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**STUDY ON MARKET PROCESS OF TUNA POLE-AND-LINE FISHERY
IN EASTERN INDONESIA:
A STUDY CASE IN SORONG, PAPUA BARAT PROVINCE**

**Alexander M. A. Khan^{*1&4}, Lantun P. Dewanti¹, Izza M. Apriliani¹, Dedi Supriadi¹, Anta M. Nasution², Tim S. Gray³,
Aileen C. Mill⁴ and Nicholas V. C. Polunin⁴**

¹Laboratory of Fishing Management and Technology, Faculty of Fisheries and Marine Sciences, Universitas Padjadjaran, Bandung, Indonesia;

²Center for Deep Sea Research, Indonesia Institute of Science, Ambon, Indonesia;

³School of Geography, Politics and Sociology, Newcastle University, NE17RU United Kingdom;

⁴School of Natural and Environmental Sciences, Newcastle University, NE17RU United Kingdom.

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ABSTRACT

This research is a study of the way the small-scale pole-and-line tuna fishery in Sorong, Indonesia by examining official records of supply chains; key informant and fishers' perceptions of marketing; and personal observations of landings and selling. The main finding of the study is that the pole-and-line fishers in Sorong have made strenuous efforts to escape the constrictions of middlemen by direct selling to processors.

Keywords: Marketing; pole and line; small scale fisheries; Sorong; tuna fishery

INTRODUCTION

Indonesia is one of the world's largest producers of tuna with 767.000 tonnes export (FAO, 2017). The country lies between two major tuna producing regions, the Pacific and Indian Oceans and, furthermore, the Eastern Indian Ocean contributes about 20%, whilst the West and Central Pacific Ocean contributes about 80%, to Indonesia's total tuna landings (Bailey *et al.*, 2013, Investment, 2016, IPNLF, 2017). There is a huge global demand for tuna products, including canned tuna, fresh and frozen sashimi, other fresh and frozen value-added products, and *katsuobushi* (Hamilton *et al.*, 2011). Most of that demand is met by large-scale industrial fisheries (de Graaf *et al.*, 2015) and these provide work for 90% (109 out of 119 million people) of the people employed in capture fisheries (FAO, 2016). Moreover, globally, small-scale fisheries provide much more employment than do large-scale fisheries - 109 out of the 119 million people employed in capture fisheries (FAO, 2016). The small-scale pole-and-line tuna fishery in Indonesia mostly supplies local and national markets, whereas the industrial tuna fisheries sell their catches mainly to national and international markets (Bjorndal *et al.*, 2014). However, small-scale pole-and-line tuna

fisheries in Indonesia are at risk from the threat of overfishing by illegal, unreported, and unregulated (IUU) industrial fisheries, mostly foreign, which derive substantial tuna catches from within Indonesia's exclusive economic zones (EEZs). This threat has been periodically addressed by the government: for example, in 2014-2015, the Ministry of Marine Affairs and Fisheries (MMAF) imposed a moratorium on foreign industrial fishing in Indonesian waters, which temporarily had some beneficial effect on the pole-and-line tuna fishery (Khan *et al.*, 2018). Another threat comes from the marketing strategies adopted by some of the legal industrial tuna fisheries, including selling directly to processors thereby cutting out the middleman; eco-certification of their products: and traceability of their catches. The last two initiatives are undertaken to convince consumers that tuna products have come from sustainable and responsible sources (Stratoudakis *et al.*, 2016, Stemle *et al.*, 2016, Parenreng *et al.*, 2016, Hadjimichael & Hegland, 2016, Duggan & Kochen, 2016, Adhuri *et al.*, 2016, Yeeting *et al.*, 2016, MSC, 2017) This study examines some analyses to understand the marketing supply chain in Sorong, Papua Barat Province. (Chandler, 2014, Chandler & Reid, 2016, Boyd & Folke, 2012, Gunderson & Holling, 2002).

correspondence author:

e-mail: alexander.khan@unpad.ac.id

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MATERIALS AND METHODS

Study Sites

The field survey was conducted at Sorong, Papua Barat Province, Indonesia in July–September 2015. The study location was selected because they were representative of fishing bases for small-scale tuna pole-and-line operations and markets in Papua Barat, eastern Indonesia.

Data Sources

Documentary Sources

The market supply lines and selling data for the study were gathered from landing site managers; government fisheries offices; tuna processing companies; a desk study; and a field survey.

Questionnaires

Two separate exercises of questioning stakeholders were carried out. First, the key informants (KIs) were interviewed face-to-face by the researcher to find out their perceptions of the market based on prepared questionnaires consisting of both open-ended and closed questions (Gubrium & Koro-Ljungberg (2005). The KIs interviewed were chosen for their expert knowledge and working experience of tuna pole-and-line fisheries in Indonesia. Part of the KI questionnaire focused on the KIs' perceptions of their market supply lines and the traceability of their products. Initial contact was made with several potential KIs by way of interactions and introductions made by local tuna processing company staff, fishery office staff, landing site staff, fishers' group leaders, captains, community leaders, scientists, and policy makers from local and national levels and their responses to the interviewer generated mainly qualitative data. Additionally, further contacts were made by using the 'snowball sampling' method, whereby participants suggested other possible participants (Gubrium & Koro-Ljungberg, 2005), or by visiting other stakeholders at the research sites in the manner suggested by Turner (2010). Second, the fishers were questioned in a field survey by the researcher with additional support from two local field assistants who received training related to the conduct and aims of the research (Lavides, 2009). This survey

questionnaire (SQ) contained closed questions and generated quantitative data.

Observations of Tuna Pole-and-Line Market Activities

The researcher observed the unloading of the catches at the landing base then observed fishers transferring fish to market and subsequently to processing companies and occasionally outside the fishing base. Thus, the entire market process was observed in order to better understand the mechanisms involved.

Data Analysis

The information obtained from the questionnaires on respondents' perceptions of the supply lines and market chains was collected, interpreted, and analysed descriptively. From the SQ questions, the associations between types of stakeholders and their perceptions of the supply chains and the approaches to traceability were compared and the differences were determined using Chi-square tests.

RESULTS AND DISCUSSION

Results

A total of 215 respondents were interviewed during the research survey in Sorong with a total number of 40 key informants [KIs]. The age range was from 25 to 47 years old and with years of working experience ranging from 2 to 23 years. The majority of the respondents from both the policy makers and public-sector workers (62.5%; $n=20$) said they were aware of the overall tuna supply chain, although nine of the policy makers and public-sector workers (28.1%) said they were unaware, and three said they did not know (Fig 1). Taken as a whole, there was no significant difference in the stakeholders' perceptions of the tuna supply chain between the policy makers and the public-sector workers ($c^2=2.133$; $p>0.05$). It was postulated that the tuna supply lines would vary between the research sites, and this was confirmed by a public-sector worker (KI-03) who stated: "*there are many types in terms of tuna supply lines, such as: (1) direct selling by the fishers into the local market; (2) selling by fishers to the middle-man prior to the local market, and (3) fishers-private partnership on export market orientation*".

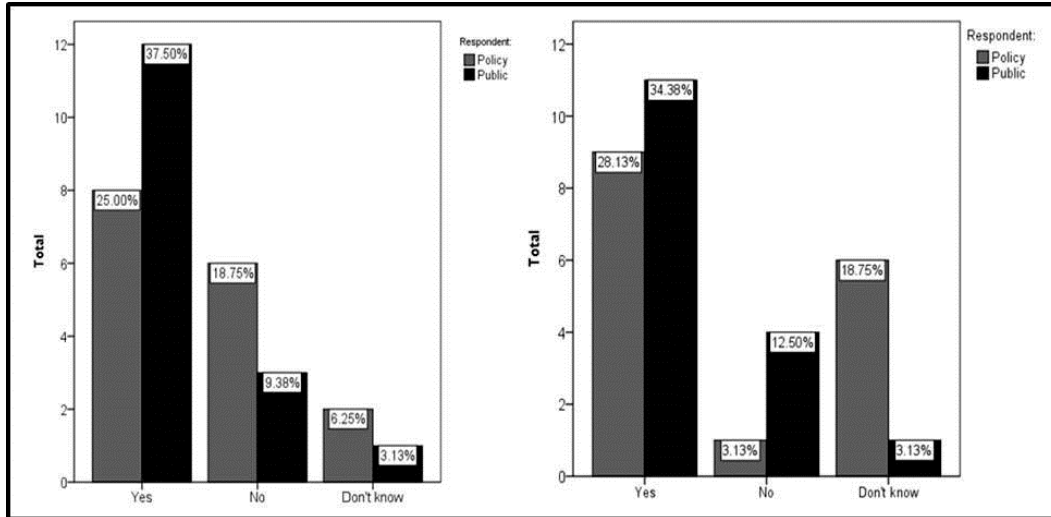


Figure 1. Respondents' responses to the research questions:
 a. "are you aware of the tuna supply lines?"
 b. "are you aware of the tuna traceability process?"

The traceability process in the supply of tuna pole-and-line products consists of several processes according to one of the policy makers, KI-04, who stated: "the tuna traceability process in Indonesia generally follows these simple processes: (1) the tuna canning company's traceability system; (2) the catch origin certificate, which is issued by the fish landing manager; and (3) the fishing licence, which is issued by the government". Another key informant (KI-05) said that the company has its own traceability system: "the processing company has its own barcode system that it employs in its canned operations, which enables the end buyers or consumers to trace back any product to its point of origin".

All the fresh tuna catches from the Sorong fishing grounds are landed by the fishers at two locations. If the fishers are contracted by a canning company, the catches are landed at the canning company's port. Similarly, if the fishers obtain logistical support for their operations from a frozen fish company, the tuna will be landed at that company's landing site: there is no way for a fisher to enter the canned market if he is not contracted by a company. The tuna canning company in Sorong targets national and international markets. Likewise, the frozen fish companies predominantly supply whole frozen tuna to the export market and the national market, though they distribute a small amount locally in Sorong (Fig. 2).

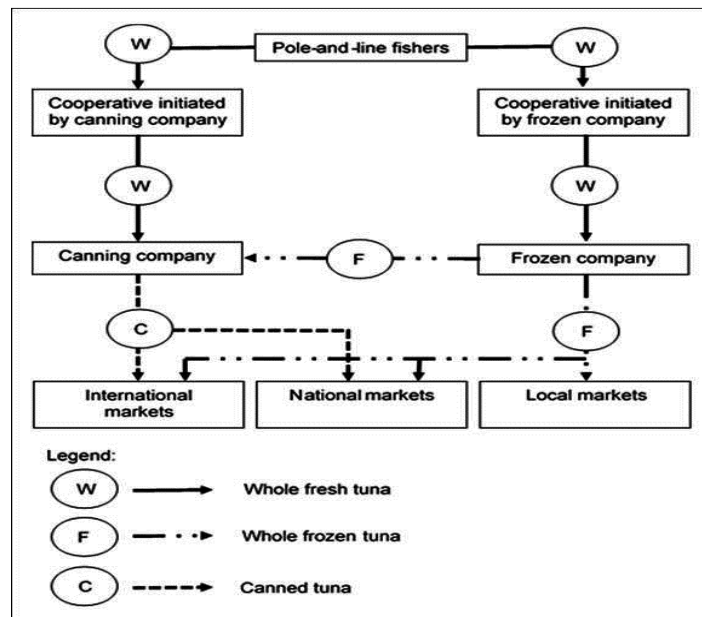


Figure 2. Pole-and-line tuna market distribution supply lines in Sorong. The arrows illustrate the market flow of the tuna.

KI-01, one of the employees at the frozen tuna company in Sorong, stated: “our frozen tuna product is supplied to the local markets within this location and within the province ... sometimes it is distributed inter-island, while the export of our tuna is typically to the market in the US”. The supply lines both from the canning and frozen companies (Fig. 2) show that the traceability system was an important element in their marketing strategy since they are oriented towards the export and national markets. The traceability system used by one of the processing companies in Sorong was confirmed by KI-05 (a worker in a canning tuna processing company in Surabaya) who said the: “list of documents to confirm the tuna origin provided by our suppliers is one of the requirements that must be met.” The tuna pole-and-line fishery in Sorong was also pursuing Marine Stewardship Council (MSC) certification for its skipjack and yellowfin tuna (White, 2017, Service, 2017, Bailey, 2017).

Discussion

As Alimina *et al.* (2015) notes, the small-scale tuna pole-and-line supply line in Southeast Sulawesi, eastern Indonesia mainly runs from fishers to middlemen or to retailers and subsequently to processing or cold storage, and finally it is sold on to consumers locally. In Sorong, nearly half of the pole-and-line fishers are constrained by the fact that they must land their whole fresh tuna catches in the cooperative unit which is initiated by the processing companies. Data from the Sorong fishery office showed that in 2014, 131 of the total of 375 units of pole-and-line were tied to processing companies (Dinas Perikanan Kota Sorong, 2015). Fishers who receive logistical and financial support for conducting their fishing operations from the companies with whom they are affiliated and contracted cannot land their catches elsewhere even though the prices could be higher, and so their relationship to the companies is more like an employee-employer arrangement than a partnership arrangement. These fishers are thus highly dependent on their ‘bosses’ and have no control over the market.

These marketing restrictions in Sorong are clearly contrary to the FAO’s Blue Growth Initiative, which demands fair access to markets by small-scale fisheries (FAO, 2016). The restrictions are threats to the livelihoods of small-scale fishers: a study undertaken by Watson *et al.* (2017) revealed that open market access between developed and developing countries leads to poverty reduction, greater food security and strengthened small-scale fisheries resilience. For example, open market access for tuna

products from Regional Fisheries Management Organizations (RFMOs) members such as Indonesia to markets in Europe, USA, Japan and other developed countries led to more fairness in setting tuna prices (Yongil *et al.*, 2008, Huang & Leung, 2011, Fernández-Polanco, 2016).

The profits from tuna fishing go mostly to processors and middlemen rather than fishers. The fishers have very limited direct interface with retailers and are therefore price-takers rather than price-makers (Fig. 2). The added-value profit from the tuna which has eco-certification and traceability guarantees goes primarily to the owners and financiers of the processing companies, both canning and frozen, rather than to the tuna pole-and-line fishers. Both canning and frozen processing companies in Sorong export to international markets, mostly to the USA and the EU, which are high quality markets requiring strict standards to be met. Washington & Ababouch (2011) reported that since 1973 the food control authorities in the USA have imposed on imported tuna products the code of good manufacturing practices (GMP) and incorporated both hazard analysis and critical control point (HACCP) systems as a condition of entering their markets. An observer might think that these certification requirements would benefit local fishers by sharing in the high prices obtained for their high quality products (Adolf *et al.*, 2016). But in fact, most of the added revenue goes to processors not local fishers; Stratoudakis *et al.* (2016) found that fisheries certification has potentially negative socio-economics consequences particularly for small-scale fishers, as furthermore, Gunderson & Holling (2002) stated that this unfair relationships may led to socio conflict.

Moreover, this situation is unlikely to change in the future. In mid-2017 one of the tuna processing companies in Sorong, which is supplied by local pole-and-line fishers, committed to apply for internationally recognized MSC certification for its fishing practice in eastern Indonesia (White, 2017). This certification process is one of the adaptation processes mentioned by Boyd & Folke, (2012) to deal with the complexity and uncertainty of globalization of fish markets, especially for small-scale fisheries such as tuna pole-and-line which are vital to food security, livelihoods and economic development of local communities (Longo *et al.*, 2017). But while MSC accreditation might help to maintain demand for Sorong pole-and-line tuna fish and therefore safeguard jobs, it is unlikely to make the fishers richer, because most of the premium for MSC tuna will be absorbed by processors.

Traceability can be defined as being able to track a product through every stage of the overall production and handling process from fishing ground to plate (Popper, 2007). The traceability scheme of tuna pole-and-line in this study consists of two types: manual and electronic schemes (Leal *et al.*, 2015). In Sorong, the tuna processing companies use both manual and electronic schemes to track their tuna products as part of their product traceability. Other studies found that in Bitung, Indonesia, a manual traceability scheme has been adopted by tuna processing companies (Parenreng *et al.*, 2016) and an electronic scheme for tuna pole-and-line (Seminar *et al.*, 2016). Three lessons can be learned from these traceability schemes. The first lesson is that the active involvement of all stakeholders including fishers, processing companies, government retailers, and end-consumers, is crucial to their success (Bush *et al.*, 2017). The second lesson is that the traceability process must be robust and firmly secured all the way from the fishing grounds to the consumers (Seminar *et al.*, 2016). Third, the basis of the traceability process is food safety (Leal *et al.*, 2015).

There are, however, many obstacles faced by tuna pole-and-line fisheries in eastern Indonesia in adopting the traceability schemes. Traceability implementation in the seafood market can be costly, and it requires coordination with all actors involved in the fisheries (Bailey *et al.*, 2016). Traceability schemes also require valid and reliable data, which has been difficult to obtain in Indonesia due to lack of authorities' monitoring capabilities and so uncertainty of data on tuna is commonplace (Yuniarta *et al.*, 2017). As a result, the traceability systems that are in place for these pole-and-line tuna fisheries are variable in their reliability. Finally, even when reliable, traceability schemes invariably bring premium prices to processors rather than fishers. To deal with such problems, in 2017 a collaborative partnership between the US government and a non-governmental organisation (NGO) embarked on establishing a tuna pole-and-line traceability system throughout Indonesia with the purpose of gaining a niche advantage of sustainable fisheries management and supply chain procedures (IPNLF, 2017).

CONCLUSION

This study has examined the marketing system in place for small-scale pole-and-line tuna fishery in Sorong, Indonesia, and has found that the supply chains are tightly controlled by middlemen and processors, who provide financial and other operational help to fishers to enable them to continue fishing, in return for which fishers are required to deliver their

fish to them at prices set by the middlemen and/or processors. This means that apart from the few fishers who can fund their fishing without help from middlemen or processors, most fishers have little or no control over the terms on which they deliver their fish for sale.

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