5,000,000
Total				**16,880,000**
Fixed Cost				
Wages @ Rp. 1.000.000/person/month	1,000,000	8	months	16,000,000
Total				**16,000,000**
Total Cost of Production				**32,880,000**
Revenues				
Items**	**Unit price [Rp]**	**Quantity**	**Unit**	**Total price [Rp]**
Sales (2 cycles/year)	55,556	1,344	kg	74,666,667
Total				**74,666,667**
Net Income (Total Revenues - Total Cost of Production)				**41,786,667**
Return of Investment (Total income/Total investment)				**2.20**
Payback Period				**0.46**

PS:
*: obtained from WWF (2014)
**: obtained from research questionnaire

Table 8 above showed Red Snapper's aquaculture business plan that had been created for respondents. Regarding to investment, respondent have to spent Rp. 165,500,000 for main gear (floating cage, guard house, nets, boat and equipment). Meanwhile in variable cost, consist of their daily operational cost which consist of fish seeds, fish feed and supplements and it took approximately Rp. 98,658,000. Furthermore, respondents also have to spent about Rp. 2,000,000 per month for technician's wages. Regarding to revenue, respondents could receive Rp. 268,988,644 per 8 months if

they could harvest Red Snapper up to 7,290 kilograms. Thus, respondents could receive approximately Rp. 154,330,644 as their net income and its payback would be turned within less than a year.

Table 9 showed Banana Shrimp's aquaculture business plan which contains investment, costs, revenues and its net income and payback period. Respondents have to spent Rp. 34,000,000 for investment (land rent, water pump, windmill and guardhouse & warehouse). Regarding to costs, it is divided into two kinds of costs. Variable costs contain their operational costs which consist seed, feed and fertilizer and it took up to Rp. 16,880,000, while fixed costs consist wages with Rp. 16,000,000, thus respondents have to spent Rp. 32,880,000 for their costs on this aquaculture. Its revenues would be as much as Rp. 74,666,667 in one year (2 cycles), thus its net income would be at Rp. 41,786,667 and its payback same as Barramundi's business plan, less than a year (0.46).

3.3 Discussion

This survey was carried out in March until May 2021, selected 21 villages from both Aru Islands and Maluku regencies. It was found that the majority respondents from both areas was in 26-35 years old's age group with 31 percent and education level in both areas was dominated by graduated from primary school (55 percent in Merauke and 48 percent in Aru).

This survey is probably the most comprehensive business plan survey that has been carried out in Indonesia especially in Eastern Indonesia. There are only a few research about preferred business plan held in Eastern Indonesia. According to KKP (2015), Merauke has a huge potential fishery that could be utilized. In 2015, the amount of fish that had been captured were 374,960 tons nevertheless the numbers were not optimized yet, in fact those numbers were just 15 percent of fisheries potential in this area (KKP, 2015). In addition, Aru Regency were have the same thing, a huge fisheries potential that could lift fishery production which could contributed to wealthiness of fishers (Widihastuti and Rosyidah, 2018).

Regarding to respondents preferred business in fishery in Merauke (n=211), it is dominated by fisheries capture with 51,18 percent followed by fish processing with 18,96 percent and respondent's additional answer which consist of state government venture with 17,06 percent. Whereas in Aru Regency, were dominated by fisheries capture with 48,84 percent followed by fish processing 19,47 percent and respondent's additional answer with 19,80 percent. Similar results shown in this section, fisheries capture become the top of the answer. It is probably due to potential of fisheries in both areas.

Results shown in respondents preferred product had a correlation with its preferred business before. It is shown that in Merauke most of respondents were choose fresh fish as their main product with 69,01 percent while in Aru Regency were had a similar result with 56,25 percent. The second highest answer was salted fish in both areas. It should be known that in Aru Regency, salted fish were often consumed (Ubwrin *et al.*, 2019). Furthermore, in Merauke respondents choose center of regency to sell their product with 47,26 percent while in Aru Regency respondents choose their current location to sell fish with 52,88 percent.

Regarding to fishery business plan, it was consisted of Barramundi & Banana Shrimp in Merauke and Red Snapper & Banana Shrimp in Aru Regency. Those business plans were based on aquaculture although regarding to respondents most answered in preferred business plan was capture fisheries. Another research by Jaya *et al.* (2013) mentioned that Snapper's aquaculture was liked due to its growth and easy controlled. In addition, WWF (2015) mentioned that snapper's

aquaculture could reduce its resource pressure in nature. Thus, this study highly recommends to snapper's aquaculture instead of capturing from the nature.

The items and its price in investment and costs table were obtained from WWF (2015), while the fish price were obtained from questionnaire. Fish harvest in variable costs and revenues were made from calculation which based on its survival rate. Although Windarto *et al.* (2019) mentioned that Snapper's survival rate on its results were at 82 percent, this article assume Snapper's survival rate at 80 percent which was the lowest survival rate comparing to other similar results. Meanwhile a research from Supono (2017) mentioned that Banana Shrimp has 80-100 percent survival rate in aquaculture. Thus, in Barramundi & Red Snapper's harvested fish target were at 7,290 kg [80 percent of 12,150 seeds (weight assumption when it is harvested: 750 gr/fish)] while Banana Shrimp harvested target was at 1,344 kg [80 percent of 60.000 seeds (weight assumption when it is harvested: 28 gr/shrimp)].

Regarding to revenues, Red Snapper's aquaculture in Aru Regency had the biggest revenues among the others. It is due to its selling price (Rp. 36,898) although in WWF (2015) stated that Snapper's could be sold at Rp. 70,000. In addition Melianawati and Aryati (2012) mentioned that international market price for Snapper could be at 5.50-18.10 US$. Thus, its revenues could be increased if respondents willing to sell their fish much higher. Regarding to payback period, both species aquaculture in both areas seems to be a promised business with its payback within less than a year.

CHAPTER 4. CONCLUSION

4.1 Conclusion

The results show that respondents in Merauke were from 3 subdistricts with a total of 10 villages and the number of respondents were 220 people. While the number of respondents in Aru were 408 people from 3 subdistricts with a total of 11 villages.

This study found most of respondents in both areas were choose fish capture as their venture with fresh fish as their product and salted fish as the second highest responses. This study highly recommends into aquaculture business due to its sustainability and easy controlled. This study found that respondents would receive variated revenue due to its diverse fish selling price and the number of fish harvested. In Snapper's aquaculture, Aru Regency had the biggest revenue due to its selling price [(Rp. 36,898) while Merauke (Rp. 27,683)] meanwhile in Banana Shrimp's aquaculture, in Aru Regency (Rp. 55,556) respondents would receive bigger revenue than Merauke (Rp. 26,714). If respondent willing to increase their selling price than they proposed, thus the bigger revenue they would receive. This study also found for both species aquaculture in those areas, it's payback period would be turned in within less than a year.

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ANNEX

Annex 1. Terms of Reference

AMENDMENT No. 2 TO THE IC/2019/0000000829 BETWEEN

THE UNITED NATIONS DEVELOPMENT PROGRAMME ("UNDP") AND ALEXANDER M A KHAN ("INDIVIDUAL CONTRACTOR")

Reference is made to the Contract for the services of an Individual Contractor, number IC/2019/0000000829, entered into on 30 December 2019 by and between the UNITED NATIONS DEVELOPMENT PROGRAMME ("UNDP"), and "**Alexander M A Khan**" (the "INDIVIDUAL CONTRACTOR"), and
together with UNDP, the "Parties" [as previously amend on 2 July 2020] (herein after referred to as the "**CONTRACT**").

WHEREAS the Individual Contractor provides that any modification thereto shall require an amendment inwriting between the Parties, duly signed by the authorized representatives of UNDP and the Individual Contractor.

WHEREAS UNDP has requested, and the Individual Contractor has agreed to amend the IC/2019/0000000829 in order to extend the date for completion of services until **30 August 2021**; to extend the deliverable with no additional cost

NOW THEREFORE, the Parties agree:

1. The relevant Individual Contractor deliverables indicated below are hereby amended as follows:

DELIVERABLE	NEW DUE DATE
Conduct desk research report that consist reference data and information that related to fisheries trade, fishing company and fisheries business chain that actively operate in ATS	31 January 2020
Capacity building report for enumerator andstakeholder on field data collection	28 March 2021
1. Field report for local Seafood consumption'slevel assessment in Merauke regency 2. Field report for Value chain assessmentfor Barramundi in Merauke	30 April 2021
1. Field report for local Seafood consumption's level assessment in Aru regency 2. Field report for Value chain assessment for red snapper and shrimp in Aru Regency	30 May 2021
1. Final report for Seafood local consumption assessment in Aru and Merauke regency 2. Final report for Value chain assessment for red snapper and shrimp in Aru Regency and Barramundi in Merauke regency	30 June 2021
Final report for fisheries commodities business plan in Aru and Merauke regency to support livelihood in local communities	30 July 2021

(2) Except as expressly modified herein in accordance with paragraph 1, all other terms of the Individual Contractor remain unchanged [as previously amend on 2 July 2020] and shall continue in full force and effect.

(3) This Amendment will come into effect as of the date of last signature hereof by UNDP and the Individual Contractor.

Annex 2. Questionnaire

Kusioner *General Information*

A. *Informasi umum*

A.1 *Tanggal* : _____ 2020

A.2 *Nama responden* : _____

A.3 *Kisaran usia* : ☐ 18-25 ☐ 26-35 ☐ 36-45
☐ 46-55 ☐ 56-65 ☐ >66

A.4 *jenis kelamin* : ☐ *Laki-laki* ☐ *Perempuan*

A.5 *Lokasi* " ☐ D*i ibukota kabupaten*
☐ D*i ibukota kecamatan*
☐ D*i pedesaan*

Kebupaten : _____

A.6 *Pendidikan akhir* : ☐ *SD* ☐ *SMP*
☐ *SMA* ☐ *Sarjana*
☐ *lainnya, sebutkan:*

_____

A.7 *Pekerjaan* : ☐ *Pelajar*
☐ *Pensiunan*
☐ *Tidak bekerja*
☐ *Bekerja, sebutkan*

_____

A.8 Pendapatan per bulan :
☐ *Kurang dari* Rp. 1 *juta* ☐ Rp. 1 *juta* – Rp. 3 *juta*
☐ Rp. 3 *juta* – Rp. 5 *juta* ☐ Rp. 5 *juta* – Rp. 8 *juta*
☐ *lebih dari* Rp. 8 million/*juta*

Kuisioner Business planning/ *rencana usaha*

A.1 If there is a chance for start a business, what business do you think is the best to be developed within your location/ *jika ada kesempatan untuk memulai usaha di bidang perikanan, menurut anda usaha apa yang paling cocok dikembangkan di lokasi anda?*

☐ Aquaculture/ *budidaya* ☐ Capture fisheries/ *penangkapan ikan*
☐ trade/ *pedagang ikan* ☐ Fish processing/ pengolah ikan
☐ Fish specify/ lainnya, sebutkan: Other,

_____
_____
_____

A.2 Continue with your choice from question A.1, what product do you think is the best product that you will produce with your business plan?/ *Melanjutkan pertanyaan sebelumnya di nomor A.1, menurut anda, produk apa yang akan anda usahakan?*

☐ Fresh fish/ *ikan segar* ☐ Frozen fish/ *ikan beku*
☐ Salted fish/ *ikan asin* ☐ Smoked fish/ *ikan asap*
☐ Dry fish/ *ikan kering*

Other, specify/ lainnya, sebutkan:

_____
_____
_____

A.3 Where is the best place for you to sell your products?/ *kemanakan anda akan menjual produk usaha anda?*

☐	Within your location/ *di tempat anda saat ini*
☐	Sub-district center/ *di ibukota kecamatan*
☐	Regency center/ *di ibukota kabupaten*
☐	Other regency/ di kabupaten lain
☐	Other province/ di provinsi lainnya
☐	Export market/ pasar expor
Other, ☐	specify/ lainnya, sebutkan: _____
☐	_____
	_____

A.4 What species and price you will put into your product?/ *jenis ikan apa dan berapa harga yang akan anda tawarkan untuk produk yang anda hasilkan?*

No.	Species/ *jenis ikan*	Price/ *harga* [Rp]
1.	Skipjack/ *Cakalang*	
2.	Trevally/ *selar*	
3.	Grouper/ *Kerapu*	
4.	Red snapper/ *Kakap merah*	
5.	Barramundi/ *Kakap putih*	
6.	Indian mackerel/ *Kembung*	
7.	Eastern little tuna/ *Tongkol*	
8.	Selar/ *Selar*	
9.	Tuna/ *tuna*	
10.	Rays/ *Pari*	
11.	Squids/ *Cumi-cumi*	
12.	Tiger shrimp/ *Udang windu*	
13.	Banana shrimp/ *Udang jerbung*	
14.	Lobster/ *lobster*	
15.	Anchovy/ teri	
Other, specify/ lainnya, sebutkan:		
16.		
17.		
18.		
19.		
20.		
21.		
22.		
23.		
24.		

Annex 3. Statistical Output

Annex 3.1 Merauke

Annex 3.1.1 Business Plan

Section A: General Information

Statistics							
		Residential Area	Gender	Age Group	Educational Level	Occupation	Range of household salary
N	Valid	220	220	220	220	220	220
	Missing	0	0	0	0	0	0

Residential Area					
		Frequency	%	Valid	Cumulative %
Valid	Urban	16	7%	7%	7%
	Rural	204	93%	93%	100%
	Total	220	100%	100%	

Gender					
		Frequency	%	Valid	Cumulative %
Valid	Male	209	95%	95%	95%
	Female	11	5%	5%	100%
	Total	220	100%	100%	

Age Group					
		Frequency	%	Valid	Cumulative %
Valid	18-25	39	18%	18%	18%
	26-35	68	31%	31%	49%
	36-45	44	20%	20%	69%
	46-55	44	20%	20%	89%
	56-65	19	9%	9%	97%
	>66	6	3%	3%	100%
	Toal	220	100%	100%	

Education Level					
		Frequency	%	Valid	Cumulative %
Valid	Primary	120	55%	55%	55%
	Secondary	49	22%	22%	77%
	High School	45	20%	20%	97%
	Vocational	1	0%	0%	98%
	No Schooling	3	1%	1%	99%
	Bachelor	2	1%	1%	100%
	Total	220	100%	100%	

Occupation					
		Frequency	%	Valid	Cumulative %
Valid	Working	210	95.5%	95.5%	95%
	Not Working	1	0.5%	0.5%	96%
	Student	9	4.1%	4.1%	100%
	Total	220	100.0%	100.0%	

Range of household salary					
		Frequency	%	Valid	Cumulative %
Valid	< 1 million	70	32%	32%	32%
	1-3 million	80	36%	36%	68%
	3-5 million	26	12%	12%	80%
	5-8 million	20	9%	9%	89%
	> 8 million	24	11%	11%	100%
	Total	220	100%	100%	

Case processing summary						
	Valid		Missing		Total	
	N	%	N	%	N	%
Residential area * age group	220	100	0	0	220	100

Residential area *age group cross tabulation									
			Age Group						
			18-25	26-35	36-45	46-55	56-65	>66	Total
Residential area	Urban	Count	3	7	3	3	0	0	16
		Within residential area	18.8%	43.8%	18.8%	18.8%	0.0%	0.0%	100.0%
		Within age group	7.7%	10.3%	6.8%	6.8%	0.0%	0.0%	3.9%
		Percentage of total	0.7%	1.7%	0.7%	0.7%	0.0%	0.0%	3.9%
	Rural	Count	36	61	41	41	19	6	204
		Within residential area	17.6%	29.9%	20.1%	20.1%	9.3%	2.9%	100.0%
		Within age group	92.3%	89.7%	93.2%	93.2%	100.0%	100.0%	50.0%
		Percentage of total	8.8%	15.0%	10.0%	10.0%	4.7%	1.5%	50.0%
Total		Count	39	68	44	44	19	6	220
		Within residential area	17.7%	30.9%	20.0%	20.0%	8.6%	2.7%	100.0%
		Within age group	100%	100%	100%	100%	100%	100%	100%
		Percentage of total	12.7%	31.1%	29.7%	16.7%	8.6%	1.2%	100.0%

Case processing summary						
	Valid		Missing		Total	
	N	%	N	%	N	%
Residential area *Gender	220	100	0	0	220	100

Residential Area *gender group tabulation					
			Gender		
			Male	Female	Total
Residential Area	Urban	Count	16	0	16
		Within residential area	100.0%	0.0%	100.0%
		Within gender	7.7%	0.0%	3.9%
		Percentage of total	3.9%	0.0%	3.9%
	Rural	Count	193	11	204
		Within residential area	94.6%	5.4%	50.0%
		Within gender	92.3%	100.0%	50.0%
		Percentage of total	47.3%	2.7%	50.0%
Total		Count	209	11	220
		Within residential area	95.0%	5.0%	100.0%
		Within gender	100.0%	100.0%	100.0%
		Percentage of total	77.7%	22.3%	100.0%

Section B: Business Plan

Case Summary					
Valid		Missing		Total	
N	%	N	%	N	%
211	95.91	9	4.09	220	100

Respondents Preferred Business				
		Responses		% Cases
		N	%	
what business do you think is the best to be developed within your location	Aquaculture	8	3.79	3.64
	Capture fisheries	108	51.18	49.09
	Fish trade	19	9.00	8.64
	Fish processing	40	18.96	18.18
	Other	36	17.06	16.36
	Total	211	100.00	

Case Summary					
Valid		Missing		Total	
N	%	N	%	N	%
171	77.73	49	22.27	220	100

Respondents Preferred Product				
		Responses		% Cases
		N	%	
what product do you think is the best product that you will produce with your business plan?	Fresh fish	118	69.01	53.64
	Frozen fish	0	0.00	0.00
	Salted	45	26.32	20.45
	Smoked fish	0	0.00	0.00
	Dry fish	2	1.17	0.91
	Other	6	3.51	2.73
	Total	171	100.00	

Case Summary					
Valid		Missing		Total	
N	%	N	%	N	%
168	76.36	52	23.64	220	100

Respondents Preferred Location to Sell Product				
		Responses		% Cases
		N	%	
Where is the best place for you to sell your products?	Within your location	20	11.90	9.09
	Sub-district center	64	38.10	29.09
	Regency center	80	47.62	36.36
	Other regency	3	1.79	1.36
	Other province	0	0.00	0.00
	Export market	0	0.00	0.00
	Other	1	0.60	0.45
	Total	168	100.00	

Preferred Species and Price		
Species	**Frequency**	**Avg. price per kilo (Rp)**
Cakalang	3	10,000
Selar	0	0
Kerapu	1	30,000
Kakap Merah	30	37,000
Kakap Putih	161	27,683
Kembung	0	0
Tongkol	0	0
Tuna	0	0
Pari	4	12,500
Cumi-Cumi	0	0
Udang Windu	1	20,000
Udang Jerbung	35	26,714
Lobster	2	50,000
Teri	0	0
Others		
Angkui	8	13,125
Benih Nila	2	1,000
Bulanak	13	16,462
Gastor	2	2,000
Gel. Ikan	1	200,000
Gel. Ikan Gulama	1	150,000
Gulama	14	25,964
Gurame	1	35,000
Kepiting	3	41,667
Kuro	35	27,443
Lele	1	25,000
Mujair	7	20,000
Sembilan'	2	22,500
Total	327	

Barramundi Business plan calculation			
Variable cost			
Fish seeds	Stock density	x	Volume floating cage
	450 fish/m^3	x	27 m^3 (3x3x3 m)
	12,150		
Fish feed	Total fish when harvested		
	Fish seeds	x	Survival rate
	12,150	x	80%
	9,720		
	Total weight when harvested		
	Total fish	x	Weight per fish
	9,720	x	750 gr
	7,290		
	Total feed given (kg)		
	Total weight	x	FCR
	7,290	x	1.3
	9,477		
Revenue			
Sales	Total fish when harvested		
	Stock density	x	Survival rate
	12,150	x	80%
	9,720		
	Total weight when harvested (kg)		
	Total fish	x	Weight per fish
	9,720	x	750 gr
	7,290		

Banana Shrimp Business plan calculation			
Variable cost			
Fish seeds	Stock density	x	Volume floating cage
	3 shrimp/m^2/cycles	x	10.000 m^2
	60,000		
Fish feed	Total fish when harvested		
	Fish seeds	x	Survival rate
	60,000	x	80%
	48,000		
	Total weight when harvested		
	Total fish	x	Weight per fish
	48,000	x	28
	1,344		
	Total feed given (Kg)		
	Total weight	x	FCR
	1,344	x	0.5
	672		
Revenue			

Sales	Total fish when harvested		
	Stock density	x	Survival rate
	60,000	x	80%
	48,000		
	Total weight when harvested (Kg)		
	Total fish	x	Weight per fish
	48,000	x	28
	1,344		

Annex 3.2 Aru Regency

Annex 3.2.1 Business Plan

Section A: General Information

Statistics							
		Residential Area	Gender	Age Group	Educational Level	Occupation	Range of household salary
N	Valid	408	408	408	408	408	408
	Missing	0	0	0	0	0	0

Residential Area					
		Frequency	%	Valid	Cumulative %
Valid	Urban	250	61%	61%	61%
	Rural	158	39%	39%	39%
	Total	408	100%	100%	100%

Gender					
		Frequency	%	Valid	Cumulative %
Valid	Male	317	78%	78%	78%
	Female	91	22%	22%	22%
	Total	408	100%	100%	100%

Age Group					
		Frequency	%	Valid	Cumulative %
Valid	18-25	52	13%	13%	13%
	26-35	127	31%	31%	31%
	36-45	121	30%	30%	30%
	46-55	68	17%	17%	17%
	56-65	35	9%	9%	9%

	>66	5	1%	1%	1%
	Toal	408	100%	100%	100%

Education Level					
		Frequency	%	Valid	Cumulative %
	Primary	196	48%	48%	48%
	Secondary	91	22%	22%	22%
	High School	105	26%	26%	26%
	Vocational	4	1%	1%	1%
	No Schooling	1	0%	0%	0%
	Bachelor	11	3%	3%	3%
	Total	408	100%	100%	100%

Occupation					
		Frequency	%	Valid	Cumulative %
Valid	Working	385	94%	94%	94%
	Not Working	21	5%	5%	5%
	Student	2	0%	0%	0%
	Total	408	100%	100%	100%

Range of household salary					
		Frequency	%	Valid	Cumulative %
	< 1 million	149	37%	37%	37%
	1-3 million	172	42%	42%	42%
	3-5 million	49	12%	12%	12%
	5-8 million	14	3%	3%	3%
	> 8 million	24	6%	6%	6%
	Total	408	100%	100%	100%

Case processing summary						
	Valid		Missing		Total	
	N	%	N	%	N	%
Residential area * age group	408	100%	0	0	408	100%

Residential area *age group cross tabulation									
			Age group (%)						
			18-25	26-35	36-45	46-55	56-65	>66	Total
Residential area	Urban	Count	31	69	79	48	19	4	250

		Within residential area	12.4%	27.6%	31.6%	19.2%	7.6%	1.6%	100.0%
		Within age group	59.6%	54.3%	65.3%	70.6%	54.3%	80.0%	61.3%
		Percentage of total	7.6%	16.9%	19.4%	11.8%	4.7%	1.0%	61.3%
	Rural	Count	21	58	42	20	16	1	158
		Within residential area	13.3%	36.7%	26.6%	12.7%	10.1%	0.6%	100.0%
		Within age group	40.4%	45.7%	34.7%	29.4%	45.7%	20.0%	38.7%
		Percentage of total	5.1%	14.2%	10.3%	4.9%	3.9%	0.2%	38.7%
Total		Count	52	127	121	68	35	5	408
		Within residential area	12.7%	31.1%	29.7%	16.7%	8.6%	1.2%	100.0%
		Within age group	100%	100%	100%	100%	100%	100%	100%
		Percentage of total	12.7%	31.1%	29.7%	16.7%	8.6%	1.2%	100.0%

Case processing summary						
	Valid		Missing		Total	
	N	%	N	%	N	%
Residential area *Gender	408	100	0	0	408	100

Residential Area *gender group tabulation					
			Gender		
			Male	Female	Total
Residential Area	Urban	Count	195	55	250
		Within residential area	78.0%	22.0%	100.0%
		Within gender	61.5%	60.4%	61.3%
		Percentage of total	47.8%	13.5%	61.3%
	Rural	Count	122	36	158
		Within residential area	77.2%	22.8%	38.7%
		Within gender	38.5%	39.6%	38.7%
		Percentage of total	29.9%	8.8%	38.7%
Total		Count	317	91	408
		Within residential area	77.7%	22.3%	100.0%
		Within gender	100.0%	100.0%	100.0%
		Percentage of total	77.7%	22.3%	100.0%

Section B: Business Plan

Case Summary		
Valid	Missing	Total

N	%	N	%	N	%
303	74.26	105	25.74	408	100

Respondents Preferred Business				
		Responses		% Cases
		N	%	
what business do you think is the best to be developed within your location	Aquaculture	12	3.96	2.94
	Capture fisheries	148	48.84	36.27
	Fish trade	24	7.92	5.88
	Fish processing	59	19.47	14.46
	Other	60	19.80	14.71
	Total	303	100.00	

Case Summary					
Valid		Missing		Total	
N	%	N	%	N	%
272	66.67	136	33.33	408	100

Respondents Preferred Product				
		Responses		% Cases
		N	%	
what product do you think is the best product that you will produce with your business plan?	Fresh fish	153	56.25	37.50
	Frozen fish	1	0.37	0.25
	Salted	42	15.44	10.29
	Smoked fish	0	0.00	0.00
	Dry fish	2	0.74	0.49
	Other	74	27.21	18.14
	Total	272	100.00	

Case Summary					
Valid		Missing		Total	
N	%	N	%	N	%
191	46.81	217	53.19	408	100

Respondents Preferred Location to Sell Product				
		Responses		% Cases
		N	%	
Where is the best place for you to sell your products?	Within your location	101	52.88	24.75
	Sub-district center	6	3.14	1.47
	Regency center	51	26.70	12.50
	Other regency	0	0.00	0.00
	Other province	8	4.19	1.96

	Export market	8	4.19	1.96
	Other	17	8.90	4.17
	Total	191	100.00	

Preferred Species and Price		
Species	**Frequency**	**Avg. price per kilo (Rp)**
Cakalang	25	72,400
Selar	8	15,625
Kerapu	89	60,315
Kakap Merah	59	36,898
Kakap Putih	18	24,722
Kembung	15	19,000
Tongkol	16	17,188
Tuna	8	200,000
Pari	9	10,000
Cumi-Cumi	6	40,000
Udang Windu	6	40,000
Udang Jerbung	18	55,556
Lobster	35	1,014,118
Teri	6	10,000
Others		
Abalon	3	450,000
Balobo	21	44,762
Baronang	7	33,571
Belanak	18	15,882
Gel. Ikan Kakap Putih	11	6,831,818
Julung	34	84,853
Kakatua	16	25,125
Kaci-Kaci	5	4,705
Kepiting Bakau	14	157,143
Kuwe	5	18,600
Lencam	29	17,828
Napoleon	7	13,000
Sakuda	3	18,000
Sirip Hiu	5	900,000
Siput Mutiara	2	200,000
Telur Ikan Terbang	25	351,600
Tenggiri	21	31,250
Teripang	22	745,455
Total	566	

Barramundi Business plan calculation			
Variable cost			
Fish seeds	Stock density	x	Volume floating cage
	450 fish/m^3	x	27 m^3 (3x3x3 m)
	12,150		
Fish feed	Total fish when harvested		
	Fish seeds	x	Survival rate
	12,150	x	80%
	9,720		
	Total weight when harvested		
	Total fish	x	Weight per fish
	9,720	x	750 gr
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	Total feed given (kg)		
	Total weight	x	FCR
	7,290	x	1.3
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Revenue			
Sales	Total fish when harvested		
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	Total weight when harvested (kg)		
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	7,290		

Banana Shrimp Business plan calculation			
Variable cost			
Fish seeds	Stock density	x	Volume floating cage
	3 shrimp/m^2/cycles	x	10.000 m^2
	60,000		
Fish feed	Total fish when harvested		
	Fish seeds	x	Survival rate
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	48,000	x	28
	1,344		
	Total feed given (Kg)		
	Total weight	x	FCR
	1,344	x	0.5
	672		

Revenue			
Sales	Total fish when harvested		
	Stock density	x	Survival rate
	60,000	x	80%
	48,000		
	Total weight when harvested (Kg)		
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