

Simple Economics in Small Scale Tuna

Fisheries:

Results of an economic-survey conducted in

four MDPI sites in Eastern Indonesia



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Abstract

Fishing activities are an important livelihood option in Indonesia, especially in the more remote and rural regions. Tuna species are one of the most valuable species targeted in Indonesian waters, caught by both large- and small-scale operations. Small-scale tuna fisheries generate employment, income and contribute to food security and nutritional needs, often in disadvantaged and impoverished communities. Information and knowledge on the economic conditions of small-scale tuna fishermen is lacking. This report outlines a survey conducted with handline small-scale tuna fishermen in eastern Indonesia to gain better understanding on this topic. The aim of the survey was to understand the economic conditions and potential factors influencing wealth generated by these small-scale fisheries. The results highlight the pivotal role suppliers (or middlemen) have in local communities. The estimated average monthly incomes are compared against provincial minimum wages and the poverty line, indicating that these fishermen hover above the poverty line for most of the year. The relevance of these findings to national policy and the need to ensure sustainability and improvement within small-scale fisheries is discussed.

Keywords: alternative livelihoods, debt cycle, handline, minimum wage, poverty line

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1. Introduction

Indonesia is an expansive archipelagic state, with an estimated 28% of the 250 million population living within 10km of the coastline (Asian Development Bank, 2014). Fisheries resources are an important component of community livelihoods in these coastal regions, contributing to food security, nutritional needs and providing employment opportunities. At least 800 species are harvested in Indonesian waters (White et al., 2013), with fisheries varying in scale depending on the species, from small-scale and/or subsistence fishing activities to large-scale industrial activities. Tuna species are possibly one of the most valuable species in Indonesian waters, with the main tuna species including yellowfin (*Thunnus albacores*), skipjack (*Katsuwonus pelamis*), bigeye (*Thunnus obesus*) and albacore (*Thunnus alalunga*). Up to 90% of Indonesian vessels targeting tuna species are <5GT (Sunoko and Huang, 2014), using artisanal methods such as handline and pole and line. However up to 80% of the catch volume is caught by larger purse seines and longline vessels (Davies et al., 2014). Tuna fisheries are important both for the local and export markets, with the total export value of tuna products in 2013 estimated at ~ US\$760 million (MMAF, 2014). In recent years, market forces are influencing market access and demand for Indonesian tuna products, in terms of sustainability attributes (Duggan and Kochen, 2016), which is likely to influence the future export value and volume from Indonesia.

Small-scale tuna fishery operations usually occur in remote communities of eastern Indonesia, often with poor public infrastructure, education levels and unfavourable socioeconomic conditions. Investment in public infrastructure in Indonesia remains low (Lewis, 2013; World Bank, 2011), creating difficulties in reaching fishing communities to provide support and in transporting products to market. A continuous electrical supply may be lacking from some communities, especially in more remote locations (Blum et al., 2013), with a generator sometimes the only electricity source available during the day. This challenge with

electricity increases the costs of maintaining product quality within the cold chain. Access to ice and fuel may be limited and landing facilities can be minimal. Socioeconomic conditions mean that individuals tend to focus on short-term subsistence approaches to financial income, with limited importance placed on long-term planning, an observation comparable with other developing world fisheries (Teh et al., 2013). In terms of education, the net enrolment rate of individuals 16-18 years old varies across provinces, with eastern Indonesia generally having lower rates than the west (eastern Indonesia being the focus of this study the following figures are relevant: 47-52% in south east and central Sulawesi, 52-57% in north Sulawesi, 57-62% in West Nusa Tenggara and 67-74% in Maluku (Miranti et al., 2013)).

Despite progress and growth in the economy in recent years, Indonesia is still classified as a developing country, with a national poverty rate of 13.3% in 2010 and eastern Indonesia having the highest poverty rates, between 10-36% (Miranti et al. 2013, poverty rate defined as the percentage of the population earning between US\$1.25-2 a day). A minimum wage regulation exists in Indonesia (MMT, 2003), and varies by province (Anonymous, 2015). The regulation typically applies to waged employees, with the self-employed and casual workers not included, although it is unclear whether enforcing a minimum wage policy would contribute to poverty alleviation (Bird and Manning, 2008). Additionally, as with other sectors of Indonesian regulations, implementing and enforcing these regulations in such remote communities is problematic for the national government. Poverty in the fisheries sectors of developing countries is widely reported, although the reasons for such poverty are mixed (Béné, 2003). Small-scale fishermen in Indonesia are usually self-employed, with a variable income dependent on catches, meaning that the minimum wage regulation mentioned above is not relevant to their situation. To date the literature on economic conditions of small-scale tuna fishermen in Indonesia is lacking and the status of fishermen in context of the provincial minimum wage level is largely unknown.

Despite the scale and economic importance of tuna capture fisheries sector, the data availability is often low and mainly focused on catch compositions from large-scale operations. Data collection activities have improved in recent years, from the national departments, industry involvement and through NGO initiatives. However, the availability of socio-economic data from small-scale fisheries is sparse, a feature common in many small-scale fisheries worldwide (Teh et al., 2011), with the effect that the economic conditions and contributions of small-scale fisheries is often unknown or underestimated (Barnes-Mauthe et al., 2013). Assessing the status of a fishery solely on the available ecological data generates an incomplete picture of the fishery, especially when considering other objectives, such as economic and social (Anderson et al., 2015). Incomplete understanding of the economic conditions and viability of the small-scale fishery can hinder developing management plans towards improving the (ecological-economic) sustainability of the fishery (Cinner et al., 2009; Schuhbauer and Sumaila, 2016). Consequently, it is difficult to understand the economic contribution to and reliance on small-scale tuna fisheries in fishing communities.

Currently, there is no information in the scientific literature specifically relating to the social-economic conditions of small-scale tuna fisheries in eastern Indonesia. This paper attempts to fill some information gaps on the economic conditions of small-scale handline tuna fishermen in eastern Indonesia and provides insights into the potential vulnerability of such fisheries. Data from an economic survey and from an online small-scale fisheries database (I-Fish, www.ifish.id) are analysed to understand the conditions in these fisheries. Section two outlines the survey method and sites. Section three outlines the results from the four sections of the survey and gear use data from I-Fish. Section four presents estimated monthly incomes based on I-Fish catch data and price data from the survey. Section five discusses the implications of the results in terms of national and international policies and guidelines and identifies areas for future research.

2. Survey method and results

The survey was conducted in November 2015 in handline fisheries and in five provinces of eastern Indonesia. (Figure 1, Table 1). The survey was drafted in collaboration with the MDPI regional supervisors, who have in depth knowledge of local conditions and who can identify which sections should be adjusted to avoid fisherman confusion. Individual captains were interviewed using a structured survey (Supplementary Information I) and interviewees are anonymous. The interviews were conducted in Indonesian by MDPI site supervisors in each location, who are well known and trusted in the community. Fishermen were interviewed after a fishing trip, either on the beach or in their homes. The resulting sample is small due to fishermen availability and site supervisor schedules.



Figure 1. Site locations for the interviews. A – West Nusa Tenggara, B – South Sulawesi, C – Buru Island, Maluku (two villages), D – Central Sulawesi.

Table 1. Site descriptions and number of interviews per site.

Location	Main gear type	Tuna catch composition	Tuna locating technique	High season	Trip duration	Catch share system	Average crew onboard	Vessel type	# of Interviews
A. Lombok Island, Nusa Tenggara Barat (NTB)	Handline and pole and line	~70% yellowfin ~15% skipjack ~3% albacore ~2% bigeye	FAD, birds, dolphins	Apr-June, Oct-Nov	7-20 days	Yes		<i>Mandar</i> , 3-6GT <i>Penongkol</i> , 4-6GT	5 handline
B. South Sulawesi	Handline	~70% yellowfin ~20% skipjack ~10% bigeye	FAD		10-14 days	Yes		<i>Pa'ba</i> , 5-10GT	5 handline
C. Buru Island, Maluku	Handline	Mainly yellowfin	FADs, dolphins and birds		10-14 hours	No		<i>Bodi</i> , 1GT	10 handline
D. Central Sulawesi	Handline	~80% yellowfin	FADs	Mar-Oct	10-14 hours	No		1GT vessel	5 handline

The sections in the interview cover four topics: vessel ownership, fixed and variable costs and background information. Vessel ownership is a salient topic for small-scale fisheries because they are often dependent on support from suppliers/middlemen/aggregators (in the form of loans) to acquire a vessel. 25 valid responses were obtained (Table 1).

The Maluku and Central Sulawesi fishermen are involved in the Fair Trade program (Duggan and Kochen 2016), whereby the Fisher Association will receive a premium for every kilo of Fair Trade certified fish exported, known as a Premium Fund. The money in the Premium fund is to be spent on community development and environmental conservation programs and cannot be spent on improving fishing capacity and is not for the personal profit of individual fishermen.

2.1.Vessel ownership

In all sites, the majority of respondents required help in acquiring a vessel. Three respondents from South Sulawesi, four respondents from Maluku and one respondent from Central Sulawesi did not require assistance in acquiring the vessel. For those requiring assistance the vessel came from a combination of sources, but suppliers were the main source of assistance across locations (Table 2). Suppliers, also known as middlemen, are value chain actors who buy directly from the fishermen at the dock, store and transport the fish and then sell the catch to local processors. These actors can take various forms and buy the fish at different stages, some buying directly when the fish is landed, some buying from the vessel while it is still at sea (Adhuri et al., 2015). These suppliers tend to have a powerful and highly respected role in the community, help fishermen source items such as ice and fuel and can have a large influence on the financial status of fishermen (Bailey et al., 2015). Varying levels of binding relationships may exist between fishermen and suppliers, depending on the level of sponsorship the supplier enacts towards the fisher. Vessel ownership is an indicator of status:

fishermen who can acquire a vessel without support from external sources have the advantage of independence, are not tied to specific suppliers to sell their catch, and have the option of bargaining for a higher price.

Table 2. Source of assistance reported by fishermen in obtaining a vessel and associated agreement.

Source of loan	Number of respondents	of Repayment agreement
Bank	3	Instalments
Friends	5	Cut from the catch
Local government	2	Cannot sell vessel to another fisherman
Supplier	13	Instalments, binding agreement that must sell all fish to supplier
Do not need help	2	

2.2.Variable costs

The supplier was the most frequent provider of both ice and fuel, both seen as variable costs for the fishermen. Other sources for ice include a '*warung*' (small local restaurant), local vendors, homemade or buy from the ice factory. Other sources of fuel include Pertamina (a state-owned Indonesian fuel company) a cooperative or they buy themselves. The price per kilo of ice and per litre of fuel varied amongst sites (Tables 3 and 4). Many of the respondents from Maluku did not know the price of ice, as it is given from the supplier or homemade. Fuel is the largest cost component. Maluku and Central Sulawesi have the most expensive ice, with

West Nusa Tenggara and having the cheapest (based on price per kilo). For fuel, South Sulawesi has the cheapest price whereas Maluku has the most expensive, depending on the source (based on litre of fuel). The agreement for supplying ice and fuel depends on the supplier agreement. Ice is usually given at no cost if the member fisherman agrees that the supplier has exclusivity over the catch of large tuna. The supplier sources the fuel for member fishermen and pays for the transport cost, with the fishermen consequently paying a higher cost per litre of fuel but without the sourcing effort.

Table 3. Average price per kilo of ice and the average cost of ice per trip, per surveyed site.

Site	Price per kilo (US\$)	Average ice use per trip (kg, 2014*)	Average cost of ice per trip (US\$)
West Nusa Tenggara	0.02 – 0.03	4194	117
South Sulawesi	0.03	1234	41
	<i>from supplier</i>		
Maluku	0.05 – 0.08	40	2 – 3
	<i>homemade</i>		
	0.17 – 0.23		7 – 9
Central Sulawesi	0.05 – 0.07	53	3 – 4

*Data collection began in 2015 for Central Sulawesi. Average ice use per trip is based on data available in 2015.

Table 4. Average price per litre of fuel and the average cost of fuel per trip, per surveyed site

Site	Price per liter of fuel† (US\$)	Average fuel use per trip (liter, 2014*)	Average cost of fuel per trip (US\$)
West Nusa Tenggara	0.48 – 0.50	432	207 – 218
South Sulawesi	0.42	203	85
Maluku	0.54 – 0.64	35	19 – 22
Central Sulawesi	0.52 – 0.56	27	14 – 15

*Data collection began in 2015 for Central Sulawesi. Average ice use per trip is based on data available in 2015.† West Nusa Tenggara and South Sulawesi use diesel and Maluku and Central Sulawesi use gasoline.

2.3.Fixed costs

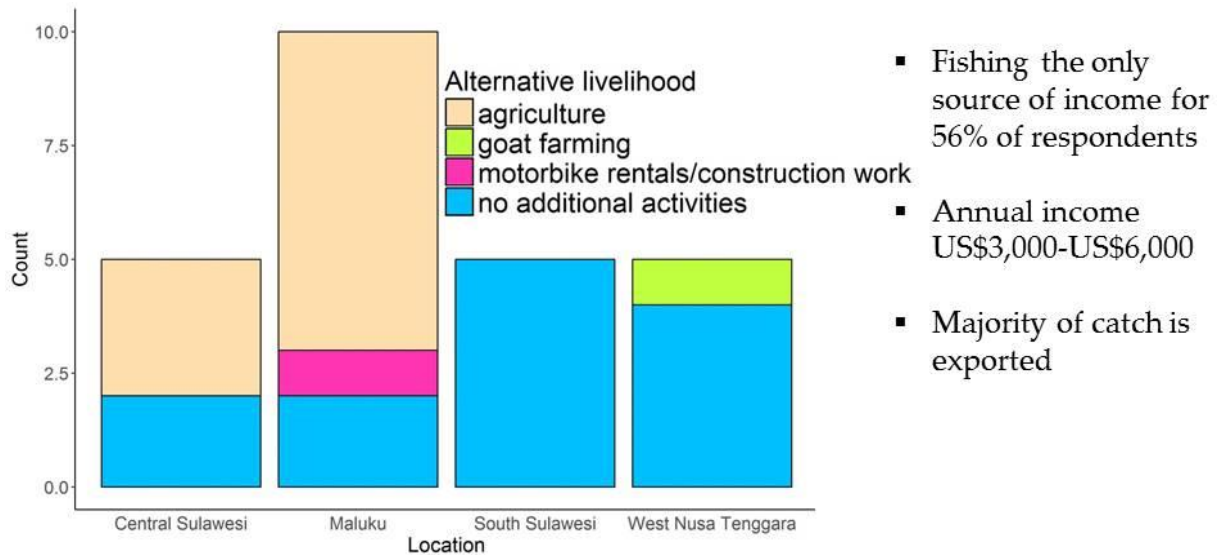
All respondents sell their catch to suppliers, who provide the transport for the catch to the processing facility, the cost of which is often included in a supplier-fisherman agreement (for example, a lower dock price per kilo of fish than if the fishermen transported the catch themselves). In terms of maintenance, all fishermen clean their vessel after each trip. The agreement for vessel maintenance assistance varied between sites: in Maluku, there was no

repayment when the assisting individuals were the respondent's wife, children or brother, but respondents repaid other assisting individuals with an agreed amount of money; in West Nusa Tenggara the assisting individuals (usually the crew) are paid through a catch-share system after unloading. Food and cigarettes were another fixed cost that varied between sites.

Table 5. Expenditure on fixed costs such as food and cigarettes per trip. All prices in US\$

Site	Food	Cigarettes	Others	Total cost/trip	Average cost/trip day
West Nusa Tenggara	108 – 178	100		208 – 278	21 – 28
South Sulawesi				63 – 174	6 – 17.4
Maluku	0.69 – 2	0.49 – 3		1 – 4	1 – 4
Central Sulawesi	2	5		7	7

The background information section can be summarised as in Figure 2.



- Fishing the only source of income for 56% of respondents
- Annual income US\$3,000-US\$6,000
- Majority of catch is exported



- <10% of women in Maluku reported to be involved in fishing activities
- Only one woman in West Nusa Tenggara reported to be involved in fishing activities
- All other sites, women reported as housewives

Figure 2. Summary of responses in the background information section.

3. Average monthly catches and estimated monthly incomes

Monthly average catches are compared with estimated maximum, minimum and average monthly incomes per fisherman for each of West Nusa Tenggara, Maluku and South Sulawesi (Figure 2, there was insufficient data for calculations in Central Sulawesi). Data for this analysis comes from I-Fish, www.ifish.id, a port sampling system for Indonesian small-scale tuna fisheries. The provincial minimum wages (Anonymous, 2015) and the provincial poverty line values (Badan Pusat Statistik, 2016) are included to contextualise the estimated monthly incomes (Table 6 and Figure 3). The situation varies depending on the province, reflecting the different vessel types and fishing characteristics in each site.

Table 6. Provincial minimum wages and provincial poverty lines per month, as at 2016

Province	Minimum wage	Poverty line
West Nusa Tenggara	103US\$ (1,482,950 Rp)	24.29US\$ (335,284 Rp)
South Sulawesi	156US\$ (2,250,000 Rp)	19.86US\$ (274,140 Rp)
Maluku	123US\$ (1,775,000 Rp)	27.42US\$ (378,538 Rp)

Fishing occurred throughout the year in 2015 in West Nusa Tenggara. The highest monthly average catches (March, August and September) do not overlap with the maximum estimated monthly incomes (May-June, under all three scenarios). The traditional high seasons of April-June and Oct-Nov are not immediately apparent in the graph of monthly catches. This is explained by the number of vessels unloading each month; an ~35-fold increase in May compared with January. The month with the highest maximum monthly income (June) is approximately the Muslim month of Ramadan, when fewer fishermen engage in fishing activities due to family responsibilities, fasting observances and mobile fishermen returning to their home location. Additionally, because of Ramadan and fewer active fishermen, the price of fish may be higher due to a temporary limited supply. The lowest estimated monthly incomes occur in January and February, with estimated incomes below the provincial minimum wage. This is traditionally the low season, with fish often being of lower quality, potentially explained by increased disturbance of fish in the storage unit caused by large waves, longer trips in attempts to increase the catch and melting of ice due to longer trips.

Fishing occurred for only seven months of 2015 in South Sulawesi, reflecting the fishing season. The fishing begins with a high season in April, with catches decreasing until July, this timing roughly again coinciding with Ramadan and Idul Fitri (end of Ramadan celebrations). August is typically a month of unfavourable climatic conditions, with fishermen choosing not to go to sea, reinforced by a traditional belief of low fish availability. The next three months of fishing occur September-November. Although the estimated monthly incomes

fall below the provincial minimum wage level on occasion (June, July and September, depending on the scenario), the estimated monthly income does not fall below the poverty line (25\$ per month, (Miranti et al., 2013)).

Similar to West Nusa Tenggara, fishing occurs year round in Maluku, with a high average monthly catch occurring from Jan-July and a decrease for the second half of the year. In all three scenarios of estimated monthly income, April is potentially the only month where the income of Maluku fishermen is equal to or greater than the provincial minimum wage. There are four months where the estimated monthly income potentially falls below the poverty line (August, September, October and December).

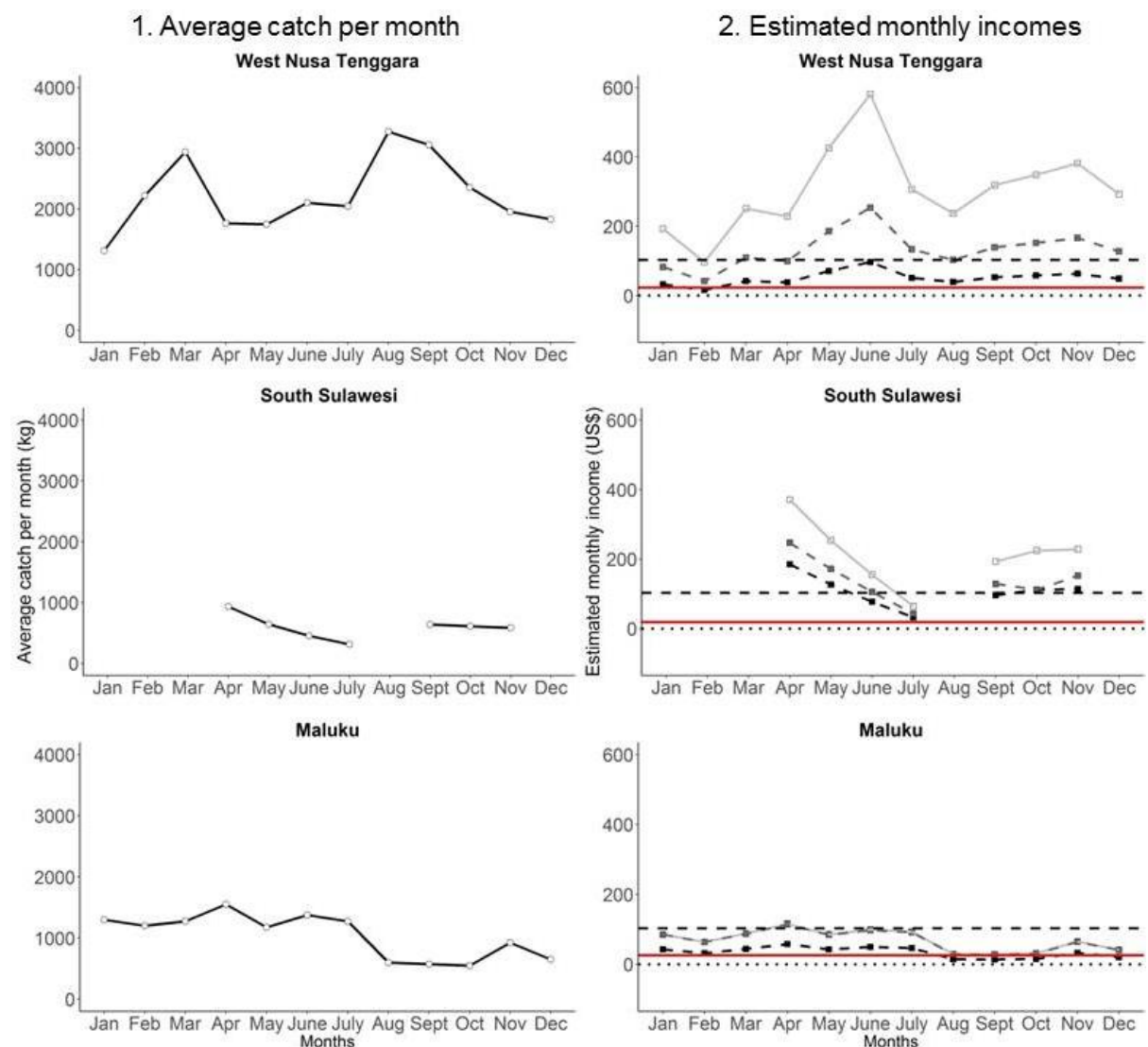


Figure 3. Column 1: Average catch per month of tuna species in West Nusa Tenggara, South Sulawesi and Maluku in 2015. Column 2: Estimated monthly incomes per fisherman in West Nusa Tenggara, South Sulawesi and Maluku, in 2015. Light grey – maximum monthly income, dark grey – average monthly income, black – minimum monthly income. Horizontal dash line – minimum monthly wage per province, horizontal dotted line – zero, red line – the provincial poverty line. The prices used in this study are from the survey period of September-November 2015.

4. Discussion

This survey intended to supplement the information collected from port sampling activities with small-scale tuna fishermen in eastern Indonesia and to identify potential vulnerability in fishing activities. Although the current findings are based on a small number of respondents, due to resource limitations and interviewing during fishing activities, the results nonetheless fill some information gaps on small-scale tuna fishermen in eastern Indonesia, whilst also highlighting differences compared with small-scale fisheries in other parts of the world. This is an important contribution as global generalisations of poverty and other aspects of small-scale fisheries are inadequate for guiding local management and support (Béné et al., 2016)

The majority of the respondents received help in obtaining the vessel from suppliers, the agreement being that the supplier receives exclusivity over the catch, a common practice in Indonesia (Adhuri et al., 2015). The agreement with the local government may initially seem more attractive, as it would give the fishermen more freedom when selling their catches, allowing them to get the best price. However, the agreement with a supplier may be safer. As seen from the responses in the *Variable Costs* section, the supplier also supports the fishermen

to obtain ice and fuel, two commodities that can be difficult to obtain in rural, remote communities of Indonesia. This is particularly true for the fishermen in Maluku on Buru Island, an island with poor and therefore expensive transport costs, and which had the highest prices per kilo of ice and per litre of fuel. Although the suppliers support the fishermen in many ways, a debt relationship is often generated between supplier and fisherman given the conditions the suppliers' assistance can place on fishermen, preventing fishermen from maximising value (Adhuri et al., 2015). However, some suppliers also support fishermen in other aspects of community and family life, as they are often related to the fishermen (Bailey et al., 2015).

In an Indonesian context, Stanford et al. (2013) found that communities highly-dependent on fishing activities were not automatically the poorest communities and that income from alternative livelihoods need to be considered. Agricultural activities, such as coconuts, bananas, cloves, goats, cassava and other miscellaneous activities, were some of the alternative livelihood options that respondents engaged in. Only one respondent had a non-agricultural alternative livelihood: motorbike renting and construction work. Maluku had the highest occurrence of alternative livelihood responses, possibly because of its location and characteristics: these sites are remote and rural, with low populations, compared to the other sites that are more urbanised, with low access to agricultural land. Information on the income generated from alternative livelihoods is required to fully understand fishermen's economic conditions in Maluku.

It is suggested that fishers in developing countries are masters of their own poverty (Cunningham et al., 2009), and fishing is frequently viewed as a last resort livelihood option for the poorest of the poor, with the need for alternative options to boost incomes (see Béné, 2003). However, this view is challenged (Béné, 2003), with Martin et al., (2013) finding that alternative livelihoods do not cause individuals to exit the fishery but support household incomes by diversifying the livelihood portfolio. The responses from Maluku would support

the theory that fishing activity is just one of many economic activities in which they engage (Allison and Ellis, 2001). Engagement in a diversity of livelihood options could make communities less vulnerable to market changes, to environmental cycles (Allison and Ellis, 2001) and to the natural seasonality of fishing activities. As is typical in small-scale fisheries, there is a strong dependence on specific gears within in each community (Table 7). West Nusa Tenggara was the only one to have recordings of additional gear use (four out of 445 port sampling interviews). This gear dependence highlights the vulnerability of all communities to any potential gear bans or gear restrictions by national or provincial management regulations, the suitability of which would need to consider other factors such as food security and livelihood alternatives before implementation.

Table 7. The occurrence of the use of ‘other gear’ types from port sampling data from the five sites in 2015 and 2016. (Data from I-Fish, an online database of port sampling in small-scale tuna fisheries)

Location	Number of port sampling interviews available	Main Gear	Frequency of other gear use
A. Lombok, Nusa Tenggara Barat (NTB)	445	Handline	Pole and line – 2 Gillnet – 2
B. South Sulawesi	38	Handline	0
C. Buru Island, Maluku	991	Handline	0
D. Central Sulawesi	123	Handine	0

From the results of this survey, it is clear that the fishermen potentially encounter seasonally-dependent periods of financial deficits on an annual basis. However on average the fishers, while earning below the minimum wage level are above the poverty line. The estimates

are slightly higher than for small-scale fishermen in other developing countries: the annual income of finfish and invertebrate fishers/gleaners in Madagascar is ~US\$ 1000-3500 (~US\$ 9-12 per day, Barnes-Mauthe et al., 2013). Vulnerability (exposure to risk and susceptibility) is an issue often related to poverty in fishing communities, with some evidence that individuals can be vulnerable despite earning above average income (Béné, 2009). Despite the occurrence of alternative livelihoods, the fishermen in this study may still be vulnerable to being caught in a 'poverty trap' (i.e. insufficient resources to overcome shocks or chronic low-income situations and remain poor or move towards poverty (Cinner et al., 2009)). For Maluku fishermen, there is no catch-share system, since it is one fisherman per trip. However, in West Nusa Tenggara and South Sulawesi, individual fishermen may earn slightly less than the estimated monthly incomes in Figure 2, because of the catch share system between the vessel owner, captain and crew, with the crew receiving an equal share of one third of the profits. This varies depending on the status of the captain and the agreement with suppliers and it was not possible to include this into the calculations for estimates of monthly income.

The results also highlight that the presence of fishing activity is of benefit to the community: they provide food for locals, either through direct sales of catches or giving away the carcasses; they provide post-harvest employment in the area, when the loins have to be cleaned and prepared for export; both local men and women derive employment opportunities from local fishing activities; they create a market for other traders, such as for fuel, knives, equipment, etc. The fishing activities also give rise to collective and reciprocal actions within the community (helping boats land, vessel maintenance, etc.), contributing to the overall well-being of fishing communities (Weeratunge et al., 2014) and building a collective identity (Pollnac et al., 2001, from a survey of Maluku fishermen, overlapping with Maluku).

The results from this survey are important to discuss in terms of the FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (FAO Guidelines, FAO 2015). The

social and economic development and well-being of small-scale fishing communities is a primary focus of these FAO Guidelines, with a request to recognise the significance of small-scale fisheries in local economics. Occupational multiplicity should be taken into consideration in management and development of small-scale fisheries. For example, the farming livelihoods of Maluku Island should not be adversely affected. The FAO Guidelines also provide a special provision for migrant fishers; that the role of these fishers should be understood, recognised and respected and should be considered in policies and management measures. This is relevant to these fisheries, where three respondents were not from the interview location and are often termed ‘Andon’ fishers, a common feature of eastern Indonesian fishing communities (Adhuri et al., 2015). If these fishers have an identity card that is registered in the location of origin they become ineligible for government assistance in the location of fishing (Stanford et al., 2013). This issue was addressed and resolved by developing provincial agreements between the province of origin and province of fishing activity. The procedure for granting government assistance to these migrant fishers may need to be reviewed if Indonesia wishes to fully adopt the FAO Guidelines.

Access to international markets is an important opportunity for small-scale fisheries, and the results from this survey indicate that respondents already have this opportunity, with the majority of catches going to the export markets for all respondents, a finding supported by the data collected by MDPI since 2012 across eastern Indonesia, where only the low quality fish is directed to the local market for domestic consumption. However, one issue that is not clear from the survey but which is considered in the FAO Guidelines is the effect of export levels on the nutritional needs of local communities. Further research is needed to determine if any food security issues exist and if they are related to the export of the fishermen’s catch. It may be that food security issues are not a direct consequence of the fishing livelihood but of wider

vulnerabilities affecting the community, as discussed by Mills et al., (2011) for African fisheries.

These results are important to consider in a national context for Indonesia. Indonesian fisheries management is going through a period of change with many new, and at times controversial, regulations introduced since a new cabinet was installed in 2014 (Duggan and Kochen, 2016). Additionally, international import requirements and certification schemes are having a big influence on the regulatory landscape of Indonesian fisheries management. Biological characteristics of a stock are often used to explain poverty in a fishing community but improved understanding of the influence of institutional dynamics, and of social-ecological dynamics can support development in these disadvantaged communities (Béné, 2003; Tilley and López-Angarita, 2016). Given the potentially low income and high vulnerability of small-scale handline tuna fishing communities, the implications of new regulations and policies for these communities needs to be fully considered if these communities are to maintain incomes at or above provincial minimum requirements and contribute towards pro-poor growth in Indonesia.

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Survey

Interview Economic data

Interview questionnaire

Interview number :
Date of interview :
Time start interview :
Interview location :
Supplier name :

Participants statement of Informed Consent

I understand that the purpose of this survey is to obtain data relating to the economic conditions of small-scale fisheries. I understand that all information I provide is confidential and will not be released by investigators to others. I agree that the information gathered from this study may be published, provided that no information can be used to identify participants.

I agreed to be interviewed. I understand that I do not have to answer certain questions and I am free to withdraw from the study at any time.

All my questions about the survey have been answered satisfactorily.

Currently MDPI collects data on catch composition, vessel characteristics, fishing trip characteristics and length of species such as skipjack and yellowfin. This data is stored securely in the I-Fish database system. MDPI does not, to date, collect data on the economic aspects of small-scale fisheries operations. The availability of such data from government sources is sparse and may not be specifically related to the small-scale fishermen of MDPI's project sites. Consequently it is difficult for MDPI to provide fishermen with an economic analysis of their fishing operations. This survey aims to gather economic data from a number of MDPI sites across eastern Indonesia to facilitate economic analysis and interpretation of existing I-Fish data. The study sites would be chosen to obtain data from both pole and line and handline fisheries as well as allowing comparison of the economic situation between provinces. The data collected will help MDPI conduct preliminary economic analysis of small-scale fisheries operations and identify whether such data needs to be collected on a regular basis or not.

Participant signature: _____ *Date:*/...../.....

I have explained the purpose of the project to the participants who have chosen to give oral consent to an interview with the conditions stated above:

Interview signature: _____ *Date:*/...../.....

Section 1: Boat ownership

1. Did you require any financial assistance in purchasing/renting the boat?

2. If you required assistance in purchasing/renting the boat, where did you find assistance?

3. What (financial) agreement did you make to obtain assistance?

4. If you rent the boat, how often do you rent and what is the (financial) agreement for renting?

Section 2: Variable costs

5. Where do you source your ice?

6. If you require assistance for sourcing your ice, what is the financial agreement?

7. What is the average price per kilo (block) of ice? If blocks are used, what is the weight of the block?

8. Where do you source your fuel?

9. If you require assistance in sourcing your fuel, what is the financial agreement?

10. What is the average price per litre of fuel?

11. (Pole and line only) Where do you source your bait?

12. (Pole and line only) If you require assistance for sourcing your bait, what is the financial agreement?

13. (Pole and line only) What is the average price per bucket of bait? What is the capacity, in litres, of the bait bucket?

Section 3: Fixed costs

14. To who do you sell your catch? How is your catch transported?

15. Who covers the cost of transporting the catch?

16. What are the maintenance and repair requirements for your vessel? How often do you do maintenance and repairs on your vessel?

17. Do you need assistance for vessel maintenance?

18. If you require assistance for vessel maintenance, what is the financial agreement?

19. Where do you source your fishing equipment (hooks, line, knife, etc.)?

20. If you require assistance in sourcing your fishing equipment, what is the financial agreement?

21. How is the price per catch determined? Price inclusive of transport, ice, fuel, quality, size, etc?

22. What is the average price per kilo of catch?

Whole Fish			
Species	Weight (kg)	Quality	Price

Loin

Species	Quality	Size	Dirty / Clean	Price

23. Any other expenses related to fishing that occur per trip? Example, how much is spent on food and cigarettes? Is there a donation to those who helped land the boat?

24. Do you need additional crew per trip? If yes, how many crew and how do you pay them? For example, are the crew paid per trip or per month? Are they paid a percentage of the catch or in money? What happens if there is no catch?

25. Do you receive any other financial assistance (outside of supplier)? Details?

Section 4: Background socio information

26. What percentage of household income comes from small-scale fishing (harvest and post-harvest)? How much income?

27. What percentage of women are involved in post-harvesting activities?

28. What other 'non-fishing' livelihood activities do small-scale fishers / you participate in (i.e. coconut plantation, clove farm, etc)?

29. What percentage of women work in employment unrelated to fishing activities?

30. How much of your catch per trip goes to the following channels?

	All	More than half	Half	Less than half	None
A. retained for household consumption and given to family/friends					
B. sold in local markets					
C. sold to outside markets (export)					
D. going to animal feed use					
E. going to other or unknown uses					

31. Do you encounter any problems in answering these questions? Details?