



# Study on trawl fishery socio-economics and supply chains in Kien Giang, Viet Nam

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## ABBREVIATIONS

<b>Abbreviation</b>	<b>Description</b>
ASC	Aquaculture Stewardship Council
BAC	Boat Active Coefficient
BRD	bycatch reduction device
CP Vietnam	CP Vietnam Joint Stocks Company
CPUE	Catch per Unit of Effort
CSR	Corporate Social Responsibility
CTI	Coral Triangle Initiative
DARD	Provincial Department of Agriculture and Rural Development
DFISH	Directorate of Fisheries
DOF	Department of Fishery
DPI	Department of Planning and Investment
EEZ	exclusive economic zone
FA	fisheries association
FAO	Food and Agriculture Organization of the United Nations
FAORAP	FAO Regional Office for Asia and the Pacific
GDP	Gross Domestic Product
GEF	Global Environment Facility
HCMC	Ho Chi Minh City
hp	horsepower
IFFO	International Fishmeal and Fish oil Organization
MARD	Ministry of Agriculture and Rural Development
PPC	Provincial People's Committee
RIMF	Research Institute for Marine Fisheries
SEAFDEC	Southeast Asian Fisheries Development Center
TC	total cost
TR	total revenue
UNEP	United Nations Environment Programme
VND	Viet Nam Dong (Viet Nam Currency); 1USD is equivalent to 22,470 VND

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## ABSTRACT

This study on the socio-economics and supply chain of trawl fisheries in Kien Giang province, Viet Nam, was conducted during November and December 2015, and focused on otter trawler fleets, shrimp trawlers, anchovy pair trawlers and mixed pair trawlers in Rach Gia city, Chau Thanh district and Ha Tien Township. Questionnaires were designed to interview and get feedback and relevant information from fishers, vessel owners, middlemen, seafood/fishmeal processors and traders, associations and fisheries managers. The main objectives of the study are to identify: (1) the key issues related to socio-economics of the trawl fishery in Kien Giang including catch and catch composition, catch volume and value, role of main fish production in the fishery concerned; (2) issues related to fishing operation and post-harvest handling practices; (3) importance of the trawl fishery in terms of food security, livelihoods and incomes of stakeholders who may be directly or indirectly impacted by the fishery and; (4) issues related to management of the fishery.

The study focused on social aspects such as the number of fishermen and associated labourers in the fishery; and the incomes and livelihoods of major groups (fishers, vessel owners, fish porters, fish pickers, workers in the fishmeal processing plants, seafood processing factories). Analysis of trends in catch landings of the important fishing fleets in recent years and rough estimations of some other indicators for the fishing fleets concerned (e.g. trip revenue, trip operational cost and net benefit) was performed based on the data and information collected. Assessments of the key supply chains for the major products caught by trawlers such as pig fish/fertilizer fish,<sup>1</sup> dried squid, octopus and cuttlefish, shrimp, were carried out.

The trawl fishery plays an important role in terms of socio-economic development in the province, and annually contributes about 85 percent of the total landing volume, as well as providing work for about 27 500 fishers, as well as a larger number of labourers involved in fishmeal processing, seafood processing and sun-drying shrimp, and fish porters at the landing sites and fishing ports. Additionally, the fishery supplies important sources of raw materials for the fishmeal industry in the Province as well as throughout South Viet Nam. In 2015, about 110 000 tonnes of fishmeal was produced in the province which is important ingredient of the aquaculture feed for shrimp and other fish species farmed in the country and a part was used for export.

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<sup>1</sup> Pig fish and fertilizer fish are translations into English of the Vietnamese terms that refer to fish that are used for feeding pigs, or in the past, used as fertilizer in agriculture. Pig fish or fertilizer fish is normally comprised of low value species mainly threadfin porgy, flat head fish, cardinal fish, goatfish, and partly of juveniles of economically important species, including lizard fish, goat fish, red bigeye, and croaker. In the literature, pig fish and fertilizer fish may be referred to as low value fish or “trash fish”. In this paper, there are instances when the term “trash fish” is used, and this refers to what is locally termed as pig fish/fertilizer fish.



However, the fishery is faced with issues that may impact on its sustainability and these challenges and difficulties must be addressed to ensure a long-term sustainable fishery. Such issues currently include: weak management of fishing labourers, increasing conflicts with other fishing fleets, poor fishing and handling practices, and weak monitoring, control and surveillance (MCS). The increasing demand on raw materials for fishmeal industry and seafood for human consumption create more challenges to the sustainability of the fishery.

This study also emphasized current fisheries management bodies at the local level and management policies and strategies at both the central and local levels. The central government has recognized that trawl fishing capacity should be reduced and have developed a roadmap to decrease the number of trawlers in the coming years. This also involves a freeze on the quantity of small trawlers (below 90 HP). Additionally, the study shows that it is difficult to persuade trawler operators to change to other gears, because trawl fishers are still able to stay in business with positive benefits.

There is a need to improve the trawl fishery in Kien Giang towards sustainability to ensure security for the large number of beneficiaries who have either direct or indirect benefits from the fishing operations. Collective efforts should be made among relevant stakeholders and actors along the key supply chains of the products sourced by this important fishery.

While the information collected from the study is informative and valuable, the limitations of the study duration and coverage should be taken into consideration when using the results. An in-depth study on the socio-economics of trawl fishery and other gear types should be performed to fulfill the gaps and to keep track of the trends. Nevertheless, the outputs of the study are useful as baseline for later comparison and valuable for reference purposes.

## 1. INTRODUCTION

Increasing fisheries sustainability concerns, particularly in relation to trawl fishing, are being paid more attention globally. Approaches relating to social aspects, environmental impacts and the promotion of the ecosystem approach to fisheries management are being applied by a range of organizations to try to improve the sustainability of trawl fisheries. Trawlers are dominant in Thailand, Viet Nam and many other Southeast Asian nations and are important in providing raw materials for fishmeal processing industries and seafood for human consumption. However, trawlers are largely non-selective in their operation and may have negative impacts on fisheries resources and the environment by damaging critical habitats such as nursery grounds, spawning grounds, seaweed meadows and coral reefs. Poorly managed tropical trawl sector in Asia is leading to depletion of fish stocks in nearshore waters (FAO, 2014) and dramatically decreased landing volumes and catch per unit effort (CPUE) in some countries in the Region (Saikliang, 2013, Ramiscal and Dickson, 2009).

Asian countries are currently among the biggest aquaculture producers and Viet Nam is considered as one of the top five aquaculture producers in the world. This means that the demand for fishmeal is rapidly growing and huge volumes of fishmeal and fish oil are needed to produce the aqua feeds upon which the industry depends. This demand means that fishers are able to retain all the fish caught and the ‘bycatch’ and discard definition/concepts cannot be applied to the Region. In Viet Nam, bycatch reduction devices (BRDs) are not being used by trawlers and small mesh-size codends are the norm. A large number of households have livelihoods and incomes that are heavily dependent on the trawl fishery. In Viet Nam, materials to replace fishmeal as an aquafeed ingredient have not yet been developed. This leads to the requirement for harmonized solutions to fisheries management that ensure the sustainability of the trawl fishery, while negative impacts to the environment and livelihoods, are reduced, but which still match the demands from the aquaculture sector.

Some international organizations are updating, amending and developing new standards for aquaculture feed production through certification and labeling, e.g. Aquaculture Stewardship Council (ASC) and The International Fishmeal and Fish Oil Organization (IFFO). Thus higher standards for social and environmental impacts and the concept of corporate social responsibility (CSR) in the fishery industry are also being developed and are starting to be applied in many fisheries. These demands add pressure on the aquaculture industry to improve and promote sustainable fisheries management. The sustainability of the trawl fishery is a vital issue not only for people directly involved in trawl fishing operations but also for the large number of people indirectly engaged in the fishery and other stakeholders who are using or trading fish products unloaded by the trawlers.

There are presently about 3 192 units of pair trawlers and 560 otter trawlers operating in Kien Giang province. Officially, there are no “anchovy pair trawlers” in the Registry licensing system used in the province. However, there are significant differences between the fleets of anchovy pair trawlers and “mixed pair trawlers” in terms of fishing gear used, the fishing grounds trawled and the main target species. There are 350 pairs of anchovy pair trawlers in the province, and mixed pair trawlers which use two types of trawl fishing gears, and can fish both daytime and nighttime. Otter trawlers are normally small in size and engine capacity, targeting mainly shrimp, squid and cuttlefish, and mixed fish.

There are around 30 seafood and 12 fishmeal processing companies operating in the Province (not including fish sauce industry). Annually, the local fishmeal processing plants provide thousands of tonnes of fishmeal as an input material for aqua feeds or livestock feed processing industries in Viet Nam, and a part is used for export. The importance of the trawl fishery can be seen through these linkages. Nevertheless few studies have been done to obtain more comprehensive knowledge and information about the fishery. To date, in-depth studies on the socio-economics of trawl fishery are very limited, either in Kien Giang or anywhere else in Viet Nam.

In the current context, there are insufficient human and other essential resources to ensure good management of the fishery. Landing data collection is not part of the routine work done by the local authorities. There is an absence of data on fish landings, fish stock assessment or other fisheries economic information. Thus it is challenging to do a rapid assessment of the economic aspects, including fish landing value, contributions to livelihoods, incomes of the relevant actors) and social aspects (labour, gender issues, conflicts, work generation, raw material dependence etc.). Studies relating to the socio-economics of the trawl fishery in Kien Giang are rare and no specific research on socio-economics of the trawl fleet has been done so far. In 2014, an assessment against Responsible Supply of Fish Meal and Fish Oil standard (IFFO RS standards)<sup>2</sup> concluded that fishery compliance is low (IFFO, 2014).

In order to have a more detailed and comprehensive understanding of the trawl fishery and to better understand its importance, the REBYC-II CTI Project designated an activity namely “Study on trawl fishery socio-economics and supply chains in Kien Giang, Viet Nam”. This study focuses on the Kien Giang trawl fishery and some important related supply chains. Data for the study were collected between October and December 2015.

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<sup>2</sup> The International Fishmeal and Fish Oil Organization (IFFO) has developed a Global Standard and Certification Programme for the Responsible Supply of Fishmeal and Fish Oil (IFFO RS). IFFO recognizes the importance of responsible sourcing, responsible production and responsible supply practices. The standard covers criteria related to state of fisheries resource concern, existing and operating of the fisheries management in place (management framework), management approaches and measures and management performance, responsible traceability and manufacturing practices.

The study aimed to find answers to the following concerns:

- The major socio-economic characteristics of the trawl fishing community;
- Importance of trawl fishery in food security, livelihoods, incomes and resource users dependent on this fishery;
- Key issues related to fishing operations and fisheries management; and
- Connections between capture fishery (trawl fishery) and aquaculture as well as industries dependent on raw materials sourced from trawl fishery in Kien Giang.

This report presents key findings from the study, particularly with regards to the supply chain of some key products from the trawl fishery in Kien Giang. The supply chain approach provides information on the linkages between actors and identifies who are getting benefits, and whose incomes/livelihoods are most dependent on the trawl fishery.

## **2. OVERVIEW OF KIEN GIANG TRAWL FISHERY**

Located in the southwest area of Viet Nam, Kien Giang is a relatively large province and the fisheries sector is important to the local socio-economy. There are 15 administrative districts having marine capture fishing vessels. However, the vessels are most dominant in Phu Quoc, Rach Gia City, Kien Hai, Kien Luong, and Ha Tien township and Hon Dat districts. Accordingly, Kien Giang is the most important fishing province in Viet Nam. Kien Giang marine waters belong to the eastern part of the Gulf of Thailand which border with Ca Mau province and Cambodian waters ([Figure 1](#)).



Figure 1. Location and map of Kien Giang and its adjacent waters.

The province has the largest number of fishing vessels (10 275 units). The trawl fleet in Kien Giang is also the largest compared to the other provinces. There are many different fishing gear types used in the province, including trawls, gillnets, purse seines and hook & lines (Table 1). There are also several thousand small fishing boats catching fish by other gears such as pots and traps (for crab, squid and cuttlefish, octopus), push nets and lift nets.

Table 1. Structure of fishing fleets by gear types and horsepower groups in Kien Giang.

Gear type	HP group							Sub-total
	< 20	20 - < 45	45 - < 90	90 - < 150	150 - < 250	250 - < 400	>= 400	
Anchovy purse seine	0	2	3	8	47	138	44	<b>242</b>
Mackerel purse seine	0	0	1	1	6	98	4	<b>110</b>
Purse seine with light	0	0	0	0	0	0	0	<b>0</b>
Bottom gillnet	103	101	34	4	7	88	3	<b>340</b>
Gillnet	0	3	8	1	3	87	9	<b>111</b>
Shrimp gillnet	78	55	5	3	3	0	0	<b>144</b>

Small size trammel net	0	4	0	0	0	0	0	<b>4</b>
Sardine gillnet	99	40	1	0	0	0	0	<b>140</b>
Crab trammel net	1 329	1 043	317	17	75	18	4	<b>2 803</b>
Otter trawl	1	69	72	41	181	125	71	<b>560</b>
Pair trawl	0	0	1	10	56	406	2 159	<b>2 632</b>
Squid hooks and lines	743	620	72	23	39	11	2	<b>1 510</b>
Bottom long line	92	91	27	8	25	32	1	<b>276</b>
Crab trap	0	0	3	0	0	0	0	<b>3</b>
Cuttlefish trap	107	107	10	6	31	10	0	<b>271</b>
Set net	7	41	0	0	0	0	0	<b>48</b>
Logistic services	19	16	3	6	24	148	57	<b>273</b>
Others	112	359	161	73	89	14	0	<b>808</b>
<b>Sub-total</b>	<b>2 690</b>	<b>2 551</b>	<b>718</b>	<b>201</b>	<b>586</b>	<b>1 175</b>	<b>2 354</b>	<b>10 275</b>

*Source of data:* Kien Giang Department of Fishery, 2015.

Official statistics state that the agriculture and fishery sectors account for 30 percent of gross domestic product (GDP) of the Province. The annual fish landing of the province is estimated at more than 500 000 tonnes. In the first six months of 2015, the total landing volume of the marine capture fishery was about 238 900 tonnes (Kien Giang PPC, 2015). Trawlers yearly contribute about 440 000 tonnes. The biggest fishing port in Kien Giang is Tac Cau, which is located in Chau Thanh district and the port is large, compared to others in Viet Nam. The port has developed a number of facilities, including clean water supply, fuel stations, sorting places, quays for unloading fish, anchoring places, stores for foods and beverages and other necessary support for crews. There are smaller fishing ports in other districts e.g. Xeo Nhau fishing port (An Bien district), Ba Hon fishing port (Kien Luong district), An Thoi fishing port (Phu Quoc island), Nam Du fishing port (Kien Hai district) and Linh Huynh fishing port (Hon Dat district) and about six landing sites located in the coastal districts of the province. However, most of the port facilities are old and poorly planned and managed. The environment in and around the ports is not clean and little attention is paid to collecting and treating waste materials. Most landing sites are under-invested and have few facilities available for providing the necessary services for fishing operations. Typically, landing sites are difficult to approach, transport fish to, and it can be difficult to purchase ice and fuel.

Under this study, the trawlers in Kien Giang can be categorized into several types as below:

**Anchovy pair trawlers** operate during the nighttime and use larger gear compared to that of other trawlers. The anchovy trawl normally has a header and footer rope of about 150 m and the length of the gear is about 140 m. The length of the codend is around 8 m and the mesh

size at the wings can be 8 m (stretched full mesh size) and is then gradually decreasing downward to the belly. The codend mesh size is 3–4 mm, although some gears may have smaller mesh size. The opening width of the gear can be in range of 70–80 m and opening height 30–40 m. Anchovy trawling fleets mainly catch anchovies and other small pelagic fish species; however, they also catch squid, cuttlefish and octopus. Usually, anchovy and economically important species are dominant in the catches. Anchovy pair trawlers are abundant in Ha Tien, Hon Dat and Ba Hon districts.

**Mixed pair trawlers** targeting mixed species are dominant in terms of the number of trawlers in the province. This fleet uses two types of trawl gears that are used during the daytime or nighttime. Squid is the most important commercial catch of this fleet in terms of landing value or trip revenue. The majority of squid caught is sun dried onboard and kept in milled ice for transporting to the shore. Catches comprise of commercially valuable species and what is called in Vietnamese as “pig fish” (fish for feeding pigs) or “fertilizer fish” (in the past this sort of fishes was used as fertilizer in agriculture/cultivation). Pig fish or fertilizer fish is normally comprised of low value species mainly threadfin porgy, flat head fish, cardinal fish, goatfish, and partly juveniles of economically important species, including lizard fish, goat fish, red bigeye, and croaker. Mixed-species pair trawlers come mainly from Rach Gia, Kien Luong, Kien Hai districts.

**Shrimp trawlers** use otter trawls (i.e. have trawl doors and are dragged along the seabed to keep the trawl net open) and are usually smaller compared to other trawlers. The number of shrimp trawlers is about 1 000 units in the whole Province with the majority concentrated in Ha Tien, Ba Hon and Hon Dat districts. The engine capacity of the vessels varies from 50 to 350 hp, with the most common range being 70–250 hp. The fishing grounds of the shrimp trawl fleet are around the islands of Phu Quoc, Tho Chu, Nam Du and close to Ca Mau Cape, with some operating in Ba Ria Vung Tau waters. The key target species of these fleets are shrimp, squid, cuttlefish, and octopus. Pig fish/fertilizer fish also contributes a proportion of the catch of the shrimp fleet and are retained in their catches.

All types of trawlers in the province operate all year round and are active on average for 10–11 months per year. However, the important season is the southwest monsoon (May–September). During this season, sea conditions are favourable for trawl fishing operations. During northeast monsoon season (November–March), fishing vessels have smaller catches compared to the southwest monsoon season. During this season the sea is rougher which is disadvantageous for conducting trawl-fishing activities. In addition, some fish species also have seasonal migration behaviour.

The agriculture and fishery sectors account for 49 percent of the labour in Kien Giang (Kien Giang DPI, 2015). It is estimated that 82 000–90 000 fishers are working in the capture



fishery sector of the province. Crews and labour are important matters for the fishing vessel owners in Kien Giang. In 2014, during the northeast monsoon, about 500 trawlers were not able to carry out fishing operations due to lack of crew members ([Kien Giang Fisheries Association, 2014](#)). Two fisher associations were established in 2012 and 2014. The first fisher syndication has 91 members and the second one has 25 members. The fisher associations were formed at the provincial level (Kien Giang Fisheries Association) and at the district level, e.g. Rach Gia City Fisheries Association. However, these associations have limited operations and do not have a strong impact on fishers and other members. Fishers have formed themselves into informal cooperatives based on relations or friendships. Normally, users of the same fishing gear or the same fleet, may gather together to establish cooperatives. A typical cooperative of shrimp trawlers is about 30–40 vessels and for anchovy pair-trawlers, 20–30 pairs.

Middlemen play an important role in providing capital for vessel owners to cover fishing operational costs and play a lead role in the market distribution of landed catches. Fishers have close connections with middlemen in the fishing sector or in the supply chains for seafood and fishmeal originating from the trawl fishery. It is difficult for seafood producers to buy fish directly from fishers, and they usually have to buy fish through middlemen. There are about 30 seafood processing companies (excluding fish sauce industries) and 12 fishmeal processing companies located in Kien Giang. This industry creates jobs and livelihoods for thousands of workers in the Province.

Ice blocks are kept on board all types of trawlers for preservation of the catches. Shrimp trawlers also bring salt for boiling shrimp at sea. Most trawlers bring their catches to Tac Cau fishing port. Anchovy pair trawlers usually come to Muong Dao landing site in Ha Tien Township for unloading purposes. Anchovy and pig fish/fertilizer fish are mainly purchased by local fishmeal processing plants. However, a certain part is transported to other provinces e.g. Dong Thap and An Giang provinces, for either homemade aquafeed production or fishmeal processing purposes. Some pair trawlers unload their catches in other provinces that are closer to their fishing grounds, such as Ba Ria-Vung Tau, Ca Mau and Bac Lieu. Then, their catches are transported to Kien Giang by trans-shipment boats. There are now no trans-shipments boats servicing shrimp trawlers in Kien Giang. A representative from each cooperative alternately comes to the homeport or landing site and brings the catches of the others. This kind of activity is performed daily by the cooperatives.

Several studies done by Research Institute for Marine Fisheries (RIMF) show that the fishing effort in southeast and southwest Viet Nam is showing signs of overcapacity ([Bui Van Tung et al., 2013](#); [Do Van Thanh &, Pham Van Tuyen, 2014](#)). The catch rates of fleets fishing for demersal and bottom fishes have declined while the pig fish/fertilizer fish proportion has increased in trawl landings; the average CPUE declined from approximately 0.30 tonnes per



hp per year in 2003 to approximately 0.25 tonnes per hp per year in 2014 (Dang Van Thi & Nguyen Ba Thong, 2008; Do Van Thanh & Pham Van Tuyen, 2014). Post-harvest loss is another issue affecting trawl fishing. It is estimated that 35–48 percent of the landings from trawlers is lost due to the loss of quality resulting from poor handling practices applied while fishing and preserving catches at sea (Nguyen Xuan Thi *et al.*, 2014).

### 3. METHODOLOGY

#### a. Scope of the study

##### *Time frame*

This study was carried out during November 2015 to December 2015. The survey, fieldwork and consultation with stakeholders were mainly conducted during November 2015. Secondary data, information and previous study results were also gathered and collected as inputs for the study.

##### *Area of the study*

The survey was conducted in Ha Tien Township, Rach Gia City and Chau Thanh District in Kien Giang province. These study sites are highlighted in red circles in Figure 2. The focus of the study was on single trawlers (otter trawlers) and pair trawlers. Studies on the supply chain were also performed in Ho Chi Minh City to gather information related to seafood trading companies.



Figure 2. Study sites of the socio-economics survey for trawl fishery in Kien Giang in 2015.

### *Study fields*

The study focused on social and economic aspects of the trawl fishery in Kien Giang province. Study indicators and parameters included: the structure of the trawl fishing fleets; catch per unit effort (CPUE), catch composition by main commercial groups; total revenue; total cost of fishing trip; fishing grounds and seasons; numbers of labourers, social issues related to fishing operations; and supply chain actors for pig fish/fertilizer fish, squid and shrimp. Some specific social impacts of the fishery were examined at the data collection sites and included work generation, livelihoods, gender aspects, working conditions, civil society organizations and conflicts.

#### **b. Data collection**

##### *Secondary data*

Secondary data and information were collected from relevant sources e.g. Provincial Department of Agriculture and Rural Development (DARD), Department of Fisheries Management, Research Institute for Marine Fisheries (RIMF), Tac Cau fishing port authority, Ha Tien Socio-economic Division, and from available published papers and scientific articles. The desk review was performed to compile data and information for analytical purposes.

##### *Socio-economic study design*

The survey was designed to include representation from the two main types of pair trawlers operating in Kien Giang: anchovy pair-trawlers (mainly in Ha Tien township and Ba Hon and Hon Dat districts) and mixed pair trawlers operating both day and night time. These fleets target all types of fish species; however the main revenue comes from squid, followed by the commercially valuable species. The other trawler types surveyed during the study were shrimp trawlers. This fleet mainly occurred in Ha Tien and Ba Hon districts. For each fleet, the survey was designed to cover the key actors ([Figure 3](#)) involved in the supply chains of its key products, i.e. “supply chain approach”.

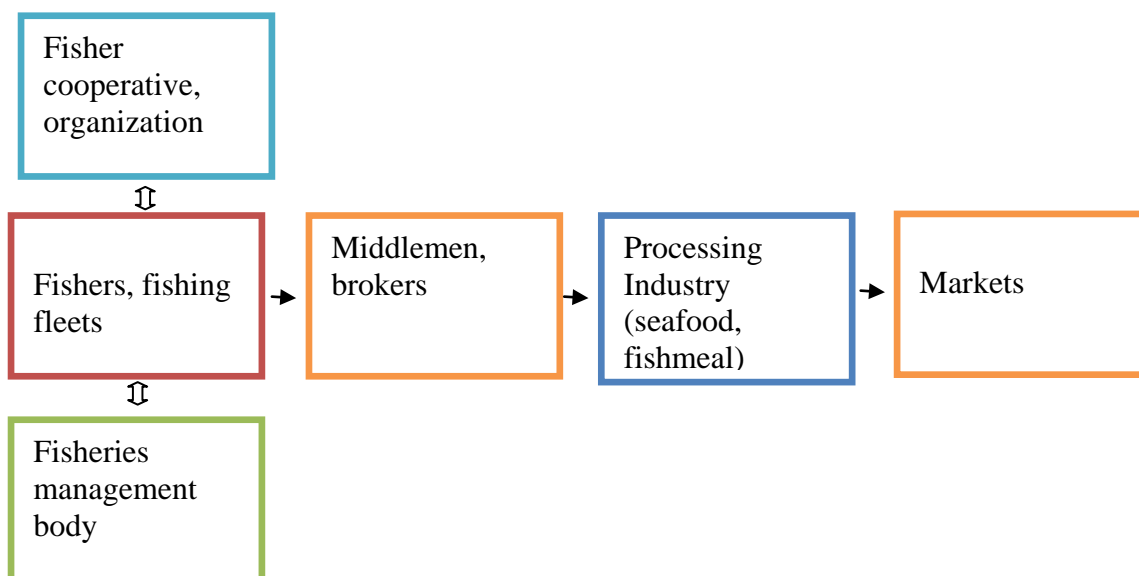


Figure 3. Key stakeholders in the socio-economic study of the Kien Giang trawl fishery.

Middlemen in Ha Tien, Rach Gia and Chau Thanh were interviewed and relevant information related to their businesses (annual catches, production traded, prices, costs associated to the business) collected. However, due to the strong competition in this sort of business, some important information was considered as “sensitive” and was not easy to obtain from the interviewees. The processing industry can be categorized into two major types: fishmeal processing and seafood processing. Important fishmeal processing plants in Ha Tien and Chau Thanh were visited and operators interviewed to acquire relevant information. Some seafood processing, cephalopod processing and exporting companies located in Chau Thanh district were also surveyed. Specific questionnaires were designed to collect information from fishers, fishing vessel owners, middlemen/brokers and processing industry. The questionnaires used in this survey can be found in the appendices.

#### *Consultation with relevant stakeholders*

Consultations with stakeholders including fisheries managers, fisheries management experts, middlemen, fishmeal and seafood processors, crews, vessel owners, and fisheries associations were performed to acquire a basic understanding of the trends in fisheries resource availability, landings, fish quality and associated issues. Consultations were either done by individual meetings or at group meetings. However, stakeholders were segregated by actors along the supply chain, to ensure that no conflicts of interests occurred during the consultation process. Talks included broad and focused comments, discussions and suggestions from all relevant stakeholders. Issues frequently repeated by stakeholders were considered as core issues.

### *Sample size*

The category and number of respondents are described in [Table 2](#). Questionnaires were designed to explore gaps in existing information. Some relevant information was retrieved from available studies already carried out under either REBYC II-CTI Project or other projects related to trawl fisheries in Kien Giang, e.g. landing data collection survey done by RIMF, IFFO–RS standards assessment of Kien Giang trawl fishery (IFFO, 2014).

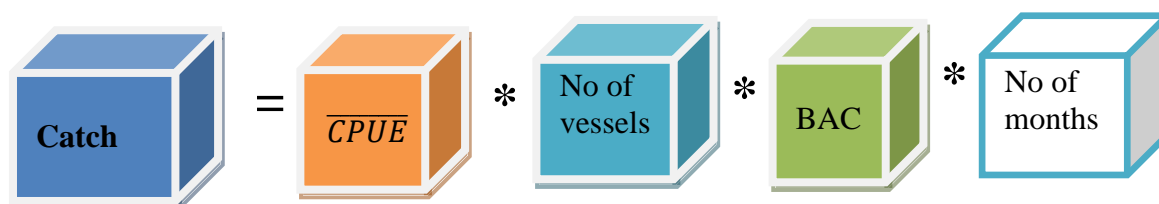
Table 2. Respondents for the socio-economic survey of the trawl fishery in Kien Giang.

Category of respondents	Number of samples
Shrimp trawlers	30
Shrimp sundried processing	15
Anchovy pair trawlers	20
Mixed pair trawlers	20
Middlemen	3
Fish porter	6
Fishmeal processing	3
Seafood processing	1
Total	98

### **c. Data analysis**

#### *Total catches of the fleet*

An estimation of the catch from the fishing fleet was done in line with suggestions from Stamatopoulos (2002). The calculation of the total catch of a fishing fleet concerned is calculated by the mean catch rate (catch per unit effort or CPUE), quantity of the vessels, the proportion of vessels operating, Boat Active Coefficient (BAC), and the given time period (month, quarter or year).



The Boat Active Coefficient (BAC) reflects the level of intensity of fishing fleet effort assumed during a certain time period. If 100 percent of vessels are operating, the BAC is 1.0. In bad weather conditions (typhoon, storm, rough sea etc.) no fishing vessel can operate, meaning that the BAC of the fleet at that time is 0. In a simple way, the BAC can reflect the

percentage of the total fishing effort of the fleet. In other words, the higher the BAC, the more fishing effort is being used for fishing activity.

The BAC is referred from previous studies conducted for the Kien Giang trawl fishery and in consultation with local fishers, fishing vessel owners and managers. The BAC is estimated to be 0.65 to 0.70, meaning that on average, 65–70 percent of the fishing effort is involved in fishing operations at any one time.

*Catch composition by commercial groups*

The catch composition or proportion of each commercial group or even single species can be calculated by the following equation:

$$P_i = \frac{\text{Catch}_i}{\text{Total Catch}}$$

Where:  $P_i$  is proportion of group  $i^{\text{th}}$

$\text{Catch}_i$  is total catch in the trip of the group or species  $i^{\text{th}}$

Total Catch is the total weight of all species, groups caught in the trip.

*Total cost*

Table 3 identifies the costs associated with fishing operations.

Table 3. List of some associated costs to be included in the fishing operations of the fleet.

Type of cost associated with fishing operation	Covering	Remarks
Fuel consumption	Oil, gas, lubricant	
Materials for fish handling	Ice block, salt	
Plastic bag, baskets	Bags for packing fish onboard	
Food and fresh water	Food, drinking waters for crew onboard	
Gear reparations	Cover gear repaired	
Home port fee	Fee paid according to current regulations	
Fish unloading service charge	Fish porters rent at landing site	
Fees for broker to recruit/find fishers		
Opportunity costs	Compensation for the capital	The opportunity cost

	invested in fishing operation	may be estimated relative to the commercial bank interest rates
Fixed costs	Capital invested in buying/building vessel, gear and fishing equipment, maritime devices	

**Operational costs:** The total operational cost for each fishing trip is a sum of the costs covering fuel, ice block, food, water, fees of finding fishers (if any), plastic bags, and small reparation cost, fees associated with unloading fish, and staying at the port. The calculation used is as follows:

$$TC = \sum_{i=1}^n C_i$$

Where: TC is the total operational cost of the trip,  $C_i$  is the cost of item  $i^{\text{th}}$ .

**Investment costs (fixed costs):** The total investment cost of the vessel is the sum of the money put into building, buying the vessel, cost of maritime equipment, fishing devices, (e.g. echo-sounders), gears, etc. This is normally a large investment and depreciation should be taken into account.

**Opportunity costs:** Opportunity costs are the capital invested in building vessels or investment in fishing operation that could have been invested in another enterprise or a bank account (for interest). In this study, the opportunity cost of fishing vessel is based on the popular interest rate of the commercial bank, about 6.5 percent per year. The opportunity cost of the fishing vessel is estimated from the amount of money put into the fishery, if the fisher had not invested money in his fishing operation.

$$OC = Q * r$$

Where: OC is the opportunity cost, Q is amount of money invested in the fishery by the vessel owner and r is commercial rate of the bank.

**Lending rate:** Most vessel owners have to borrow money from a bank to invest in fishing. Normally they can borrow up to half of the value of the vessel building cost. Thereafter, the vessel owner has to pay monthly interest on the money borrowed.

$$LR = Q * r$$

Where: LR is the lending rate, Q is amount of money borrowed from the bank and r is commercial rate of money borrowed.

### *Total revenue*

The total revenue (TR) of the fishing trip is estimated by applying the following equation:

$$TR = \sum_i^n Catch_i * p_i$$

Where: TR is total trip revenue,  $Catch_i$  is the catch of commercial group  $i^{th}$  and  $p_i$  is corresponding market price of that group.

### *Fleet benefit*

The benefit of the fishery is estimated for each trip or for one month. The net benefit is the difference between total revenue (TR) and total costs (TC).

### *Number of crews*

For each fleet, the total number of fleet crew working onboard may be estimated using the below formula:

$$FC = N * C$$

Where: FC is the number of crews of the given fleet (for instance, shrimp trawlers or anchovy pair trawlers), N is total number of vessels, and C is average number of crews on every vessel. Then the total number of crews working in trawl fishery in the province is estimated as follows:

$$NC = \sum_{i=1}^n FC_i$$

Where: NC is number of crew in the fishery interested,  $FC_i$  is the number of crews of the fleet  $i^{th}$  and i is the number of stratum or fleet.

### *Middlemen benefit*

Benefits to the middlemen can be estimated based on capital invested, daily or monthly catch volume traded, market prices, and costs of operation. Normally, financial investments or information related to benefits are considered as sensitive, therefore the benefits and other related information were estimated through calculating the mean values of catches bought (volume, prices), and operational costs (labourers, other fees, taxes, transportation etc.).

### *Fishmeal production*

Fishmeal production from a fishmeal processing plant can be either based on the daily or monthly intake of raw materials. According to the information provided by local fishmeal processors, the average ratio between raw material (wet) and final production (dry) in fishmeal industry is in the range of 3.2–3.4:1. This depends on the quality of the raw material

used as well as type of pig fish/fertilizer fish used. Annual reports from the fishmeal industry were also used for reference purposes. Additionally, fishmeal production can be calculated from information generated from the middlemen who supply raw materials to the processing plants and from their yearly estimated landings of pig fish/fertilizer fish.

#### 4. RESULTS AND DISCUSSION

This study was conducted in a short period and was not able to cover all districts of Kien Giang province. Therefore, the results may not reflect the complete status of the fishery. Additionally, secondary data and information on landings, and socio-economics related to the trawl fisheries in the Province are very limited or absent. However, the study can still be considered as a deep investigation about the socio-economic aspects of trawl fleets operating in Kien Giang, and the outputs of the study may be useful for reference purposes. In-depth research studies of a longer duration or regular surveys should be planned for a more evidence-based policy decision-making process.

##### a. Fishing effort and operations

###### a) Otter trawl fishery (*Shrimp trawlers*)

Based on the current statistics reports of the Kien Giang DARD (2015), there are 560 otter trawlers, targeting shrimp and prawn in the provincial waters and adjacent areas such as Ca Mau and Vung Tau provinces. About 75 percent of the total number of shrimp trawlers is above 90 hp (Table 4). The shrimp trawlers mainly concentrate around Ha Tien Township, Hon Dat and Kien Luong districts. The main fishing grounds are in Kien Giang (around Phu Quoc, Hon Thom, Nam Du, Ba Ria Vung Tau islands) but in the northeast monsoon, they tend to trawl the nearshore areas in Ca Mau province. A fishing trip of 5–6 days usually comprises of 3–4 hauls per night with an average towing duration for each haul of around 3–4 hours.

Table 4. Number of shrimp trawlers (unit) by engine capacity groups and administrative districts in Kien Giang.

District	<90 HP		>90HP		Total	
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
An Bien	2	1	26	6	28	5
An Minh	1	1	17	4	18	3
Chau Thanh		0	31	7	31	6
Ha Tien	64	45	30	7	94	17
Hon Dat		0	62	15	62	11
Kien Hai	61	43	37	9	98	18
Kien Luong	8	6	113	27	121	22



Phu Quoc		0	4	1	4	1
Rach Gia	6	4	93	22	99	18
Tan Hiep		0	3	1	3	1
Giang Thanh		0	2	0	2	0
Sub-Total	142	100	418	100	560	100

Source: Kien Giang Provincial Department of Fisheries (DOF), 2015.



Figure 4. Some pictures of vessels, landing site, facility for dried shrimp of the trawl fishery in Kien Giang Province.

Usually, shrimp trawlers voluntarily organize cooperatives, which are based on kinship relations and/or friendships. Typically, a group of 30–40 trawlers organizes a cooperative. The cooperatives are not registered with any management body or fulfilled any administrative procedures needed; they are completely voluntary and “free” organizations. This is to ensure that after several days, one member vessel of the cooperative will be available to trans-ship the catches of the others to the shore for unloading. Transporting of the catches of the cooperative is alternately done by all members. There are no specialized trans-shipment vessels now because it is not economically efficient. [Figure 4](#) shows some images of the shrimp trawl fishery in Kien Giang Province.

## b) Pair trawl fishery

Pair trawlers in Kien Giang are dominant in terms of the quantity of vessels, total engine capacity, as well as landing value. Pair trawlers in Rach Gia city account for approximately 50 percent of the total number of trawlers. Pair trawlers are also found in large numbers in Hon Dat, Kien Hai and Ha Tien districts. However, most pair trawlers in these districts are focusing on catching anchovies and other small pelagic fish. The rest of the trawlers in Kien Giang have mixed gear types: regular trawling nets for daytime fishing and high-opening trawl nets for nighttime operations. Accordingly, there are about 350 pairs of anchovy pair trawlers operating in the province. Detailed information on the number of trawlers by fleet sizes (horsepower) and administrative district are presented in [Table 5](#).

Table 5. Number of pair trawlers by engine capacity and districts of Kien Giang in 2015.

District	<250 hp		250– 400 hp		≥ 400 hp		Total	
	<i>Number (unit)</i>	<i>%</i>	<i>Number (unit)</i>	<i>%</i>	<i>Number (unit)</i>	<i>%</i>	<i>Number (unit)</i>	<i>%</i>
An Bien			3	0.7	45	2.1	48	2
An Minh			6	1.5	31	1.4	37	1
Chau Thanh			13	3.2	272	12.6	285	11
Giong Rieng			2	0.5			2	0
Go Qao			3	0.7	1	0.0	4	0
Ha Tien	31	46.3	95	23.4	85	3.9	211	8
Hon Dat	27	40.3	111	27.3	301	13.9	439	17
Kien Hai			1	0.2	150	6.9	151	6
Kien Luong	6	9.0	93	22.9	46	2.1	145	6
Phu Quoc	1	1.5	1	0.2	8	0.4	10	0
Rach Gia	1	1.5	67	16.5	1201	55.6	1 269	48
Tan Hiep			1	0.2	10	0.5	11	0
U Minh Thuong	1	1.5					1	0
Giang Thanh			10	2.5	9	0.4	19	1
Sub-Total	67	100	406	100	2 159	100	2 632	100

Source: Kien Giang Provincial Department of Fisheries (DOF), 2015.



Figure 5. Anchovy pair trawlers unloading their catches at a landing site in Ha Tien district, Kien Giang province.

Anchovy pair trawlers (Figure 5) are dominant in Ha Tien and Hon Dat districts while mixed pair trawlers are more concentrated in Rach Gia, Kien Hai and Kien Luong. These mainly target cephalopods (squid, octopus, and cuttlefish), mixed fish (economically valuable fish, including threadfin bream, croakers, lizard fishes, scads, snappers, groupers, etc.) and pig fish/fertilizer fish (threadfin porgy, lizard fish). A few mixed pair trawlers in the province also fish for anchovy during the night. Normally, the mixed pair trawlers operate for 24 hours per day and the number of hauls per day is about 3–4 with each tow being of 6–8 hours duration. As their fishing grounds tend to be more offshore, these trawlers need more crew numbers (20–24 crew members), compared to anchovy pair trawlers (Table 6).

Table 6. Information on the fishing operations by gear types of the trawl fishery in Kien Giang.

Fisherries	Trip duration (day)	No of crew (person)	Fishing time	No of haul per day (unit)	Haul towing duration (hour)	Fishing time per year (month)	Fishing ground
Shrimp trawler	4–5	4–5	Night	3	3	10–11	Kien Giang, Ca Mau, Vung Tau
Anchovy pair trawlers	15–20	9–11	Night	2	5–6	10–11	Kien Giang
Mixed pair trawlers	25–30	20–24	Day and Night	3–4	6–8	10–11	Kien Giang, Vung Tau

Source: Survey data (November–December 2015).

Anchovy pair trawlers are important suppliers of raw materials for fishmeal processing companies located in Ha Tien and Rach Gia (Tac Cau industrial zone). In addition, a volume of anchovy and pig fish/fertilizer fish landed are transported to neighboring provinces for either fishmeal processing or for processing into aquafeeds for tilapia, snakehead fish or catfish farming. These fleets operate all year, around Phu Quoc Island, in the southwest waters of Viet Nam. Structure of trawling fleets by gear types can be graphically presented as in Figure 6. The two most dominant fleets are mixed pair trawlers and anchovy pair trawlers.

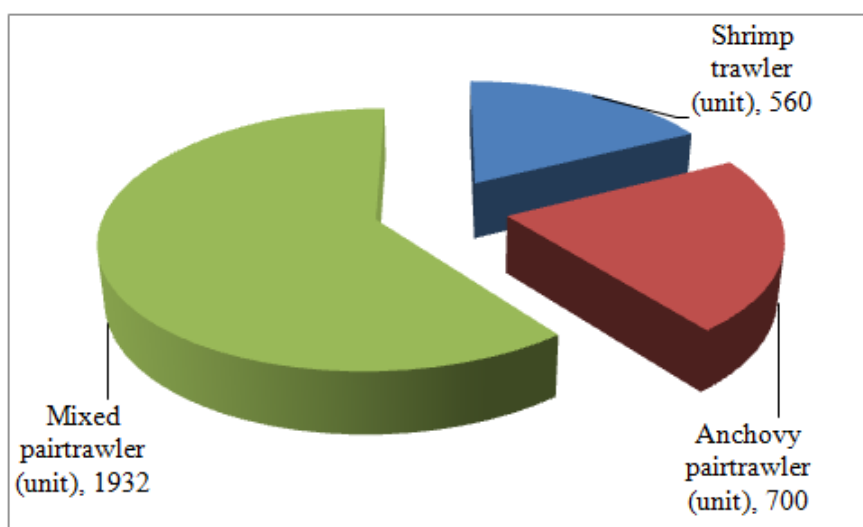


Figure 6. Structure of trawl fishery in Kien Giang in 2015.

The mixed-species pair trawler fleets in Rach Gia, Kien Luong, Kien Hai frequently fish in offshore waters close to the neighboring countries. Fishing operations take place 24 hours a day. They use both types of trawls: large mesh size trawls and small mesh size fish trawls. The main targeted species are economically valuable fish and cephalopods (squid, cuttlefish and octopus). There are 1 932 mixed pair trawlers, which can set up 966 pair trawler operations. The large mesh size trawls operate during the nighttime. Currently, the mixed pair trawl (Figure 7) fleet is providing the largest contribution to the provincial annual landing volume.



Figure 7. The mixed pair trawlers are unloading their catches at the Tac Cau fishing port in Chau Thanh district, Kien Giang Province.

#### b. Catches and landings

Shrimp trawlers have an average catch of around 6 000 kg per month. The most important component in terms of catch value are shrimp, accounting for 64 percent of the catch value, followed by cuttlefish and squid (19 percent), mixed fish for human consumption (13 percent) and pig fish/fertilizer fish accounting for about 3 percent (Table 7). Pig fish/fertilizer fish from shrimp trawlers obtain lower prices compared to pig fish/fertilizer fish from anchovy pair trawlers. The reason for this is that pig fish/fertilizer fish from shrimp trawlers are made up of a number of low value species (threadfin porgy, cardinal fish, puffer fish, flat head fish, goat fish, flounders, leather jacket fish) with a smaller part being made up of juveniles of more economically important fish species, while the “trash fish” in anchovy pair trawlers are mainly anchovies which are preferred for fishmeal processing due to the better quality fishmeal produced and the unique quality of associated fishmeal products.

Table 7. Average estimates of monthly economic indicators of the shrimp trawlers (otter trawlers) in Kien Giang based on the survey conducted in November 2015.

Commercial Group	Catch per day (kg)	Catch per month (kg)	Catch Value (1000 VND)	Percentage of revenue (%)
Shrimp	120	3 600	90 000	64.4
Mixed fish	30	900	18 000	12.9
Squid, cuttlefish	15	450	27 000	19.3
pig fish/fertilizer fish	40	1 200	4 800	3.4



Total	205	6 150	139 800	100
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Estimates of economic indicators for anchovy pair trawlers and the mixed pair trawlers in the province are presented in [Table 8](#) and Table 9. The anchovy group is dominant in terms of both catch volume and value for anchovy pair trawl fleets, while squid is the major contributor to trip revenue for the mixed pair trawl fleet.

Table 8. Average estimates of monthly economic indicators of the anchovy pair trawlers in Kien Giang based on survey conducted in November 2015.

Commercial group	Catch per day (tonnes)	Catch per month (tonnes)	Catch value (1000 VND)	Percentage of revenue (%)
Anchovy	2.56	43.5	348 000	64
Mixed fish	0.14	2.3	46 000	8
Squid, cuttlefish	0.09	1.5	150 000	28
<b>Total</b>	<b>2.79</b>	<b>47.3</b>	<b>544 000</b>	<b>100</b>

Table 9. Average estimates of monthly economic indicators of the mixed pair trawlers in Kien Giang based on survey conducted in November 2015.

Commercial group	Catch per day (tonnes)	Catch per month (tonnes)	Catch value (1000 VND)	Percentage of revenue (%)
Pig fish/fertilizer fish	0.8	20	82 000	7
Mixed fish	1.0	22	270 000	23
Cuttlefish, octopus	0.02	0.4	24 000	2
Squid	0.3	8	800 000	68
<b>Total</b>	<b>2.1</b>	<b>50.4</b>	<b>1 176 000</b>	<b>100</b>

The total annual landing volume by trawl fleets of Kien Giang in 2015 were estimated at about 446 000 tonnes. This was made up of 25 000 tonnes from shrimp trawlers, 107 000 tonnes from anchovy pair trawlers and 314 000 tonnes from mixed pair trawlers. The result is very similar to the published outputs made by the Research Institute for Marine Fisheries (RIMF) in 2014, which estimated the annual catch as 444 000 tonnes ([Table 10](#), [Table 11](#)).

Table 10. Annual landing estimated by gear types in trawl fishery in Kien Giang in 2015 based on the survey conducted in November 2015.

Gear types	Average monthly landing (tonnes)	No of months operated (month)	BAC	Quantity	Unit	Annual landing (tonnes)
Shrimp trawler	6	10	0.75	560	vessel	25 200
Anchovy pair trawlers	47	10	0.65	350	pair	106 925
Mixed pair trawlers	50	10	0.65	966	pair	313 950
<b>Total</b>						<b>446 075</b>

*Note:* The Boat Active Coefficient (BAC) was estimated from the fishers’ point of view. The study on BAC of trawl fishery in south Viet Nam suggested the average BAC was 0.65 (Cao Van Hung, 2013).

Table 11. Estimates of the annual landing of trawlers in Kien Giang conducted by the Research Institute for Marine Fisheries, 2014.

Fishing fleet	Total catch ( <i>tonnes</i> )	Proportion (%)
<b><i>Pair trawler</i></b>	<b><i>422 130</i></b>	<b><i>95.04</i></b>
<45 hp	-	0.00
45 – <90 hp	79	0.02
90 – <150 hp	786	0.18
150 – <250 hp	6 312	1.42
250 – 400 hp	86 293	19.43
>400 hp	328 660	73.99
<b><i>Otter trawlers</i></b>	<b><i>22 047</i></b>	<b><i>4.96</i></b>
<45 hp	1 284	0.29
45 – < 90 hp	3 679	0.83
90 – <150 hp	1 946	0.44
150 – <250 hp	4 917	1.11
250 – 400 hp	7 049	1.59
>400 hp	3 172	0.71
<b><i>Total</i></b>	<b><i>444 177</i></b>	<b><i>100</i></b>

Source: RIMF, 2014.

### c. Catch composition

In the estimated landings in Kien Giang in 2014 (RIMF, 2015), pig fish/fertilizer fish accounted for approximately 40 percent of the catch from otter trawlers and 56 percent of the catch from pair trawlers. However, the study did not categorize the pair trawlers into anchovy and mixed pair trawlers. This is important because the anchovy pair trawlers are different from mixed pair trawlers in terms of fishing grounds, target species and fishing operations. The term “trash fish” used by anchovy pair trawlers refers to anchovies (about 80–90 percent catch volume).

A study of the catch composition from shrimp trawlers in Kien Giang shows that shrimp and prawn account for an average of 58.5 percent of the landing volume (Table 12). There are several shrimp and prawn species caught and most are boiled with brine onboard and brought to the shore for sun drying and peeling (Figure 8). Pig fish/fertilizer fish from shrimp trawlers is comprised of low value species such as threadfin porgy, leather jacket fish, pufferfish, flathead fish and goatfish, and accounts for around 19.5 percent of the total catch volume,

followed by mixed fish (economically valuable species e.g. croakers, scads, lizardfish, snappers) accounting for 14.6 percent of the catch volume. The final group accounting for 7.3 percent of catch volume is the cephalopod group comprising of squid, cuttlefish and a small number of octopus. There are no discards at sea; fishers manage to utilize all the catches taken onboard.

Table 12. Average estimates of monthly catch composition by main commercial groups of the shrimp trawlers in Kien Giang, based on the survey conducted in November 2015.

Commercial group	Catch ( <i>tonnes</i> )	Proportion (%)
Shrimp, prawn	3.60	58.5
Mixed fish	0.90	14.6
Squid, cuttlefish	0.45	7.3
Pig fish/fertilizer fish	1.20	19.5
<i>Total</i>	<i>6.15</i>	<i>100</i>





Figure 8. Some important commercial groups in the catches of trawlers in Kien Giang province.

Anchovy pair trawlers in Kien Giang catch mainly anchovy and so-called “pig fish/fertilizer fish”, which account for about 92 percent of the fleet landing, followed by mixed fish (5 percent) and cephalopods (squid, cuttlefish, octopus) at 3 percent of the total landings (Table 13). There are no discards. Anchovies fished by these fleets are comprised of several species which school together and are caught during the nighttime. All the fish captured are packed in plastic bags and kept in crushed ice (Figure 8). Groups of mixed fish and pig fish/fertilizer fish are the two biggest contributors in terms of landing volumes of the mixed pair trawl fleets, accounting for approximately 44 percent and 40 percent respectively (Table 14). Cephalopods account for a small part of the landing but make an important contribution to the economic value of the catch. Some estimates for annual landing by important commercial groups in trawling fleets in the province in 2014 was conducted by RIMF and detailed information is described in Table 15.

Table 13. Average estimates of monthly catch composition by main commercial groups of the anchovy pair trawlers in Kien Giang based on survey data in November 2015.

Commercial group	Catch ( <i>tonnes</i> )	Proportion (%)
Mixed fish	2.3	5
Squid, cuttlefish	1.5	3
Anchovy and pig fish/fertilizer fish	43.5	92
<i>Total</i>	<i>47.3</i>	<i>100</i>

Table 14. Average estimates of monthly catch composition by main commercial groups of the mixed pair trawlers in Kien Giang based on survey data in November 2015.

Commercial group	Catch ( <i>tonnes</i> )	Proportion (%)
Mixed fish	22	43.6
Pig fish/fertilizer fish	20	39.7
Squid	8	15.9
Cuttlefish, octopus	0.4	0.79
<i>Total</i>	<i>50.4</i>	<i>100</i>

Table 15. Annual landing volume estimated by the trawlers in Kien Giang in 2014 based on research done by the Research Institute for Marine Fisheries.

Commercial group	Otter trawlers		Pair Trawlers		Total	
	Catch (tonnes)	%	Catch (tonnes)	%	Catch (tonnes)	%
“Trash fish”	8 733	39.6%	237 576	56.3%	246 309	55.5%
Mixed fish	3 953	17.9%	78 286	18.5%	82 239	18.5%
Croaker		0.0%	8 994	2.1%	8 994	2.0%
Rays	526	2.4%			526	0.1%
Threadfin breams			14 845	3.5%	14 845	3.3%
Lizard			7 544	1.8%	7 544	1.7%
Goatfishes	508	2.3%			508	0.1%
Bigeyes		0.0%	6 269	1.5%	6 269	1.4%
Cuttlefish	257	1.2%	5 055	1.2%	5 312	1.2%
Squids			31 857	7.5%	31 857	7.2%
Mixed cephalopods	793	3.6%	26 896	6.4%	27 689	6.2%
Mixed shrimp	6 139	27.8%			6 139	1.4%
Green tiger prawn	649	2.9%			649	0.1%
Others	488	2.2%	4 809	1.1%	5 297	1.2%
<i>Total</i>	<i>22 046</i>	<i>100%</i>	<i>422 131</i>	<i>100%</i>	<i>444 177</i>	<i>100%</i>

Source: RIMF, 2014. “Trash fish” indicated by RIMF (2014) was comprised of 93 fish species in which species Shorthead anchovy (*Encrasicholina heteroloba*) accounted for 32.5 percent landing volume. Anchovies are considered as “trash fish” in anchovy pair trawlers.

#### d. Catch preservation

All vessel owners interviewed are using milled ice to preserve their catches onboard and during transportation to the shore (Figures 9 and 10). Ice blocks are kept onboard for longer trips. Before use, the ice blocks are broken up and then mixed with fish at a proportion of 1:1 (by weight) respectively. On average, smaller trawlers use 200–300 ice blocks per month, with each block weighing around 40 kg. A large anchovy pair trawler may use 1 000–1 200 blocks per trip of 20–25 days and mixed pair trawlers use even more ice: 2 000–3 000 ice blocks (equal to 80–120 tonnes) per trip of 25–35 days.

Ice blocks are normally bought at the landing sites or fishing ports. Currently, the price of a single ice block is about 13 500 VND (in Ha Tien) and about 10 000 VND in Chau Thanh (Tac Cau fishing port). Some vessel owners with more than 10 vessels build their own trans-shipment vessels to transport fish and ice, food, fuel. Normally, mixed pair trawlers may stay at sea for 50–60 days before coming to port for unloading and conducting repairs and preparation for the next trip. After 20–30 days, their catches are trans-shipped to shore and the vessels may stay for an additional 20–30 days to reduce transporting time, fuel consumption

and to keep fishermen employed. So, although mixed pair trawl trips are in the range of 25–30 days, they may combine two trips at sea to mitigate costs and reduce future recruitment risks.



Figure 9. Fish preservation on board, at landing places and transporting means of trawl fishery in Kien Giang province.



Figure 10. Preservation of fish onboard and at the landing sites, fishing port of the trawl fleets in Kien Giang province.

Fish, pig fish/fertilizer fish and squid are also preserved on ice after unloading from the vessels and during transportation to seafood, fishmeal-processing plants and to domestic markets. Cold storage trucks are often used for transporting fresh fish or fish mixed with ice. Shrimp caught by otter trawlers are usually boiled with brine onboard and then preserved with ice, before being sent to shore every 1–2 days.

For fleets of mixed pair trawlers, one of the most economically important commercial groups is squid. Ordinarily, squid is sun dried onboard and then stored on ice. Other catch groups are also maintained in ice, packed in plastic bags or retained in plastic baskets.

#### e. Fleet economics

Investment in trawl fishing is much greater than with most other fishing gears, especially for pair trawlers. A pair trawl vessel operator needs at least two vessels of a similar size and engine capacity. Additionally, the costs of buying gears and fishing equipment, (e.g. echo sounders, communication devices), add to the fishing costs. Table 16 describes the average level of capital investment in the three different kinds of trawlers in Kien Giang.

Table 16. Average investment capital estimated in trawl fishery in Kien Giang by gear types based on survey data collected in November 2015.

Fisheries	Vessel cost (1000 VND)	Gear (1000 VND)	Communication devices (1000 VND)	Capital source	Remarks
Shrimp trawler	500 000–1 500 000	10 000–20 000	5 000–10 000	Loan, own capital	Per vessel
Anchovy pair trawler	8 000 000–12 000 000	270 000–300 000	30 000–40 000	Loan, own capital	Per pair
Fish pair trawler	10 000 000– 16 000 000	270 000–300 000	40 000–60 000	Loan, own capital	Per pair

Shrimp trawlers (otter trawlers) are mostly smaller vessels, below 20 m length with an engine capacity of below 250 hp. Therefore, the capital for investing in this fishery is significantly less than for anchovy pair trawlers or mixed fish pair trawlers.

A number of vessel owners buy secondhand vessels and engines and even some new vessels are equipped with secondhand engines to reduce initial investment costs. More than 90 percent of vessel owners have received loans from commercial banks. For instance, the cost of building one set of pair trawlers is about 12 000 million VND, of which the owner could borrow 6 000 million VND from the bank at an interest rate of 10 percent per year; the monthly repayment rate being around 50 million VND.

The cost of buying a new gear for a pair trawler is in the range of 90–120 million VND per set, depending on the engine capacity of the vessel used, with bigger vessels needing larger gears. Shrimp trawlers have smaller gears costing about 20 million VND per set. Normally, every trawler has 1 or 2 spare sets of gear onboard.

Investment in communication devices (tele-radio, radio communication) for shrimp trawlers and anchovy pair trawlers varies from 5 million VND to 15 million VND. The average investment in communication devices per pair of the mixed pair trawlers is about 30 million VND.

In Kien Giang, it is typical that vessel owners and their crews have revenue shares or net benefit shares, with different rates between these methods. The owners invest in vessels and equipment, fuel and other operational costs. Crew members are responsible for fishing operations and get paid at the end of the trip, when they are free to decide when they want to get their shares. There are no salary or wage mechanisms existing in the fishery. Shares will be based on trip revenue; the crews will take 50 percent of the net benefit, the difference between total revenue and total operational cost. The remainder is for vessel owner. In case the benefit is negative, the vessel owners have to ensure to pay at least 200 000 VND per crew per day.

Average incomes from mixed pair trawlers, at about 380 million VND per month, are highest among the trawlers in Kien Giang. The average income from one pair of mixed trawlers is around 240 million VND per month. Average incomes from shrimp trawlers and anchovy pair trawlers are typically around 30–60 million VND per month. Table 17 shows some key investments in trawl fishery by fleets. Total revenue from anchovy pair trawlers, whose catches are destined for the fishmeal industry, is low compared to mixed pair trawlers who have their main income from dried squid and economically valuable species. However, the investment capital for mixed pair trawlers are higher compared to other trawlers as they need to fish offshore and use big vessels with high engine capacities, and need more crew members working onboard, making this type of investment more risky in terms of financial return and safety at sea. The operational cost of an anchovy pair trawler is around half of that of a mixed pair trawler with the same engine capacity.

Table 17. Average investment costs of the trawlers in Kien Giang based on survey data collected in November 2015, in million VND.

Fleet	Vessel cost	Gear cost	Communication devices	Depreciation cost per month	Bank interest cost per month
SHT	1 000	30	10–15	4	5
APT	10 000	300	30–40	40	41
MPT	16 000	300	40–60	67	80

Note: SHT–shrimp trawlers; APT–anchovy pair trawlers; MPT–mixed pair trawlers



The benefit of the fishing operation may be less as opportunity cost is taken into account. This cost should be considered prior to investment in fishing vessel or fishing operation. Therefore, vessel owners and fisheries managers are advised to pay attention to this cost in development of their business plan as well as fisheries management plans and policy decision making. [Table 18](#) describes some estimates of main investments and fixed costs related to trawl fishery by fleets in which opportunity costs are taken into account.

Table 18. Average investment costs of the trawlers taking into account the opportunity costs in Kien Giang based on survey data collected in November 2015, in million VND.

Fleet	Vessel cost	Gear cost	Communication devices	Depreciation cost per month	Opportunity cost
SHT	1 000	30	10–15	4	10
APT	10 000	300	30–40	40	80
MPT	16 000	300	40–60	67	128

### Shrimp trawlers

There are four main commercial catch groups from shrimp trawlers operating in Ha Tien: mixed fish (economically important species); squid and cuttlefish; shrimp/prawn; and pig fish/fertilizer fish (threadfin porgy, flathead fish, cardinal fish, soles, puffers). The shrimp catch accounts for around 59 percent of catch volume and 64 percent of catch value. The “trash fish” group accounts for about 20 percent of catch volume but contributes only 3 percent to total catch value. The price of pig fish/fertilizer fish from shrimp trawlers is low as it is made up of mixed fish species and so is not comparable in terms of quality to the pig fish/fertilizer fish from anchovy pair trawlers ([Table 19](#)).

Table 19. Average monthly catch and revenue estimated of the shrimp trawl fishery in Kien Giang based on survey conducted in November 2015.

Commercial group	Catch (kg)	Proportion (%)	Price (1000 VND)	Total Revenue (1000VND)	Proportion (%)
Mixed fish	900	14.6	20	18 000	14
Shrimp	3 600	58.5	25	90 000	64
Squid	450	7.3	100	27 000	19
Pig fish/fertilizer fish	1 200	19.5	4	4 800	3
<i>Total</i>	<i>6 150</i>	<i>100</i>		<i>139 800</i>	<i>100</i>

Fuel consumption is an important cost of trawl fishing operations, accounting for 71 percent of the total cost of a shrimp trawling fishing trip, followed by food, ice and other costs

(include payments for local brokers and local motorbike taxi drivers hired to find new crew members). On average, for each crew member, the broker may receive 200 000–300 000 VND, and one vessel may have to pay around 3.0 million VND each month for finding new crewmembers (Table 20). Vessel owners may also have some additional costs related to fishing labour, as new crewmembers may have received some payment in advance but did not actually work. Additionally, some small costs are incurred such as gear repair, landing site fees, unloading fees etc. Even though the average fishing trip is short, varying from 3 to 5 days, these vessels try to stay at sea for as long as possible to avoid costs associated with travelling to and from the fishing grounds.

Frequently, net benefits are subtracted by 10 percent to cover the depreciation costs of the fishing vessel, engine, fishing gear etc. Typically, a vessel owner takes 50 percent of the remaining share and the other 50 percent is shared by the crew members, with the skipper normally taking double the share of a single crewmember. The average income of a crewmember is 7.0–10.0 million VND per month. Income benefits during the main fishing season (May to September) are normally higher than during the northeast monsoon (November to March).

Table 20. Average monthly operational costs estimated of the shrimp trawl fishery in Kien Giang based on survey conducted in November 2015.

Expense	Amount (1000 VND)	Proportion (%)
Fuel	38 000	71
Ice	3 200	6
Food	6 400	12
Fees to brokers for recruitment of crews	3 000	6
Others (unloading, small repairs etc.)	2 700	5
<i>Total cost</i>	<i>53 300</i>	<i>100</i>

The monthly net benefits from a shrimp trawler in Kien Giang are estimated at around 86.5 million VND. The vessel owner will take 10 percent of the net benefit for vessel and gear depreciation and a half of net benefit remaining. In this way the vessel owner receives 47.5 million VND and each crew member earns about 7–8 million VND per month (Table 21). If the net benefit is low, then the vessel owner may decide to pay 200 000 VND to each fisher per day, so that they can keep the crews working onboard their vessels.

Table 21. Average monthly economic efficiency estimated of the shrimp trawl fishery in Kien Giang based on survey conducted in November 2015.

Item	Amount (1000 VND)	Remarks
Total Cost	53,000	Gear reparation, small reparation, vessel maintaining, loan interest costs are excluded
Total Revenue	134 000	

Net benefit	81 000	
Depreciation: 8–10.0%	8 000	
Vessel owner share	36 000	
Crew share	7 000	
Skipper share	15 000	

### Anchovy pair trawlers

The most important commercial catch from anchovy pair trawlers in Kien Giang (mainly Ha Tien, Hon Dat) are anchovies, which account for 91 percent of the catch volume and 65 percent of the catch value. Cephalopods account for a considerable proportion of catch value (27 percent) but account for less than 2 percent of the catch volume. On average, the operational cost of a single trip (15–20 days) is estimated at more than 200 million VND, and the average monthly operational costs are estimated at 340 million VND, while monthly revenue generated by a pair of anchovy trawlers is about 540 million VND (Table 22, Table 23).

Table 22. Average monthly catch (tonnes) and revenue (1000 VND) estimated of the anchovy pair trawl fishery in Kien Giang based on survey conducted in November 2015.

Commercial group	Catch (tonne)	Proportion (%)	Price (1000 VND)	TR (1000 VND)	Proportion (%)
Mixed fish	2.4	5	20	45 000	8
Squid, octopus	1.6	4	110	148 000	27
pig fish/fertilizer fish (mainly anchovies)	43.0	91	8	351 000	65
<i>Total</i>	<i>47.0</i>			<i>544 000</i>	<i>100</i>

Table 23. Average monthly operational costs (1000 VND) estimated of the anchovy pair trawl fishery in Kien Giang based on survey conducted in November 2015.

Expense	Amount (1000 VND)	Proportion (%)
Fuel	195 000	58
Ice	24 000	7
Food	33 000	10
Access fishing ground of other gears	45 000	13
Gear repair cost	20 000	6
Others (crew recruitment costs, unloading costs, port in/port out fees)	21 000	6
<i>Total</i>	<i>338 000</i>	<i>100</i>



The mean income of each crew member is around 8 million VND per month while the skipper will receive 16 million VND per month. The method of sharing benefits or allocations of the catch value is similar to that used for other trawlers i.e. after subtracting the depreciation costs of the fixed investment, the net benefit is divided by two; the crew members receiving one half and the vessel owner the other. Therefore, the average monthly income of anchovy trawlers is 55 million VND per vessel or 110 million VND per pair of trawlers. Yearly, each unit of pair trawlers needs to go to the dock for maintenance, once a year and this may cost around 100 million VND. Where the vessel owner has a loan from the bank, for example, an amount of 6 000 million VND, then he will have to pay back around 50 million VND per month (Table 24).

Table 24. Average monthly economic efficiency estimated of the anchovy pair trawl fishery in Kien Giang, based on survey conducted in November 2015.

Item	Amount (1000 VND)	Remarks
Total Cost	338 000	Gear reparation, small reparation, vessel maintaining, loan interest costs are excluded
Total Revenue	544 000	
Net benefit	206 000	
Depreciation	20 000	
Vessel owner share	110 000	
Every crew share	8 000	Skipper normally gets double share of a crew

### Mixed pair trawlers

Mixed pair trawlers in Kien Giang are relatively large compared to other trawlers. The average operational cost per trip of one pair of mixed trawlers varies from 500–700 million VND (Viet Nam Dong) for a voyage of 20–25 days. Pig fish/fertilizer fish accounts for 40 percent of the landing volume but only 9 percent of the landing value (Table 25). This is due to the long preservation time on board and the fact that there are many different species mixed together. Economically important fish species are dominant in the catches of mixed pair trawlers, accounting for 44 percent and 30 percent of the landing volume and value respectively. However, the most important catch item in terms of income is squid, which although may not account for a large proportion of the catch, normally accounts for about 60–65 percent of total revenue per trip. Some estimates of operational costs, associated costs and benefits of this fishery are presented in Table 26 and Table 27.

Table 25. Average monthly catch and revenue estimated of the mixed pair trawl fishery in Kien Giang, based on survey conducted in November 2015.

<b>Commercial group</b>	<b>Catch (tonnes)</b>	<b>Proportion (%)</b>	<b>Price (1000 VND)</b>	<b>Total Revenue (1000VND)</b>	<b>Proportion (%)</b>
Mixed fish	22	43.6	15	360 000	30
Pig fish/fertilizer fish	20	39.7	5.5	110 000	9
Squid	8	15.9	90	720 000	59
Cuttlefish, octopus	0.4	0.79	60	24 000	2
<i>Total</i>	<i>50.4</i>	<i>100</i>		<i>1 214 000</i>	<i>100</i>

Table 26. Average monthly operational costs estimated of the mixed pair trawl fishery in Kien Giang, based on survey conducted in November 2015.

<b>Expense</b>	<b>Amount (1000 VND)</b>	<b>Proportion (%)</b>
Fuel	402 000	68
Ice	52 000	9
Food	35 000	6
Small reparation	70 000	12
Others (crew recruitment cost, unloading port in/port out fees, plastic bag...)	30 000	5
<i>Total cost</i>	<i>589 000</i>	<i>100</i>

Table 27. Average monthly economic efficiency estimated of the mixed pair trawl fishery in Kien Giang, based on survey conducted in November 2015.

<b>Item</b>	<b>Amount (1000 VND)</b>	<b>Remarks</b>
Total Cost		Gear reparation, small reparation, vessel maintaining, loan interest costs are excluded
Total Revenue	1 214 000	
Net benefit	625 000	
Depreciation	80 000-100 000	
Vessel owner share	375 000	
Every crew share	9 300	Skipper normally gets double share of a crew

#### **f. Labour and income**

It is estimated that there are 27 500 fishers directly involved in the trawl fishery in Kien Giang; 1 800–2 000 vessel owners; 400–500 workers at fishmeal processing plants; and approximately 2 000–3 000 labourers working in the seafood processing industry. In addition there are 2 700–2 800 crews working on large-scale trans-shipment vessels in the province

and several hundred people working on small-scale trans-shipment boats in Kien Giang and the nearby provinces (Ca Mau, An Giang, Dong Thap, Bac Lieu). Additionally, there are about 1 200 people working at landing sites and fishing ports unloading catches from trawlers and sorting fish, providing a main source of income for their households (Figure 11). Other fishery service work also provides incomes for a large number of labourers e.g. vessel construction and reparation, ice making, fueling, food supplying, fishing gear making etc. Average incomes are quite different between different actors. Women play important roles in seafood processing, sorting fish and handling fish. Briefly, there are about 36 000–37 000 people earning livelihoods either directly or indirectly associated to the trawl fishery in Kien Giang. This is really important to the socio-economic aspect in terms of work and livelihoods generation not only in Kien Giang but also in surrounding provinces as mentioned above.

**Household size:** Survey information shows that stakeholder household size is strongly varied. Typically, 4–5 members from one family are engaged in working as crew or seafood/fishmeal processing. Later generations tend to have a smaller household size (normally 4 members). Some vessel owners and seafood, fishmeal processors may have “big” families with several generations staying together, as many 15–20 members in each household.

**Age structure:** The survey shows that more than 80 percent of crewmembers working on board anchovy and mixed pair trawlers have ages ranging from 18 to 45 years. About 70 percent of shrimp trawler crews are below 40 years old. The age of people involved in sun drying shrimp varied from 16 to 70 years. This greater range can be explained by the fact that labourers can work onshore and it is not particularly heavy work. Additionally, a small number of children, normally in range of 12 to 15 years, and very old persons (65–75 years old) are involved in shrimp processing activities. In the seafood and fishmeal processing industries, 90 percent of the labourers are within the age range of 20–45 years. Around 80 percent of labourers working at the landing sites and fishing ports are in the age range of 20–40 years, the rest are between 41–55 years old. This work requires healthy employees as the work is hard.

**Gender structure:** 100 percent of the interviewees working on board trawlers were men. Conversely, women (80 percent) dominate employment in the seafood processing industry. The seafood processing lines require skillful work which women are well suited to. Women are also dominant in the sun-dried shrimp processing industry, where 85 percent of the labourers are women. In the fishmeal industry, the proportion of women is less, about 30–40 percent of the total number of employees. Fish porter work at the landing sites and fishing ports is dominated by men (60–70 percent), while the women tend to be in charge of sorting fish.

**Education:** 60–70 percent of crews working in the trawl fishery have a primary school education (about 5 years in school), 10–20 percent finished secondary school (about 8–9 years

in school), and 20 percent have a higher level education (about 10–12 years in school); no one interviewed had reached university level. A significant proportion of crews (70–80 percent) have not been formally trained on fishing operations or safety at sea. The educational background of labourers working in sun drying shrimp and as fish porters is low. Conversely, workers in the seafood and fishmeal processing industries tend to have achieved higher education, with 50–60 percent educated to primary level and 30–40 percent to secondary school level. The remaining labourers are technicians and skilled workers who tend to have graduated from high school or college.

**Income:** Average incomes of the fishing crews are in the range of 6–10 million VND per month. There are no significant differences in incomes between labourers working on shrimp trawlers or anchovy pair trawlers. However, average incomes varied seasonally and from trip to trip. The incomes of the crew are strongly dependent on the volume of their catches, fish prices, and the cost of fuel. Working at sea is considered difficult and risky, and crews have to live away from their homes for several months at a time, although they do not have to pay for meals or accommodation while working at sea. When compared to local workers in the construction industry, the average income of a fishing crewmember is higher than a construction worker, who typically earns 4.5–5.0 million VND per month (Table 28).

Table 28. Estimated monthly incomes of some actors in supply chain of the trawl fishery in Kien Giang, based on the survey conducted in November 2015.

Industry/Stakeholder	Average income per month (1000 VND)	Additional livelihoods of the family	Remarks
Shrimp trawl crew	5 000–7 000	No	No additional incomes
Anchovy pair trawl crew	8 000–10 000	No	
Mixed pair trawl	8 000–12 000	No	
Shrimp sundried labor	3 000–5 000	No	
Fishmeal processing worker	5 000–7 000	Yes, spouse and children may have additional incomes from agriculture sector, services	Company pays social and medical insurance, free accommodation including electric power, clean water and 50% food costs
Fish porter	6 000–10 000	Yes	Agriculture and/or small service businesses
Seafood processing worker	5 000–6 000	Yes	Agriculture and/or small service businesses
Fish picker	2 000–3 000	No	Collect the fish at the landing sites/fishing ports
Middlemen	90 000–300 000	No	Taxes, bank interests, transporting and opportunity costs are excluded



Figure 11. Labourers involved in unloading, sorting and processing catches unloaded by trawlers in Kien Giang province.

### **g. Fishmeal industry**

In Kien Giang there are currently 12 fishmeal processing companies. The main fishmeal producers are Minh Chau, Phuc Ngoc and Ha Tien. Other important fishmeal processing companies can be found in Kien Hung, Kien Hung 1, Tac Cau, Kien Giang and Bien Xanh. Mostly, these companies buy raw materials from local fishing vessels. Ha Tien fishmeal is considered to be the best quality fishmeal in Kien Giang because the raw materials used are anchovies harvested by local trawlers, while the other companies are using mixed pig fish/fertilizer fish. Most fishmeal processing companies are buying anchovies and mixed pig fish/fertilizer fish. Pig fish/fertilizer fish for fishmeal processing is transported from Ha Tien, Ca Mau (Song Doc fishing port), Bac Lieu (Ganh Hao fishing port) to Tac Cau (Kien Giang) which is the main fishmeal processing area. Usually, Kien Giang trawlers unload their catches at Tac Cau fishing port and Ha Tien landing sites, with some vessels operating close to the fishing ports in Ca Mau, Ba Ria Vung Tau, and Bac Lieu provinces. At these locations, the vessels come to shore for loading food, ice and fuel and their catches are transported to Kien Giang by trans-shipment boat.

Very few vessel owners sell their catches directly to fishmeal processing companies. However, about 30 percent of the raw material volume of Ha Tien Fishmeal Company is directly bought from vessel owners, with the rest being bought through middlemen. It is not convenient for small vessels and vessels with small quantities of pig fish/fertilizer fish to sell directly to fishmeal companies. Additionally, it may take time for fishers to complete the selling process. Therefore, middlemen play an important role in linking raw material sources to fishmeal processing plants. Middlemen have to pay transport costs, and unloading costs at the landing sites or at the quay of the processing plants. It was estimated that for each kilogram of pig fish/fertilizer fish, middlemen receive a benefit of 50 VND.

The average income of workers in the Ha Tien Fishmeal Company is estimated at 5–7 million VND per month. Workers are also provided with accommodation, clean water, electricity and 50 percent of daily food expenses. The volume of raw materials for fishmeal processing in this company has been stable in recent years.

Most of the fishmeal produced is purchased by domestic aquafeed companies and some joint stock companies, such as Tom Boy, Nutreco (Skretting Vietnam), Uni-president, and Thang Long. Currently, less than 10 percent of fishmeal production is exported to Japan, China and Hong Kong.

Phuc Ngoc, Minh Tam, Minh Chau and Ha Tien fishmeal processing plants are considered as the biggest ones in Kien Giang. Phuc Ngoc, and Minh Tam Fishmeal companies have a pig



fish/fertilizer fish demand of 250–300 tonnes of raw materials per day; the average ratio between the raw material and final fishmeal product is about 3.0–3.4:1 (Table 29). The Phuc Ngoc Fishmeal Company buys and processes around 200 tonnes of pig fish/fertilizer fish each day, producing around 20 000 tonnes of fishmeal per year. The other processing plants have a production rate of about one third to one half of the Phuc Ngoc fishmeal processing plant. It is estimated that the raw materials used for the fishmeal industry in the Province is in the range of 300 000 to 350 000 tonnes/year which can produce 90 000–110 000 tonnes of fishmeal. This industry creates full-time jobs and supports the livelihoods of around 500 workers. The production capacities of the processing plants have been designed higher than the current volume of raw materials available. For instance, Ha Tien fishmeal can daily process 280 tonnes of raw materials but on average the company only buys 130 tonnes of raw material per day (Table 29). The study results are similar to the official data reported by the Provincial Department of Commerce and Industry, which estimates the 2015 total production of fishmeal processed in Kien Giang to be 106 747 tonnes.

Table 29. Estimated basic production and associated indicators of some fishmeal processing plants in Kien Giang based on data collected in November 2015.

Company	Year of foundation	Production capacity of raw material (tonnes per day)	Actual production of raw material (tonnes per day)	Annual Production of fishmeal (tonnes)	No of Laborers	Sources of raw materials	Fish preservation methods
Company 1	2010	280	130	13 000	70	Local trawlers	Ice
Company 2	2007	240	200	19 000	75	Local trawlers	Ice
Company 3	2005	240	200	16 000	75	Local trawlers	Ice

Table 30 shows the monthly benefits to some fishmeal processing plants. Benefits look high but a number of costs have not been included, for example, taxes, depreciation costs of the equipment, electric power supply, water, wastewater treatment, and transportation of the raw materials. Additionally, the processing plants also provide unlimited time loans to the owners of vessels sourcing raw materials. On average, each pair trawler unit borrows 200–300 million VND per year, and the vessel owners only pay back the full amount if they do not want to sell their fish to the fishmeal processing plant providing the loan. There are about 250–300 pair trawler units selling pig fish/fertilizer fish to the Phuc Ngoc fishmeal processing company, showing that the company has invested a large amount of money in the vessels from whom they are buying fish. This opportunity cost, where money could have been invested in another enterprise instead of into fishing vessels is probably significant. However, this study did not collect detailed information for further clarification.





Table 30. Estimated economic indicators of fishmeal industry in Kien Giang based on data collected in November 2015.

Company	Raw materials volume per month (tonnes)	Price of raw material (1000 VND/kg)	Raw material cost per month (1000VND)	Production per month (tonne)	Labour cost per month (1000 VND)	Benefit (1000 VND)	Remarks
Company 1	4 500	8	36 000 000	1 400	600 000	12 300 000	Taxes, depreciation costs are excluded
Company 2	6 000	5	30 000 000	1 700	650 000	18 500 000	Taxes, depreciation costs are excluded
Company 3	6 000	5	30 000 000	1 700	650 000	18 500 000	Taxes, depreciation costs are excluded

#### **h. Seafood industry**

There are 14 seafood-processing companies located around Tac Cau fishing port, in Chau Thanh district, Kien Giang. Additionally, there are other seafood processing companies located in Phu Quoc, Ha Tien, Kien Luong, Hon Dat, and Kien Hai districts. The processed seafood products are diverse, including value-added products, frozen fish, canned fish, fish sauce, surimi, and semi-processed products. Raw materials used are also diverse, and include squid, octopus, fish, shrimp, crab, and bivalves (Figure 12). The seafood processing industry is making increasing demands on raw materials from both aquaculture and capture fisheries. Under this study, one company, Huy Nam Seafood Company was studied in more detail. The company is the biggest cephalopod processing company in Viet Nam with an annual production of around 3 000 tonnes. The main products are squid, octopus, and cuttlefish and they are processed in several different ways for markets in Japan, South Korea, United States of America, Russia, Italy, and Spain.

There are also a number of surimi processing factories located in Kien Giang and other provinces which are supplied with raw materials from trawlers. Normally, the best quality economically important species, such as lizardfish, threadfin bream, snapper, and red bigeye are used for either export or domestic consumption. However, fish which are of a poorer quality are sold to surimi processing plants. Additionally, some good quality but economically low value species e.g. goatfish, are also used for the surimi processing industry.



Figure 12. Some important commercial groups caught by trawlers in Kien Giang, from information collected in 2015.

### i. Fisheries issues

**Lack of a fisheries labour management system:** All vessel owners interviewed did not have long-term contracts with fishers. Fishers freely moved from one vessel to another, from trip to trip. Vessel owners often faced difficulties in finding crewmembers and may have to pay 200 000 VND for middlemen to find each crewmember for a fishing trip. There is no service to check or verify whether the crew is qualified enough in terms of health, skill, fishing experiences, and level of trustworthiness. Fishers may receive money from vessel owners in advance, before going to the sea, and then run away. This results in losses to the vessel owner and makes it hard to plan for the trip. Therefore the lack of a management system for crews creates risks for vessel owners in not only technical fishing operation but also finance. Vessel owners interviewed reflected that management of the crews is one of the hottest fishery issues in the Province.

**Serious competition for fishing grounds:** It is common for anchovy and shrimp trawlers to be involved in conflicts, some of them serious, with other fishing gear users, including octopus trappers (using snail shells) and crab trammel netters operating nearshore or near island waters. Normally, anchovy pair trawlers have to pay around 2 500 000 VND to the octopus trappers to fish for one night in such an area. This makes the fishing operational costs of the trawlers significantly increased.

**Lack of, or weakness of fisher associations:** There are few formal fisheries association and/or fisher associations operating at the community level in the Province. However, in some places fishers are aggregating together to informally form cooperatives among themselves. Such cooperatives are formed by a group of individuals who use the same type of vessel and

gears and fish the same fishing grounds. Often they may be relatives or friends. On average, a cooperative is made up of 30–60 vessel owners, depending on the gear types used. For otter trawlers and shrimp trawlers on short fishing trips, the number of members under each cooperative is large (around 40–60 units). Thus, they alternate in collecting catches from other members and going to shore. Such cooperatives have a verbal code of conduct to collaborate at sea, including some important activities such as, search and rescue, transporting catches and necessary items (foods, fuel, water), and assisting each other to overcome risks and accidents. They are not registered with any management body or no administrative procedures are implemented.

There is a Provincial fisheries association and a Rach Gia city fisheries association. The Rach Gia city fisheries association has 436 members, who are mainly vessel owners. This organization has some regular activities, meetings and administrative staffs working at the office. However, the provincial fisheries association is not active. Two fisher associations in Kien Giang are ineffective and are limited in scale.

**Poor and weak management of the fisheries infrastructures:** The province has a plan to upgrade 10 fishing ports<sup>3</sup> and six landing sites. However, Tac Cau fishing port is categorized as a national fishing port and is operating fully. Most of the trawl vessels in the province unload their fish at Tac Cau fishing port. The fishing port has facilities for fishing vessels and crews, and around the fishing port are 14 seafood processing plants and three fishmeal processing plants. Important facilities in the port include: quays, sorting houses with shade, clean water supplies, fuel stations, stores, vessels and engine workshops, car parking, and ice making plants. However, many of these facilities are old, and ice producers do not use stainless steel vessels, the fish sorting house is not well planned or managed, no clean water supply system is installed at the sorting area, and there is no house or space for workers, or accommodation for crews, skippers, or vessel owners during their time at port (Figure 13). Additionally, the system of wastewater and garbage collection are ineffective and inadequate and result in localised pollution.

The infrastructures and facilities in landing sites in other districts such as Muong Dao (manmade channel) are very poor. At these landing sites, there are no sunshades, no proper fish sorting places, no cold stores, and insufficient services for fishers, skippers and local government staff (fisheries managers, local enumerators). The poor status of the fisheries infrastructures provides poor services for fishing operations and increases the costs of transporting water, fuel, food and other logistic services for fishers, vessel owners, middlemen, fisheries managers etc. Additionally, this often leads to an increase in the

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<sup>3</sup> Tac Cau fishing port located in Chau Thanh district, Duong Dong and An Thoi fishing ports in Phu Quoc district, Nam Du (Kien Hai district), Tho Chau, and Bai Dong (Phu Quoc), Ba Hon (Kien Hai), Xeo Nhau, Linh Huy (Hon Dat), Hon Ngang (Kien Hai).

proportion of post-harvest losses, in terms of fish quality as well as catch volume. Poor infrastructure also causes environmental issues for surrounding communities, particularly around landing sites and fishing port. On shore, there is insufficient space for local fishers to dry their catches of shrimp and prawn.



Figure 13. Poor landing site/fishing port infrastructures and sun drying shrimp facility in Kien Giang, survey conducted in 2015.

**Weak linkages within actors along the supply chain:** At present there is little collaboration between seafood processing companies and middlemen, fishers or fishing vessel owners. Therefore, there are few incentives to improve fish handling and processing from market chain actors. However, a number of fishing vessel owners take loans from middlemen or fishmeal processors. This connection helps fishers to cover part of the costs of fuel, ice blocks and foods, gear and vessel reparation. However, in return fishers must sell their catches to their creditors at a price below the market price. In addition, the weights of the fish sold may be under-represented.



**Weak management of the fishery:** The legal framework and regulations for managing the capture fishery are available. A number of regulations relating to closed season, closed areas, mesh size limitation, zonation of the fishing grounds, logbook completion, fishing reports etc. are in force. However, the compliance of fishers and enforcement of the law are weak. Patrol vessels mainly focus on offshore trawler violations in inshore fishing grounds. Fisheries dependent data are not regularly collected and some small trawlers may be registered as using other gears. The fisheries management authority has tried to implement regulations to control the fishing operations and monitor the sector (logbook completion, fishing reports etc), mesh size limitation and zoning fishing grounds etc. However, the compliance from fishers are poor. Currently, there are seven patrol vessels operating in Kien Giang waters. The number of fishing ground violations has tended to increase in recent years.

**Post-harvest loss:** There are no available studies on post-harvest losses of the trawl fishery in Kien Giang. The freshness of fish landed by mixed pair trawlers in Tac Cau fishing port and Muong Dao landing sites is normally poor and significant proportion of the catches landed are already spoiled. According to assessments made by the fishers, about 10–20 percent of the economically important fish landed are sorted into the "pig fish/fertilizer fish" category for fishmeal processing purposes, and 40–50 percent of the commercially valuable fish are of a bad quality. The poor quality of trawled fish is thought to be due to: the long towing time (6–8 hours per haul) and poor handling and preserving practices onboard. In addition, poor facilities at the fish landing sites may have negative impacts on the quality of the fish. Long waiting times at the quays for unloading, lack of sunshade, lack of clean water and low quality ice used cause a further reduction in catch quality (Figure 14). Additionally, careless transportation of the fish may also have negative impacts on the quality of the fish.



Figure 14. Poor fish handling practices in trawl fishery in Kien Giang, survey conducted in 2015.

**Open access fishery:** In practical terms, Viet Nam's trawl fishery has been in a state of open access fishery for many years (Figure 15). The Ministry promulgated Decision No 3602/QD-BNN-TCTS on 19 August 2014 on the allocation of the number of new vessels built by provinces, in which Kien Giang was allowed to build up to 10 new trans-shipment vessels and

95 new fishing vessels. However, increasing the total quantity of trawlers is now forbidden. There was no further control on the number of trawlers until 18 November 2015, when the Ministry of Agriculture and Rural Development (MARD) issued a formal document to coastal provinces in Viet Nam to ban any new trawlers entering the fishery or other vessels switching to trawling. The Ministry of Agriculture and Rural Development has issued a formal document, No. 9443/BNN-TCTS on 18 November 2015, to the coastal provinces to control the number of new trawlers, freezing the number of trawlers in all 28 coastal provinces. The central government policy is therefore to freeze the number of trawlers in the country. However, there are already too many trawlers operating, particularly in South Viet Nam. No taxes are applied, the licensing fee is low, and cheap or free unloading fees lead to a reduction in the operational costs of the fleet. Consequently, this creates incentives for fishers to increase their fishing effort above sustainable limits.



Figure 15. Trawlers at Muong Dao landing site in Ha Tien, Kien Giang, survey conducted in 2015.

#### **j. Household economics**

Trawler crewmembers and processing industry workers are usually poor; however, their incomes are slightly higher than the official poverty line issued by the central government (<800 000 VND per month per individual income for the suburban areas). Crewmembers and processing labourers are mainly local people from Kien Giang (70 percent), with the rest coming from other districts or neighbouring provinces. The average income of each vessel owner is estimated at approximately 36 million VND per month while crew and dried shrimp workers have average incomes of 6–8 and 4–6 million VND per month, respectively (Table 31, Table 32, Table 33). Shrimp processing workers can earn an estimated average of 3 million VND per month with their incomes dependent on the production completed. The rate for processing of 1 kg shrimp production varies from 7 000 to 10 000 VND, depending on the

size of the shrimp processed. Normally, each worker works for one or two vessel owners under a long-term verbal contract.

Table 31. Average incomes and monthly household expenses estimated of relevant stakeholders of the shrimp trawler in Kien Giang, based on the survey in 2015.

Actor	No of family member ( <i>person</i> )	Main income	Household income ( <i>1000 VND</i> )	Monthly expense ( <i>1000 VND</i> )
Vessel owner	4–6	Fishery	36 000	12 000
Crew	4–5	Fishery	8 000	6 000
Shrimp sundry worker	4–5	Fishery	6 000	5 000

Table 32. Incomes and monthly household expenses of relevant stakeholders of the anchovy pair trawlers in Kien Giang, based on the survey conducted in November 2015.

Actor	No of family member ( <i>person</i> )	Main income	Household income ( <i>1000 VND</i> )	Monthly expense ( <i>1000 VND</i> )
Vessel owner	4–6	Fishery	93 000	10 000–15 000
Crew	4–5	Fishery	8 000	3 000–6 000

Table 33. Incomes and monthly household expenses estimated of relevant stakeholders of the mixed pair trawlers in Kien Giang, based on the survey conducted in November 2015.

Actor	No of family member ( <i>person</i> )	Main income	Household income ( <i>1000 VND</i> )	Monthly expense ( <i>1000 VND</i> )
Vessel owner	4–8	Fishery	120 000 – 150 000	15 000–20 000
Crew	4–5	Fishery	8 000–10 000	5 000–6 000

Typically each crewmember is responsible for the main income for one family. The average income of each crew per month is estimated at 7 million VND. In addition, their wives can do small jobs onshore such as involvement in the seafood-processing sector including crab shell peeling, shrimp processing, and may earn 2.0–2.5 million VND per month. Crew and vessel owner families have an average of 2–3 children who are sent to local schools and tend to have a better education, compared to their parents.

Vessel owners have the biggest share of the trip catches but they also have to pay for many different expenses including preparation of vessel, engine, bank interests, and fees for finding new crews, parking and keeping vessels at the landing sites or fishing ports etc. Most vessel owners have to borrow money from the banks to either buy the secondhand vessels or build new ones. Some vessel owners that can process their catches themselves do not have to hire additional people to dry and peel shrimp, thereby saving money.

In this study, the incomes of crews in mixed trawlers appear to be higher than with other gears. However, crews working on board these trawlers work harder because the vessels are fishing the whole day. These trawler fleets have almost double the number of crewmembers compared to anchovy pair trawlers and about 4–5 times as much number of crews working on board shrimp trawlers.

The main expenses of each household are education fees, food and electric power, clean water and rent accommodation. Normally, education fees of the kids account for about 30–40 percent of the incomes of each fisher household, followed by food (20–30 percent) and other expenses.

#### **k. Supply chain and markets**

##### **a) Pig fish/fertilizer fish supply chain**

Trawlers in Kien Giang play an important role in contributing to the landing volume of fish caught by the province, about 85 percent, and the most important suppliers for fishmeal industry in the province as well as in south Viet Nam (Figure 16). In Viet Nam in general, and in Kien Giang in particular, the fishmeal industry is heavily dependent on trawl fishery.

Pig fish/fertilizer fish from trawl fisheries in Kien Giang are comprised of anchovies, low value species and certain proportion of spoiled fish from the economically important fish group from shrimp trawlers and mixed pair trawlers (Figure 17). Accordingly, 80 percent of the pig fish/fertilizer fish in anchovy pair trawlers are provided to fishmeal processing plants in Ha Tien district and Chau Thanh district. The other 20 percent are transported to other provinces in the Mekong Delta areas for either fishmeal processing or homemade feed production for pangasius, tilapia, or snakehead (Figure 18). Normally, anchovies caught by trawlers are not good enough quality to make fish sauce and cannot be used for human consumption. The fish sauce industry sources raw material (anchovies) from purse seines and the lift net fisheries.



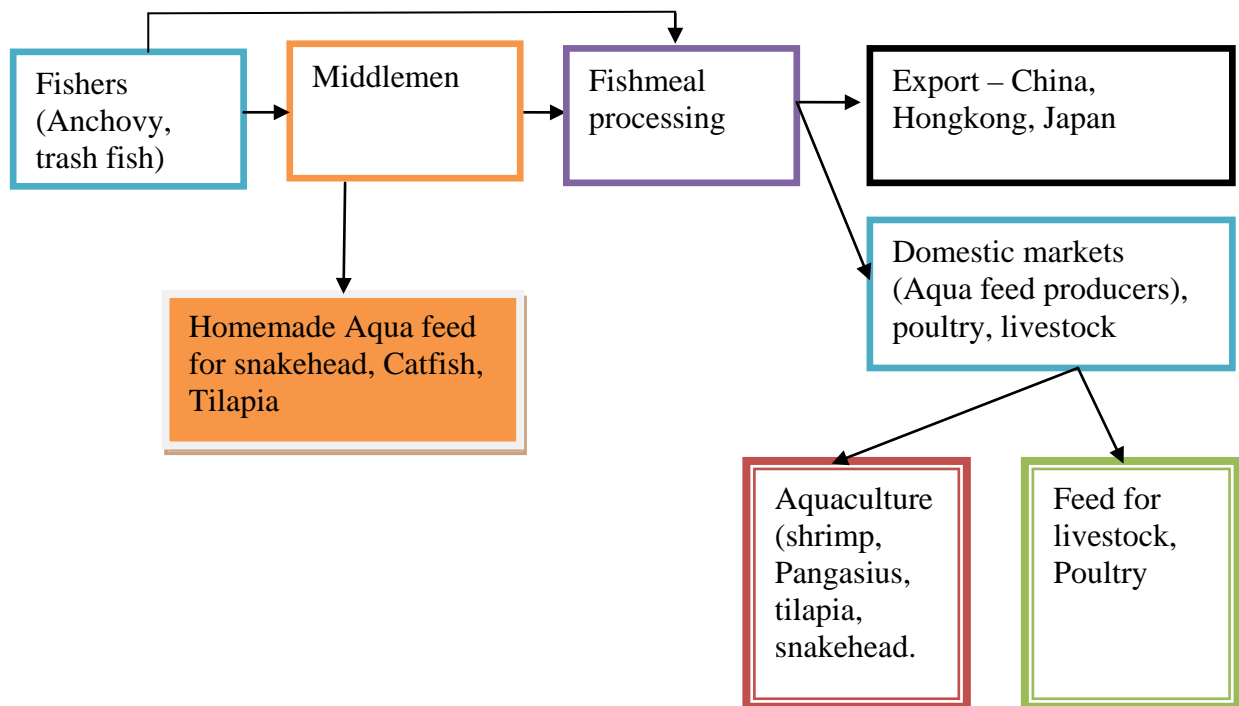


Figure 16. Supply chain of pig fish/fertilizer fish exploited by trawlers in Kien Giang.

There are two types of middlemen for pig fish/fertilizer fish in Kien Giang; large-scale middlemen who provide loans to vessel owners; and small-scale middlemen who buy smaller catch volumes and who do not provide loans to vessel owners. Large fishmeal processing plants can directly buy fish from fishers or vessel owners. However, they also provide loans to vessel owners to maintain their business relationships. A large processing plant can have verbal contracts with 200–300 pair trawler units.

There are about 20 large-scale middlemen in the Province, collecting about 50–200 tonnes of pig fish/fertilizer fish per day, depending on the season and number of vessels unloading. However, the average volume of pig fish/fertilizer fish collected by these middlemen is usually around 100 tonnes per day. The price of mixed trawl fleet sourced pig fish/fertilizer fish varies from 5 000–6 000 VND per kg while the anchovy price is in the range of 7 000 to 8 000 VND per kg. Middlemen hire labourers for unloading pig fish/fertilizer fish from the vessels, weighing and transporting to trucks. The cost of this is about 250 000 VND per tonne. Labourers earn a benefit of 500 VND per kg or 500 000 VND per tonne.

There are about 30–40 small-scale middlemen in the province. Small-scale pig fish/fertilizer fish middlemen earn approximately 1 000 VND per kg and they also sell produce to local fishmeal processing plants. The small-scale middlemen can collect around 3 tonnes per day.



Figure 17. Some fish species dominant in “trash fish” group unloaded by the trawlers in Kien Giang.

There are about 40 small-scale middlemen dealing with pig fish/fertilizer fish in Chau Doc district (An Giang province) and about 10 small-scale middlemen doing businesses on pig fish/fertilizer fish come from Dong Thap province. They buy pig fish/fertilizer fish from Tac Cau fishing port, Ha Tien landing site and other landing places in Kien Giang. On average, it takes four days per trip to buy and sell their fish; two days for transportation from their hometown to Kien Giang; one day for loading; and one day for unloading their fish. It is estimated that about 130 000 tonnes of pig fish/fertilizer fish are annually transported to An Giang for direct use in catfish and other species aquaculture. Yearly, farmers in Dong Thap Province may use about 12 000–15 000 tonnes of pig fish/fertilizer fish from Kien Giang, for homemade feeds for aquaculture activities.

Fishmeal processing plants mainly supply their products to joint stock companies, e.g. Vietnamese aquafeed companies, such as CP Vietnam, Uni-President, Thang Long, or Tomboy etc. About 5–10 percent of the total volume of fishmeal is for export to China, Hongkong, and Japan, and a part is used for local livestock and poultry feeds.



Figure 18. Transshipment boats loading “trash fish” from trawlers in Kien Giang.

**b) Shrimp supply chain of shrimp trawlers**

There are four middlemen working with sundried shrimp in Ha Tien and several in other areas of the province. However, most shrimp trawlers unload their catches at the Ha Tien landing site. Trawler operators usually hire 1.0 to 1.5 workers per vessel to carry out sun drying, processing and peeling. The final products are then sold to local middlemen, each afternoon. This type of product is for human consumption, and sold to markets in the region, most notably Cambodia. A small part of the sun-dried shrimp is used to supply domestic markets, mainly in Ho Chi Minh City. On average, each middleman may collect 1.0–3.0 tonnes of dried shrimp per day (see [Figures 19 and 20](#)).



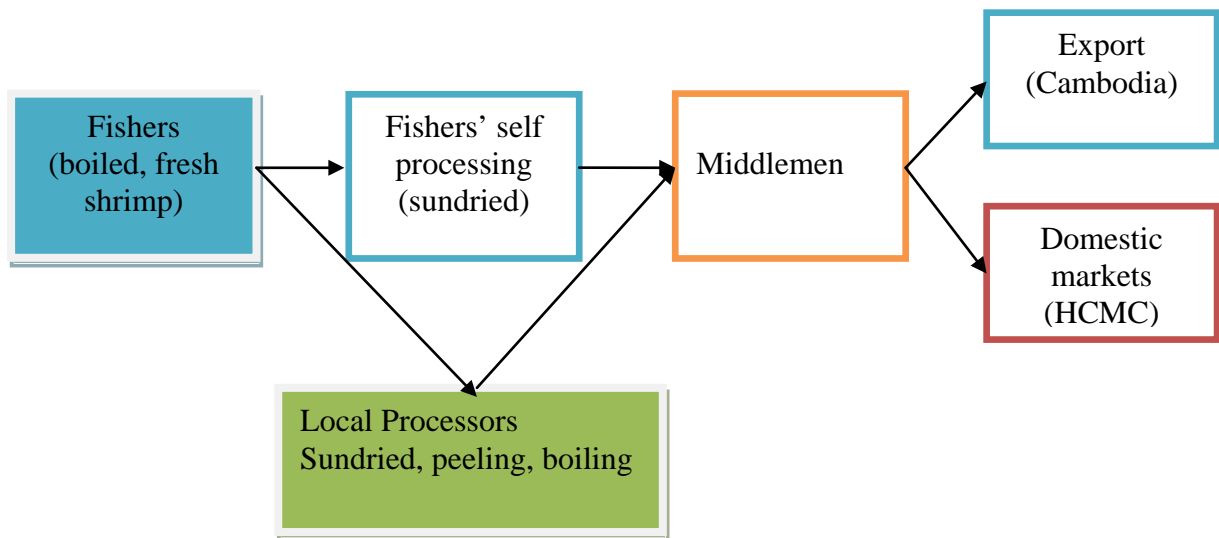


Figure 19. Supply chain of shrimp and prawn exploited by the shrimp trawlers in Kien Giang.



Figure 20. Shrimp caught by the shrimp trawlers in Kien Giang.

c) Cephalopods supply chain of trawl fishery

Sun dried squid play an important role in terms of income to the vessel owners and fishers on the pair trawlers. Dried squid mainly comes from mixed pair trawlers or so-called fish pair trawlers in Kien Giang. The major landing site for dried squid in Kien Giang is Tac Cau fishing port, in Chau Thanh district. The landing of dried squid is highly varied from vessel to vessel and there are also strong seasonal variations. Normally, one fishing trip by one mixed

pair trawler unit, lasting 20–25 days, produces a volume of about 1.5–3.0 tonnes of dried squid (equal to 6.0–12.0 tonnes of fresh squid).

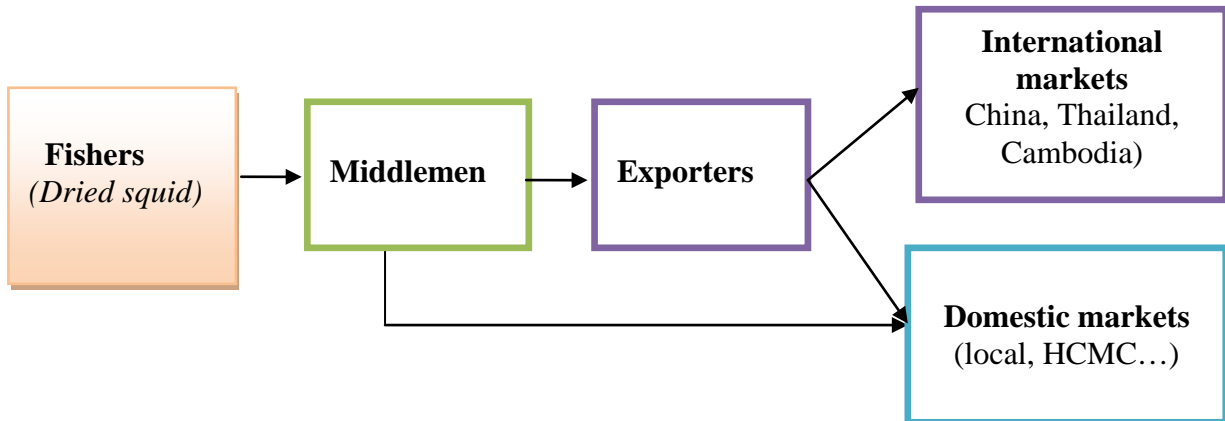


Figure 21. Supply chains of the dried squid exploited by trawlers in Kien Giang.

Dried squid is considered as the highest priced item of the pair trawlers and is fully used for human consumption. Middlemen collect all of the sundried squid that are unloaded. Some vessel owners sell their products at sea to trans-shipment vessels. However, these trans-shipment vessels are also owned by middlemen. There are about 20 middlemen working with sundried squid in Tac Cau fishing port, and each middleman buys squid from their own suppliers (about 50–80 pairs of the mixed pair trawlers). The quantity of dried squid can vary from 3–20 tonnes per day per middleman, with an average of 3 tonnes per day per middleman. The volume of dried squid in the southwest monsoon may be two to three times as high as during the northeast monsoon. Currently, the average price at port, for dried squid is about 350 000 VND per kg. The main markets for sundried squid are China, Thailand and Cambodia (Figure 21). Squid destined for international markets are handled by specialist exporters. However, the domestic market (Ho Chi Minh City and other provinces) also claims a significant share.

Another important group of cephalopods in the trawl fishery in Kien Giang, is fresh squid, octopus and cuttlefish (Figure 22). Middlemen collect squid, cuttlefish and octopus daily from the landing sites, mainly in Tac Cau fishing port and in Ha Tien. On average, the landing volume of mixed cuttlefish, squid, and octopus from one pair trawler unit can be in the range of 2.0–4.0 tonnes. Mixed pair trawlers can land about 3 tonnes of cuttlefish, octopus and some squid, while anchovy pair trawlers can land around 3.5 tonnes of fresh squid per trip (20–25 days per trip).

Fresh squid and cuttlefish are collected by local middlemen and either sold to the seafood processing industry or directly to domestic markets via other upstream suppliers (Figure 23). Huy Nam Seafood Company located in the Tac Cau industry zone, Chau Thanh district (Kien Giang) is one of the most important cephalopod processing plants in the region. Annually, this

company can process and export about 3 000 tonnes of produce, in which squid accounts for about 20 percent, cuttlefish, 20 percent and octopus, 30 percent, with the rest being other seafood. Raw materials may also be bought from some other small fisheries such as squid handlines, squid pots and traps, and squid poles and lines to boost production.

Mostly, the processed products of cephalopods are for export to the main markets in the European Union (Italy, Spain) and Asia (Japan, South Korea). Local seafood processors can either directly export their products or do so through a seafood trader. In Kien Giang, some seafood processing companies also process some cephalopods but this is not important in terms of their total production volume.



Figure 22. Fresh squid and octopus exploited by trawlers in Kien Giang.

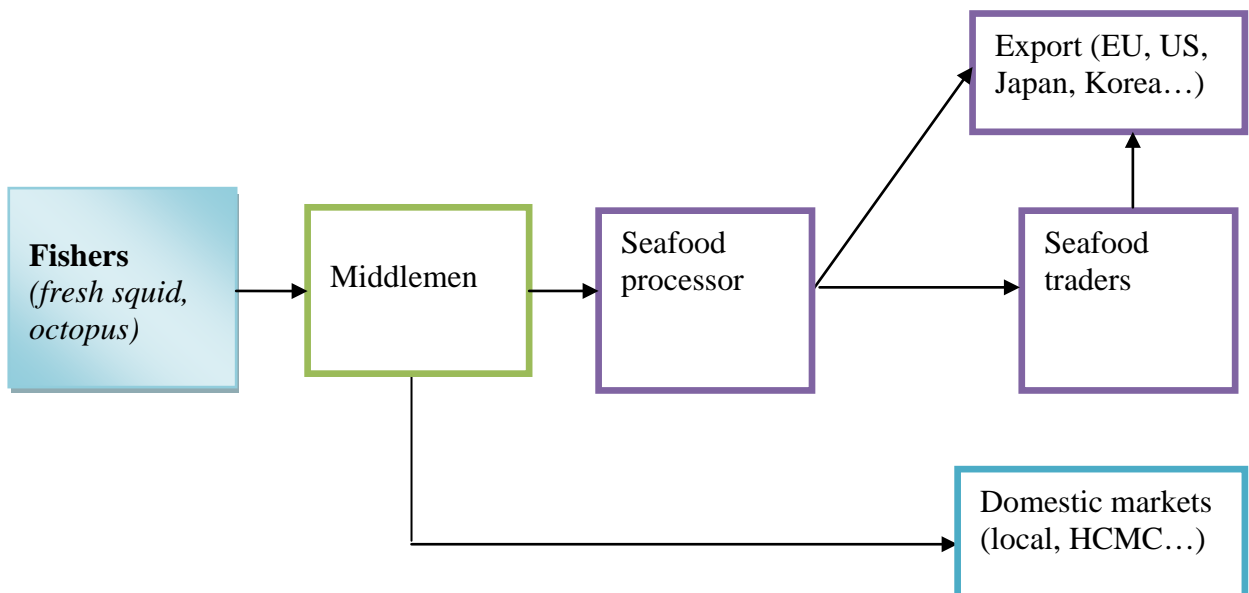


Figure 23. Supply chains of the fresh squid, octopus exploited by trawlers.

There are about 15–20 large-scale fresh cephalopod middlemen doing business at Tac Cau fishing port. On average, each middleman collects 3.0–5.0 tonnes of cephalopods per day.

Among the fresh cephalopods, cuttlefish account for about 60–70 percent and octopus for 20–25 percent, with the smaller part being made up of squid. Fresh cephalopods may come from different gears but mainly come from the trawl fishery.

Small-scale middlemen for fresh octopus, cuttlefish and squid mainly supply local and domestic markets. On average, one small-scale middleman can source 0.5–1.5 tonnes of product per landing site per day. In Tac Cau there are about 10 small-scale middlemen buying fresh cephalopods and several more at the Ha Tien landing site. Conversely, the large-scale middlemen mainly target seafood producers for exporting purposes. Due to limitations of this study, detailed information on large-scale middlemen and other information relating to fresh cephalopod marketing was not gathered.

## **1. Social impacts of the fishery**

Trawl fishing in Kien Giang is important in terms of providing jobs and livelihoods for a large number of households. The number of people directly involved in this fishery is large. There are about 27 500 fishers working on board trawlers in the province and about 600 persons directly working on sun-drying shrimp and 800–1 000 labourers unloading fish at landing sites and fishing ports (Table 34). Survey results show that 95 percent of labourers working onboard are the main breadwinner for their household. Additionally, the trawl fishery provides work for porters at landing sites (Ha Tien, Kien Luong, Hon Dat, Phu Quoc, Kien Hai) and Tac Cau fishing port. On average, each landing site can provide work for more than 100 porters (average of 150 labourers); the porter rate is 50 000–100 000 VND per metric tonne of fish unloaded. About 20–30 percent of crewmembers working on trawlers in Kien Giang come from other provinces e.g. An Giang and Dong Thap.

Each shrimp trawler provides full-time jobs for 3–4 crew plus 1–2 persons hired on a short-term basis for sun-drying and peeling shrimp. Normally, crewmembers are flexible and very few of them have long-term work or stable work with a given vessel. This creates difficulties for vessel owners to proactively arrange fishing trips and increases operational costs. However, for those vessels which are fishing effectively, a good-shared income arrangement is likely to persuade crewmembers to seek long-term work on those vessels.

Table 34. Number of labourers directly involved in the trawl fishery in Kien Giang, based on the survey conducted in November 2015.

Fleet	Quantity	Unit	Average number of crews onboard ( <i>person</i> )	Total No of crews ( <i>person</i> )
Shrimp trawlers	560	Vessel	5	2 800
Anchovy trawlers	350	Pair	10	3 500
Mixed pair trawlers	966	Pair	22	21 252
<b>Total</b>				<b>27 552</b>

Otter trawlers and shrimp trawlers also provide a significant number of business opportunities for local people and outsiders, e.g. 400–500 women dominate the sun-dried shrimp production. The average income for sun dried and peeling shrimp labour is just enough to survive, with no surplus to save. However, this sort of work is low risk compared to some other jobs and can be a year-round activity. Older persons can also do these jobs. For a number of vessel owners, this activity is considered as an additional income and it is common for the wives of the vessel owners to be involved in this kind of work. Additionally, the trawl fishery also provides work through the trans-shipment vessels used to transport raw materials to fishmeal processing plants/factories. There are hundreds of these vessels, involved in transporting fish from landing sites and fishing ports to fishmeal factories and aquaculture farms (snakehead, *Pangasius*).

Table 35. Number of labourers involved in some services related to the trawl fishery in Kien Giang, based on the survey conducted in November 2015.

Services	Gear	Total number of labourers engaged ( <i>person</i> )	Average monthly income ( <i>1000 VND</i> )
Peeling shrimp	Shrimp trawler	560–1 120	3 000–4 000
Unloading fish	Anchovy pair trawler (in Ha Tien)	150–200	6 000–10 000
Unloading fish at the landing place	Fish trawler (in Tac Cau fishing port)	800–1 000	6 000–10 000
Unloading fish at the fishmeal processing plants	Trawlers	60–100	
Fishmeal processing	Trawlers	500–800	
Seafood processing	Trawlers	8 000–10 000	
Transporting from the sea to home ports	Anchovy and mixed pair trawlers	4 000–4 500	
Transporting from other ports to home ports	Trawlers	400–500	Not available
Transporting fish to other provinces	Trawlers	400–500	Not available



Other services (gear reparation, vessel construction, ice making, fuel, food, water supply)	Trawlers	Not available	Not available
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**Note:** Some information was not available due to time limitation and short duration of the survey.

From 10 to 20 labourers are needed for unloading raw materials to each processing plant. Their average incomes are around 6 000 000 VND per month. According to the Tac Cau fishing port authority, in the large fishing port, such as Tac Cau, there are 420 fishing porters unloading fish every day as their main livelihoods. However, in reality the number is possibly double this. Each team of fishing porters is comprised of 24–25 persons and it is said that there are several tens of team working at the port. The team ratio between male and female porters and sorters is 60:40 respectively. Women are responsible for fish sorting while men are in charge of transporting fish from the vessels to the sorting places and/or to the trucks.

The fishmeal industry also provides long-term work and livelihoods for a large number of labourers. On average, 60–70 labourers work in each fishmeal processing factory and the average income per worker is 5 000 000–6 000 000 VND per month. Some factories, such as Ha Tien Fishmeal Company provide their workers with free accommodation and cover 50 percent of food costs and all clean water and electricity costs.

The trawl fishery also creates jobs for large number of employees working in the seafood processing plants in Kien Giang. On average, there are 600–1 000 employees working in each seafood processing plant or company. The majority of workers in the seafood processing industry are women, accounting for 80 percent of the number of total employees. There are approximately 300 women working in the shrimp processing industry, from Kien Giang and nearby provinces as well. Therefore, in the whole province, the seafood industry creates work and livelihoods for several thousands of employees securing the livelihoods of many thousands of households (Table 35).

In addition, there are small groups of old people and children picking up the fish dropped at the port and landing site. They are able to collect around 10–20 kg of pig fish/fertilizer fish per day and may earn 50 000–100 000 VND per day for their efforts. They are normally from very poor local households and few have additional or alternative livelihoods.

There are numerous associated service opportunities for the trawl fishery, including fuel, food, ice production, clean water supply, vessel building, repairing, and transporting which create jobs for large number of labourers. There is no doubt that the trawl fishery contributes to improving the economic conditions in the surrounding communities.

Fisheries infrastructure, labour operations at landing sites, fishing ports, and associated services have significant social as well as economic impacts on the surrounding communities.

These are generally positive; for instance, generating employment opportunities and alternative livelihoods and providing more services to the surrounding communities. But some negative impacts do result, for example, water pollution, bad smell from the fishing port, landing site and fishmeal processing plant, the noisy atmosphere, and complicated and mixed cultural environments, e.g. crews from other areas, different religions, languages.

Furthermore, this fishery is important to aquafeed producers and aquaculture in terms of both work generation and the production of feeds for many aquaculture species, including catfish, tilapia, snakehead, grouper, snapper and shrimp. A number of aquafeed companies in Viet Nam are importing fishmeal, but most are using fishmeal from domestic sources.

On average, the amount of fish consumed by the households of skippers and vessel owners varied from 10–20 kg per month. This depended on the fishery and number of their family members. For instance, pair trawlers may stay at sea for several months, so the vessel owner will use less fish than the otter trawl which come to the shore after several days. Crews are normally not allowed to take fish to their home without permission from the skipper or vessel owner.

#### **m. Attitudes towards sustainability**

Of the interviewees from shrimp trawl fishers, 80 percent reflected that their shrimp catches are stable. However, competition for fishing grounds with other gears (crab, octopus fishing fleets) makes fishing operations difficult. As a result, shrimp trawlers now move further offshore to operate. This increases the costs of fishing operations and fishers may need to upgrade and make their fishing vessels larger to ensure safety at sea. Fishers also propose that there needs to be regulation of the fishing times and fishing areas for crab and octopus fishing and for shrimp trawlers, to mitigate future conflicts.

About 70 percent of anchovy pair trawl fishers interviewed had the attitude that catches had been stable in recent years, while 90 percent of persons involved in the shrimp trawl fishery opined that the shrimp resource is being harvested at a sustainable level and their concern was more with problems over conflict and competition with other fishing fleets. As a result, shrimp trawlers are fishing further offshore than their ‘traditional fishing grounds’.

More than 80 percent of persons questioned about the stability and sustainability of the fishery and trend in their catches and landings in recent years answered that total catches had not changed, but catch values had changed as the proportion of pig fish/fertilizer fish to higher-value species had increased. Landings of squid, cuttlefish and octopus were stable compared to previous years.

About 90 percent of anchovy pair trawler fishers would support a closed season for the anchovy fishing grounds. They would also like to have regulations on fishing times for crab and octopus fisheries, and suggest that crab and octopus fisheries should fish during the daytime while anchovy trawlers operate at night.

Above 70 percent of pair-trawl fishers sampled have the point of view that fishing operations should be year-round. Although in some months during the northeast monsoon, catches were significantly lower than in the other months.

Very few endangered, threatened, or protected species are being caught by trawlers. Sea mammals have not been observed in the trawling catches and sea turtles only rarely showed up in catches. Due to religious concerns, catching sea mammals even by accident is believed to bring bad luck to the family, so fishers normally release any sea turtles or sea mammals caught at sea, particularly dolphin and whales, which are highly respected by local fishers. Some fishers also added that towing speeds of their trawlers were slow (2.0–2.4 knots) while sea turtles could easily escape through the large mesh sizes at the wings of the gear. It seems that there are not so many problems with sea mammals and sea turtles in Kien Giang.

No trawl fishers and/or vessel owners interviewed wanted to change to alternative gears or switch to other fisheries as they lack experience in the use of other gears. They also said that trawlers could not easily be modified or upgraded to use other gear types. Vessel owners confirmed that annual catches have been stable for the recent years. The strong impacts on their businesses are the market prices of fish and fuel costs.

#### **n. Fisher organizations**

Kien Giang has established a provincial fishery association. At the district level there is the Rach Gia City Fisheries Association with 436 official members, mainly vessel owners and skippers and some retired persons with experience in the fisheries sector. The associations are free for all kind of fishers, vessel owners, regardless of gender and fishing gear types to become a voluntary member. The fisheries association has already a code of conduct for members to follow. The association is considered as a platform for members to exchange information, experiences and a bridge between fishers, enterprises and the management authority. All new policies, changes in management regulations, and frameworks are updated to the members via the meetings convened. The associations also aim to protect the rights and benefits of fishers in the Province, and provide proposals and advice to central government for development and for amending the legal framework of the fisheries sector.

Two fisher associations, under the system of Viet Nam's Labor Union, have been established in Kien Giang. The first organization was formed in An Hoa Ward, Rach Gia city in January

2012, with 91 voluntary fishers of multi-fishing gears. The second one was founded in Vinh Hoa Hiep commune, Chau Thanh district in October 2014. There are 25 local fishers involved in this organization without consideration of the gear types. The aims of these syndicates are to unite fishers to assist one another while operating at sea, as well as to exchange experiences, offer financial assistance for fishing business, and particularly to coordinate search and rescue operations and to mitigate risks while fishing at sea. These associations also may create better collaboration among fishers during fishing operations at sea, thereby reducing conflict and some other negative activities.

Unofficial cooperatives or informal cooperatives (no administration, not registered) have also emerged in the trawl fishery in Kien Giang. Members of these cooperatives are normally voluntarily involved and have verbal agreements. Depending on fleet sizes, membership can range from 10 to 60 vessel operators. In the shrimp trawl fishery, typically there are 30–40 vessel owners aggregated per cooperative. In addition, the skippers may found their own cooperatives based on family relationships. They also have verbal agreements to assist each other at sea, participate in search and rescue operations, and importantly to provide alternative transportation of catches from their members to the shore every day. This type of fisher organization is very popular in the Province.

#### **o. Transshipment vessels**

In Kien Giang, there are currently 273 professional transshipment vessels, and the province may increase this by 10 more transshipment vessels, based on the legal documents issued by the Ministry of Agriculture and Rural Development. Gross tonnage of each transshipment vessel is from 60–100 tonnes, with the length of each vessel between 24–26 m. The average engine capacity of this fleet is in range of 450–1 000 hp, typically around 600–800 hp (see [Figures 24 and 25](#)).



Figure 22. Transshipment boats for trawlers in Kien Giang.



Figure 23. Transshipment vessel for trawlers in Kien Giang.

These vessels operate by transporting catches from all types of gears used in the offshore fishing fleets, to the shore. Onboard each of the transshipment vessels, there are usually 8–12 persons. To hire the transshipment vessel to carry catches from the fishing ground, each pair trawler unit has to pay 25 million VND and provide 2 000 litres of fuel which is equal to about 53 million VND. Each transshipment vessel can carry catches from a number of trawlers to the landing sites.

**p. Fisheries management**

**Policy development:** Provincial fisheries regulations are developed in accordance with legal frameworks promulgated by the central government. These include fishery laws and decrees issued by the central government and circulars promulgated by the Ministry–MARD. Currently, the Kien Giang Provincial People’s Committee (PPC) has responsibility for promulgating regulations on the management of capture fisheries and aquatic resources in the Province’s territory (Decision No 23/2015/QD-UBND). The Province has identified fishing grounds, namely coastal waters, nearshore waters, offshore waters and shared waters with neighboring provinces (Ca Mau). No-take zones have been identified in the shallow coastal waters (3 nautical miles shoreward and 1 nautical mile around islands). Additionally, closed seasons have been introduced for certain areas. Regulations on banning destructive methods of fishing and those that cause negative impacts on the ecosystem and aquatic resources have been drafted.

The Kien Giang government does not now allow for any increase in new fishing boats below 30 hp for all gear types, and smaller than 90 hp for trawlers. However, scientific evidence is not sufficient to provide a concrete basis for policy making or the development of fisheries

management measures, such as gear restrictions, zonations, mesh size regulations, closed seasons, fishing effort levels etc. (Nguyen Viet Nghia, 2014). Policy development is still top-down in nature and the involvement of relevant stakeholders in management planning and strategizing is limited. In other words, the participation of fishers and the industry (fishing, seafood processing, trading etc.) in policy decision-making is limited.

Currently, fisheries management operations are managed by the provincial Department of Agriculture and Rural Development (DARD). Under this department, the Sub-Department of Fishery (now a merger between Sub-DECAFIREF and Sub-Department of Aquaculture) is the organization responsible for management. There are seven patrol vessels operating in Kien Giang waters which are mainly doing surveillance work for violations in fishing operations, particularly fishing ground incursions.

At present, there are insufficient human resources and financial resources for the Department of Fishery to manage the sector well. The management of landing sites and fishing ports is poorly implemented, landing data are not well collected, and transportation and people access is not controlled. Hygiene and food safety conditions as well as environmental pollution concerns are paid attention to but not yet seriously acted upon.

The local authority does not routinely collect landing data and a number of small trawlers are neither monitored nor registered. Some data on landing volume were collected, following a 'sample based' approach but estimated landings cannot be disaggregated by species and are inaccurate.

Although the local government has a policy to freeze the current number of trawlers (as well as an ambition to mitigate the negative impacts on the fishery), recently, MARD allocated funds to Kien Giang to build 95 new fishing vessels and 10 more transshipment vessels (Decision No 3602/QD-BNN-TCTS dated 19 August 2014).

Despite great efforts made by local government and local authorities to better manage the fishery, compliance of fishers with management measures in Kien Giang remain relatively poor. Violations in mesh size standards are common in the trawl fishery. Similarly, most large trawlers (above 90 hp) are violating fishing grounds in the southeast waters (Bui Van Tung et al., 2013). In addition, many anchovy pair trawlers are illegally operating in nearshore waters. No fishers and skippers have documented contracts and the management of labourers working on board fishing vessels is weak. Local fishers tend to decide on fishing activities at sea, based on their experience rather than on science. Fishers tend to fish as much as possible and the quality of fish retained is not much paid attention. For instance, the towing duration is relatively long (average of 5–8 hours per haul) and fish are not well handled onboard. Fishing operations are carried out all year round that may have negative impact on fishery resources

recruitment patterns and environmental conditions. Although middlemen play a most important role in fishing operations, there are no auction markets for local fishers. Therefore, the local government finds it hard to intervene in the businesses of local fishers. Finally, connections between fishers and seafood processing and traders remains weak.

## **5. RECOMMENDATIONS**

**Development of a provincial fishery management plan is a necessary step towards sustainability.** The plan should take into account a number of issues and priorities and objectives must be clearly identified, milestones must be set, and a practical implementation plan developed. Some important aspects to be covered under the management plan include: a review of the current number of trawlers; development of routine landing data collection; monitoring of fishing effort; promotion of logbooks; improvements in fish handling practices (onboard and at shore); upgrading of important fisheries infrastructure; promoting best practices in fishing, handling, and transporting catches, and strengthening linkages between actors in the supply chains.

**Knowledge of the overall fishing effort and its distribution is important for planning appropriate management actions.** A comprehensive review of the current number of trawlers and the number of days at sea must be done to calculate actual fishing effort and to assess spatial distribution. The gear types used by fleets and districts need to be clarified for management and fisheries statistical purposes. Illegal trawlers must be banned.

**There is a need to develop a policy and management body for fishing crews.** The aims would be to legally manage the fishing labour pool to: ensure that qualified crews work on board fishing vessels; reduce conflicts between vessel owners and fleets over the recruitment of crews; and mitigate risks for both crews and vessel owners to ensure social harmony. The management body for fishing crews would also help to improve the awareness of fishers in respect of natural resource protection and be more effective in the application of fisheries regulations.

**Upgrading of the fishing ports and landing sites for better services and reduce post-harvest losses is required.** Important facilities such as sunshades, sorting places, clean water supplies, parking places and services for fuel and food are poorly organized and managed. People are free to enter the port and hygiene and food security are not well dealt with. Not enough attention is paid to the pollution of the surrounding environments.

**Studies on post-harvest losses on board and at landing sites leading to technical solutions for mitigation of post-harvest losses in trawl fisheries are required.** It does not make sense



to fish as much as possible when the quality, which is strongly linked to market price, is largely ignored.

**Assistance should be provided to local fishers to develop fisher associations at district level and should be considered in the action plan being developed for management of trawl fisheries in the Province.** The aim would be to formally set up organizations and platforms for fishers to raise their voices in the development of fisheries policy or in implementing the existing regulations. This would help fishers to address any conflicts that may be occurring at the fishing grounds and promote unity in fishing operations as well as strengthen the scope for mutual assistance in the event of natural hazards or accidents.

**In order to harness collective efforts in addressing issues in the fishery, it is critical to strengthen linkages between actors along the supply chain.** Fishers, middlemen, seafood processors, seafood traders and retailers require strong and transparent connections. The development and implementation of Fisheries Improvement Projects<sup>4</sup> is necessary to establish roundtables and platforms for all relevant actors in the supply chains and associated stakeholders (government, association, NGO, academic institutions, donor community etc.) to become more involved in the fisheries management processes.

**The Ecosystem Approach to Fisheries Management (EAFM) should be implemented.** EAFM strives to establish a balance between ecosystem and human well-being, via good governance. It should be implemented for the following reasons: the small-scale fishery context; poor data collection and multiple gears/multiple species that require comprehensive solutions; and the collective participation from all relevant stakeholders. The participation of stakeholders in fisheries management decision-making process will ensure that the management measure will be more likely to be complied with, and consensus among stakeholders should ensure the effectiveness of the policies promulgated.

**Species composition surveys must be planned and performed regularly for all trawl fleets which would help both fisheries managers and the fishmeal industry.** The concept of “pig fish/fertilizer fish” in the trawl fishery should be clarified, especially for “anchovy pair trawl fleets”.

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<sup>4</sup> Fisheries Improvement project is a globally current initiative aiming to have collective efforts from relevant stakeholders involved in fishery sector and also additional partners/stakeholders who have interests in promoting sustainable seafood sector. The improvement project is popularly led by the industry in which fishing industry is building partnerships with seafood processing industry, fisheries management body, seafood trading and NGOs, donor community to promote good governance, good practices toward long-term sustainability of the fishery.

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Once again, thank you all very much!

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**APPENDICES**

Sample ID: _____
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**QUESTIONNAIRES FOR SOCIO-ECONOMIC SURVEY FOR TRAWL FISHERY**  
*(For crew, vessel owner and skipper)*

**I. PERSONAL INFORMATION**

Full name: \_\_\_\_\_

Address \_\_\_\_\_

Age: \_\_\_\_\_ Sex: \_\_\_\_\_ Marriage status: \_\_\_\_\_

Year of experiences in fishery: \_\_\_\_\_ Vessel registration No: \_\_\_\_\_

**II. HOUSEHOLD INFORMATION**

Number of family members: \_\_\_\_\_

Name	Relation	Sex	Age	Livelihoods	Time	Average income

**Other incomes if any?**

Additional livelihoods/incomes	Amount (VND)

**III. EDUCATION BACKGROUND**

Illiteracy

Post graduate

Primary school

Vocational training

Secondary school

Others

High school

College

**IV. MEMBERSHIPS OF ASSOCIATION AND ORGANIZATION?**

Fisheries association: \_\_\_\_\_

Women union/Farmer association: \_\_\_\_\_

Cooperative: \_\_\_\_\_

Other: \_\_\_\_\_

**V. FINANCIAL SUPPORTS**                      Yes                       No

If no, why? \_\_\_\_\_

If yes, why? \_\_\_\_\_

**VI. TECHNICAL SUPPORTS?**

**A. SUPPORT FROM GOVERNMENT**                      Yes                       No

No, why? \_\_\_\_\_

Are there any supports from other organizations? \_\_\_\_\_

**B. SUPPOSRT FROM NGO**                      Yes                       No

No, why? \_\_\_\_\_

Yes, why, what services? \_\_\_\_\_

**VII. GEAR INFORMATION**

<b>Trawl</b>	<b>Number of gears/nets onboard</b>
Squid trawl	
Fish trawl	
Shrimp trawl	
Pair trawl	

Number of crews onboard?: \_\_\_\_\_

**VIII. VESSEL INFORMATION**

Engine brand: \_\_\_\_\_ Engine capacity (hp): \_\_\_\_\_

**IX. VESSEL SIZE**

<b>VESSEL NAME</b>	<b>LENGTH (m)</b>	<b>WIDTH (m)</b>	<b>HEIGHT (m)</b>
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**X. POSITION OF INTERVIEWEE**

Vessel owner                       Skipper                       Crew  
 Chief engine                       Other \_\_\_\_\_

**XI. HOUSEHOLD EXPENDITURES**

ITEM	AMOUNT (VNĐ)
Food	
Health	
Education	
Housing	
Travelling	
Power supply Telephone cost Clean water supply Television service cost	

**XII. CATCH INFORMATION**

Number of hauls per day (set)	Number of fishing day per trip (day)	Mean trip catch (kg)	Discard at sea (kg)	Number of trips per month (trip)	Number of operating month per year (month)

**CATCH SHARE INFORMATION**

	Net benefit (%)	Catch (%)
Vessel owner		
Crews		

**XIII. FISH CONSUMED BY THE FAMILY?**

\_\_\_\_\_ kg.

**XIV. INFORMATION OF FISHING GROUND?**

FISHING GROUNDS	MAIN FISH CAUGHT



## **XV. ECONOMIC INFORMATION:**

### a. Fixed investment:

<b>ITEMS</b>	<b>YEAR</b>	<b>PRICE (VND)</b>	<b>DEPRECIATION (YEAR)</b>
Vessel			
Gear			
Devices Basket Storage Electric system GPS Compass Telecommunication Safety equipments Navigation devices			
<b>TOTAL:</b>			

### b. Fishing operational costs:

<b>EXPENSES</b>	<b>AMOUNT (VND)</b>
Fuel	
Salary for crews	
Fees for finding crews	
Repair cost	
Ice block	
Salt	
Food	
Gas	
Other costs	
Fees (unloading, anchoring in landing sites/fishing ports)	
Other fees and taxes	
<b>TOTAL</b>	

## **XVI. FACTORS IMPACT TO FISHERIES OPERATIONS**

<b>Events/actions</b>	<b>Explanation</b>
Storm/typhoon	
Northeast monsoon	
Southwest monsoon	
Fisheries law	

Fish price	
Fuel price	
Fishing ground competition	
Social events	
Season	
Health care/crews' physical	
Policy	
Engine broken	
Others	

**XVII. VIEWS OF FISHERY TREND**

**1. What is your perception on the status/condition of your fishing ground?**

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**2. What are the problems and recommendations relevant to fishing activities?**

<b>ISSUES OF THE FISHERY</b>	<b>RECOMMENDATION</b>

**3. What fishery law or regulation do you know that affects your fishing?**

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**4. What are the benefits and other household amenities gained from your trawl fishing?**

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**5. Is your income from trawl fishing enough to sustain your daily family needs? Why?**

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**6. Would you like to shift or retain your fishing gear? If yes, what gear? If no, why not?**

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**7. What measures do you practice and equipment you have to ensure your safety at sea?**

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**8. Are you willing to take the debris/basura you collected into port for proper disposal?**

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**Name of Interviewer:** \_\_\_\_\_ **Date:** \_\_\_\_\_



**TRAWL FISHERIES SOCIO-ECONOMIC INTERVIEW GUIDE  
(For Middlemen, Brokers)**

**XVIII. RESPONDENT'S PERSONAL INFORMATION:**

**Full Name:** \_\_\_\_\_

**Municipality/City:** \_\_\_\_\_

**Age:** \_\_\_\_\_ **Sex:** \_\_\_\_\_ **Civil Status:** \_\_\_\_\_

**Religion:** \_\_\_\_\_ **Spoken:** \_\_\_\_\_

**No. of Years Engaged in Trawl Fishing:** \_\_\_\_\_

**XIX. EDUCATIONAL BACKGROUND:**

*Ang gin Adman*

- |  |   |
|--|---|
| <input type="checkbox"/> Never Attended School | <input type="checkbox"/> Vocational       |
| <input type="checkbox"/> Elementary Level      | <input type="checkbox"/> College Level    |
| <input type="checkbox"/> Elementary Graduate   | <input type="checkbox"/> College Graduate |
| <input type="checkbox"/> High School Level     | <input type="checkbox"/> Post Graduate    |
| <input type="checkbox"/> High School Graduate  |   |

**XX. HOUSEHOLDE IFORMATION**

Questions	Answer	Remarks
No of family member?		
Main incomes from?		
Average monthly expenditure?		
Other income than fishery?		

**XXI. RELATIONSHIP WITH VESSEL OWNERS**

Questions	Answers	Remarks
Where is main vessels you buy fish		
Do you provide loans to them?		
Do you have any forms of contract?		
How do you pay them money?		

Do you request vessel owners to change their fishing/handling practices?		
Do you have any incentives to improve/promote good practices?		
Do you have/achieve any incentives from your buyers/market?		

**XXII. QUANTITY AND PRICES OF FISH BOUGHT**

<b>LANDING SITES/FISH PORT</b>	<b>GEAR TYPES</b>	<b>COMMERCIAL GROUP (MT)</b>	<b>AVE. PRICE (2015)</b>	<b>TIME PERIOD (SEASON)</b>	<b>LOCAL VESSEL OR OUTSIDER</b>

**XXIII. QUANTITY OF FISH BOUGHT FROM TRAWLERS AT SEA (IF ANY)**

<b>FISHING GROUND</b>	<b>GEAR TYPES</b>	<b>COMMERCIAL GROUP (MT)</b>	<b>AVE. PRICE (2015)</b>	<b>LOCAL VESSEL OR OUTSIDER</b>

**XXIV. FISH HANDLING PRACTICES**

<b>COMMERCIAL GROUP (MT)</b>	<b>HANDLING METHODS</b>	<b>TRANSPORTATION METHOD</b>	<b>MARKETS/CUSTOMERS</b>	<b>DISTANCES (KM)</b>	<b>POST HARVEST LOSS (%)</b>

**XXV. RECENT TREND IN CATCHES BY GEARS**

<b>COMMERCIAL GROUP</b>	<b>OTTER TRAWLERS</b>	<b>PAIR TRAWLERS</b>	<b>OTHER GEARS</b>	<b>REMARKS</b>
High economically value fish				
Octopus				
Squid				
Cuttlefish				
Trashfish				

**XXVI. RECOMMENDATIONS**

<b>FISHERIES ISSUES</b>	<b>RECOMMENDATIONS</b>

**Name of Interviewer:** \_\_\_\_\_ **Date:** \_\_\_\_\_



**TRAWL FISHERIES SOCIO-ECONOMIC QUESTIONNAIRES**  
(For fishmeal and seafood processing industry)

**I. RESPONDENT'S PERSONAL INFORMATION:**

**Full Name:** \_\_\_\_\_

**Company:** \_\_\_\_\_

**Age:** \_\_\_\_\_ **Sex:** \_\_\_\_\_ **Position:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**II. EDUCATIONAL BACKGROUND:**

- |  |   |
|--|---|
| <input type="checkbox"/> Never Attended School | <input type="checkbox"/> Vocational       |
| <input type="checkbox"/> Elementary Level      | <input type="checkbox"/> College Level    |
| <input type="checkbox"/> Elementary Graduate   | <input type="checkbox"/> College Graduate |
| <input type="checkbox"/> High School Level     | <input type="checkbox"/> Post Graduate    |
| <input type="checkbox"/> High School Graduate  |   |

**III. HOUSEHOLDE IFORMATION**

Questions	Answer	Remarks
No of family member?		
Main incomes from?		
Average monthly expenditure of the family?		
Other incomes than fishery?		

**IV. COMPANY INFORMATION**

Questions	Answers	Remarks
Name of the company		
Year of foundation		



Number of labour? Male: Female:		
What are main products?		
Production capacity (MT)		
Where are main fish/raw materials sourced?		
Does your company have any forms of contract with your suppliers?		
How does your company pay them money?		
Does your company directly buy fish from vessels?		
Does your company request vessel owners to change their fishing/handling practices?		
Main markets?		
Does your company have any incentives to improve/promote good practices?		
Does your company have/achieve any incentives from your buyers/market?		

**V. QUANTITY AND PRICES OF FISH BOUGHT DIRECTLY FROM FISHERS/VESSEL OWNERS**

<b>LANDING SITES/FISH PORT</b>	<b>GEAR TYPES</b>	<b>COMMERCIAL GROUP (MT)</b>	<b>AVE. PRICE (2015)</b>	<b>TIME PERIOD (SEASON)</b>	<b>REMARKS</b>

**VI. QUANTITY OF FISH BOUGHT FROM MIDDLEMEN/SUPPLIERS**

PROVINCE	GEAR TYPES	COMMERCIAL GROUP (MT)	AVE. PRICE (2015)	LOCAL VESSEL OR OUTSIDER

**VII. FISH HANDLING PRACTICES**

COMMERCIAL GROUP (MT)	HANDLING METHODS	TRANSPORTATION METHOD	MARKETS/CUSTOMERS	DISTANCES (KM)	POST HARVEST LOSS (%)

**VIII. RECENT TREND IN FISH SOURCE**

COMMERCIAL GROUP	OTTER TRAWLERS	PAIR TRAWLERS	OTHER GEARS	REMARKS
High economically value fish				
Octopus				
Squid				
Cuttlefish				
Trashfish				
Others				

**IX. RECOMMENDATIONS**

FISHERIES ISSUES	RECOMMENDATIONS

Name of Interviewer: \_\_\_\_\_ Date: \_\_\_\_\_

