DFM Report

Dried Fish Value Chains in Cambodia

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Table of Contents

List of Tables

List of Figures

List of Maps

List of Photos

1.0 Introduction & background

The role of processed fish in Cambodia is well-documented in the literature (Lokuge, 2021), particularly as an important livelihood option for poorer populations and women. It is recognized for its contributions to food security, nutrition and cultural preferences, both in terms of consumption and production. However, the existing research is fragmented, and it lacks a specific focus on the processed fish sector. There are no comprehensive studies that cover all types of processed fish products, the species used, production volumes by type and region, or the proportion of households involved in processing across Cambodia. While there are studies dedicated to fish processing in Cambodia, they primarily focus on technical aspects (see Lokuge, 2021 for a detailed literature review). These include analyses of the chemical composition of processed fish and the methods used for processing fish paste and fermented fish. In contrast, a broader range of studies on Cambodia's fisheries sector touch on processed fish but tend to fall under various disciplines such as socio-economic, socio-cultural, ecological, environmental, nutrition, food security, food safety, and policy and governance.

Cambodia, home to one of the world's largest and most diverse freshwater fisheries, is currently the eighth largest inland fisheries producer (FAO, 2024). While the marine sector's contribution to Cambodia's fisheries has grown over the years and the aquaculture sector has expanded even more rapidly, freshwater fisheries still dominate. Most fishing activities occur along the Mekong River and in Tonlé Sap Lake, and as a result, the majority of fish processing is tied to these water bodies, involving the people living nearby and the market centres close to them. However, farmed fish, both from within Cambodia and imported from other countries, is becoming increasingly important for fish processing in Cambodia as discussed in this report.

The Dried Fish Matters (DFM) Cambodia scoping phase research was coordinated and supported by the Cambodian Institute for Research and Development (CIRD), led by Prak Sereyvath, with advice from Kyoko Kusakabe, Derek Johnson, Melissa Marschke, and Ben Belton. Gayathri Lokuge, a post-doctoral researcher with DFM and a senior researcher at the Centre for Poverty Analysis (CEPA) in Sri Lanka, was responsible for the literature review, data collection, analysis, synthesis, and production of outputs during the scoping phase. Data collection was supported by Mengheang Ly (qualitative semi-structured interviews), Vira Soeun from CIRD, and research assistants Sreymuch and Maridy (rapid survey in Phnom Penh markets) as well as Leabpeah Chin and Malean Roeun (in-depth qualitative research at Orussey market). The final extensive desk review, restructuring and editing of this report was conducted by Mohammad Anas Shoebullah Khan (DFM Project Manager, University of Manitoba).

This report first provides a working definition of dried fish in Cambodia, followed by a summary of the extensive literature review conducted for the study (Lokuge, 2021), highlighting gaps in the existing research. The methods used are then presented, including a reflection on respondent sample selection and challenges encountered during the scoping phase. The findings are organised by value chain segments: fish production, fish processing, and marketing. The section on fish production covers the socio-economic characteristics of fishers and their families, as well as estimates of fresh fish produced. The fish processing section begins with a description of the processing sites, seasonality in processing, and qualitative details on how fresh fish is sourced. It also covers processing methods, ingredients used, labour arrangements, the quality of fish processed, and the socio-economic profiles of fish processors, including a typology of processors.

The marketing section first describes trade at the processing unit level, where fish is sold directly to consumers within the village, and then moves to trade through organised markets. It details the structure and organisation of these markets, along with estimates of the types and volumes of products sold at Orussey market in Phnom Penh, the largest wholesale market for processed fish products in Cambodia. This section concludes with an overview of traders' socio-economic characteristics, trade histories, and practices. The report concludes by identifying future areas for research, practice, and policy development.

1.1 What does 'dried fish' look like in Cambodia?

Some element of drying occurs in the production of all the fish-based products in Cambodia, except for fish sauce and fermented products such as *pa ork* and *mum/mam* (fermented water fish) and *yahe* (fermented prawns). The length of drying varies by type of product: the most 'dried' is salted and dried fish (*trey ngeat, trey broma*) and, to a relatively lesser extent, sun-dried fish (trey brolak). Smoked fish processing includes a short period of drying, after being skewered and before smoking. Fish paste (*prahok*) and shrimp paste (*kappik*) processing also involves a short period of sun drying. The point in time/processing at which the drying occurs varies by product. For most products, it is right after cleaning and adding salt, such as for salted and dried fish. For some other products, such as dried shrimp, the drying takes place after the shrimp is boiled and mixed with salt.

Drying is done almost in all instances using natural sunlight, except by certain processors of shrimp drying in the coastal regions such as Koh Kong, who use solar-powered ovens for drying during the rainy season. The shelf-life of the different products varies by type of product, the quality of the processing followed, including the length of time the products are dried or fermented and the type of ingredients that are used. For example, salted sun-dried fish is 'completely dried', i.e. dried in strong sunlight for 1-3 days and can be kept for up to three months without refrigeration. If MSG (monosodium glutamate) is mixed with dried shrimp, along with salt, the shelf life becomes relatively shorter, compared to dried prawns that had not been mixed with MSG. Of the processed products in Cambodia, prahok (fish paste) is the product with the longest shelf-life, of up to three years, depending on the quality of the fish, the salt used, and the steps followed. Trey brolak (whole sun-dried fish) is the product with shortest shelf-life, as the drying period is relatively shorter.

Photo 1: Different types of 'dried fish' in Cambodia

1.2 Summary of literature review & objectives

This sub-section briefly presents the main findings from the extensive literature review conducted preceding this study (Lokuge, 2021). Studies specifically addressing fish processing in Cambodia tend to focus on technical aspects, such as the chemical composition of processed fish and methods used for processing fish paste and fermented fish. However, several studies that analyse the fisheries sector more broadly also include a focus on the processed fish sector. These studies cover a wide range of disciplines, including socio-economic, socio-cultural, ecological, environmental, nutrition, food security, food safety, and policy and governance. Some of these studies focus on the value chains of specific fish species and, as a result, include the processing of those species (e.g., low-value small fish, snakehead). Another set of studies examines the socio-economic characteristics of those involved in fishing, and within these, sub-sections focus on fish processors and traders of processed fish. These studies analyse their socio-economic profiles, the role of women, processing costs, value added through the processing of specific species, household income, consumption patterns (ranging from fishing-dependent households to those less reliant on fishing), and labour arrangements, including household and hired labour. However, most of these studies were published over five years ago, so they may not reflect the current situation. Additionally, since these studies do not take a comprehensive approach to analysing the processed fish sector, there are significant gaps.

Moreover, there are no comprehensive studies that analyse the diverse fish-based products in Cambodia along their respective or interlinked value chains, including trading. There is a gap in knowledge about who is involved in processing and the socio-economic changes affecting these groups. Missing information includes the proportions of fish supplied by different types of fishing (wild-capture freshwater, aquaculture, and marine), who the suppliers are, and where they are located. There is also limited data on seasonal variations, labour engagement, changes in demographic patterns, migration histories, and the livelihood security of fish workers. Additionally, local and international marketing routes, as well as price points at various stages of the value chains, remain underexplored. There is also a lack of contemporary analysis of the cultural and nutritional aspects of the processed fish sector.

Regarding types of fish products, the literature overwhelmingly focuses on fermented freshwater fish, particularly prahok. Several authors have documented the steps involved in prahok processing and outlined its value chains, highlighting regional variations. However, there is a clear gap in the analysis of marine fish-based processed products, such as fermented shrimp paste (kapik), which plays a relatively important role in Cambodia's processed fish industry. Similarly, other fresh fish-based products, such as smoked fish and salted and dried fish, receive less attention compared to prahok. While published studies have identified the consumption of processed food as a traditional practice and cultural preference within Cambodia, there are no studies that have analysed food preferences and how these may be changing within the broader changes that are taking place within the Cambodian society. A strong body of literature on the impacts of climate change on the fish ecology and water bodies and those who are dependent on these resources is emerging in Cambodia.

An extensive literature review, conducted and published as part of this scoping study, provides a detailed analysis of both academic and grey literature (Lokuge, 2021). The review first identified the types of processed fish in Cambodia, their geographic concentrations, estimated production volumes, and the proportions consumed versus sold. It then presented a brief historical overview of processed fish consumption trends in Cambodia, followed by an analysis of the socio-economic characteristics of processors, including gender dynamics. This was followed by a review of studies focusing on value chain analysis in Cambodia, covering fish sourcing, processing, trade, exports, and consumption. The review also examined the nutritional and food security value of processed fish and provided an analysis of relevant policies and challenges facing the sector. It concluded by highlighting gaps in the existing literature and identifying specific research questions to be addressed in the next steps of DFM.

The main gaps identified for further study through the literature review broadly included the need to understand the following:

a) Flows of fresh fish for processing and processed fish products through the value chain and markets, quantitatively and qualitatively, including a nationally representative and comprehensive study on what proportion of fresh fish and processed fish goes where and for what purpose,
b) how the markets for processed fish products are organized, socio-economic characteristics and changes observed among those who market processed products, including gendered socialization processes and processes of gaining access to these markets, and inter-linkages among different actors along the value chains and middlepersons*,* gendered labour relations and division of tasks
c) *c*onsumption patterns of processed fish products and changes across generations, changes in different regions, especially for traditional products like prahok and processing techniques used, except for prahok
d) the potential for strengthening the nutritional value of small-size fish targeting poorer consumers

e) linkages among ecological, environmental and climate change-related issues and the fish processing sector, especially their impact on livelihood and food security, and
f) policy gaps in terms of the role of community fisheries in strengthening governance and management of the processing sector in Cambodia, lessons learnt from previous development projects and the role of the private sector in strengthening the sector and ensuring livelihood and food/nutrition security.

Given the available resources and time constraints, it was not possible to comprehensively and systematically address all the gaps identified in the literature review. Therefore, this study focused primarily on the following objectives, which align with some of the key gaps identified in the literature review:

a) Documenting processing methods used (except for prahok*,* the processing of which is well documented)
b) Understanding the flows of processed products between and among processing sites and markets, primarily qualitatively
c) Understanding socio-economic characteristics of fish processors and wholesale and retail traders of processed products, including the nature of their social networks and social capital and gendered labour patterns

1.3 Methods and data sources during scoping phase

This report presents the secondary and primary data collected during the scoping phase of the Dried Fish Matters project in Cambodia, from October 2019 to February 2020. Data collection concluded at the end of February, and a stakeholder workshop to share initial findings was held in early March 2020. As a result, the impacts of COVID-19-related travel and work restrictions did not affect DFM Cambodia in 2020. However, this also means that the scoping research phase in Cambodia does not include any data, analysis, or reflections on the changed context due to the global pandemic. The main data sources used during the scoping phase include:

a) Secondary time-series quantitative datasets from the Cambodian Fisheries Administration on fish production by sub-sector (inland water, rice field fisheries and marine, by province), number of fishers, processed fish production volumes (inland sector and marine sector, by province), and number of processors and processing families (by province), from 2014-2018.

b) Primary quantitative and qualitative data collected via

i. 15 key informant interviews with experts in fisheries and processed fish sector in Cambodia (see Annexure 1 for list of key informants)
ii. 3 meetings with donors and INGOs working on fisheries value chains in Cambodia
iii. 58 semi-structured qualitative interviews with processed fish traders, processors and fishers located in nine provinces across Cambodia (seven in the inland water sector, around the Tonlé Sap and Mekong and two in the coastal regions). Annexure 2 provides further details of these interview locations and respondents.
iv. Observations conducted in 26 city, provincial and district markets (8 in Phnom Penh and 18 outside Phnom Penh) and two landing sites (Kampong Chhnang and Phnom Penh)
v. Mapping of Orussey market, the biggest processed fish wholesale market in Cambodia, by documenting processed fish products in 90 stalls by location of the stall and type of product sold, and counting the products traded by each stall
vi. 40 surveys via a rapid appraisal conducted in the Orussey, Derm Kor and Central markets -Phnom Penh (see Annexure 3 for rapid appraisal question guide)
vii. 10 in-depth discussions with female traders at the Orussey market (see Annexure 4 for question guide for in-depth research at Orussey market)

1.3.1 Respondent and location selection and sampling

The selection of locations for the various data collection activities was primarily based on previous research conducted by CIRD and Dr Kyoko Kusakabe, in close consultation with Dr Derek Johnson, to ensure alignment with the research interests and priorities of DFM. Respondent selection was mainly based on their availability and interest in participating in the research. Table 1 outlines the rationale for location and respondent selection for the different primary data collection activities.

Table 1: Location and respondent selection

Primary data collection activity	Location selection criteria/sampling data sources	Respondent selection criteria/rationale
Key informant interviews	These were conducted primarily in Phnom Penh, and no location criteria were applied	(a) Representation from the different sectors: Government, non-government, private (b)Representation from academics, policymakers, project implementors and donors
Meeting with INGOs/donors	Phnom Penh	These meetings, coordinated by CIRD, at the end of the scoping phase data collection, sought to establish strategic linkages with planned and ongoing development projects focusing on fisheries value chains in Cambodia, including identifying forums for sharing and validating DFM research findings, and linking with future programmes for knowledge sharing and pooling of resources.

Primary data collection activity	Location selection criteria/sampling data sources	Respondent selection criteria/rationale
Semi-structured qualitative interviews	(a) Prior research and implementation knowledge of CIRD and Dr Kyoko Kusakabe (b) Information from the brief initial scoping visit conducted in Feb 2019	(a) Based on respondent availability at the time the team visited the locations as well as their willingness to be respondents (b) Representation of actors in the the three main value chain segments: fishing, processing, and trading (with more emphasis on processing and trading as fishing segment is well document in published literature)
Observations of marketplaces and landing sites	(a) KII recommendations on main markets (b) CIRD past knowledge and experience (c) Market locations documented in published literature	Not applicable as these were mainly observations
Mapping of Orussey market	Orussey market was selected as the main wholesale hub of processed fish products based on literature, preliminary field work and Kyoko Kusakabe's past work in the fisheries sector	Not applicable
Rapid appraisal survey at Phnom Penh markets	Information gathered by the mapping exercise on: (i) Product diversity (ii) Volume of products traded (iii) Number of stalls	Willingness to respond to the survey
In-depth qualitative research at Orussey market	To ensure connectivity with other data sources such as market mapping and rapid survey	Willingness to be part of the in-depth discussion

(i) **Key informant interviews and meetings with experts and donors/implementors in fisheries and processed fish sector in Cambodia**: These interviews were conducted at the initial stage of the scoping phase, in order to understand geographic locations for scoping and to identify potential sources of collaboration. A second phase and then a third phase of such interviews and meetings were conducted towards the latter part of the scoping phase as well, in order to understand potential interest for collaborations with DFM and for validation/triangulation purposes. The list of key informants is in Annexure 1 of this report.

(ii) **Semi-structured qualitative interviews**: Focused on processed fish traders, processors and fishers located in the provinces of Kandal, Kampong Chhnang, Pursat, Kampong Thom, Siem Reap, Battambang, Bantey Minchey (inland water), Kampot and Koh Kong (marine) across Cambodia. Annexure 2 provides further details of these interview locations and respondents. The scoping research team spent about 1-3 days in each province, with repeated visits to Siem Reap, and within Phnom Penh (Kandal province). A typical research day in these provinces included at least one visit to the provincial and district markets, a few visits to floating villages where bulk of the processing was taking place and where fisher communities lived. In certain cases visits to the main landing sites/fresh fish distribution hubs such as in Phnom Penh and Kampong Chhnang were also conducted. The question guides developed by DFM for the different value chain segments, with minor revisions, were used. Gayathri Lokuge was responsible for taking notes, that were translated into English, during the semi-structured interviews. The translator was responsible for asking the questions and providing verbal translations during the interview. The notes were later typed by Gayathri into Microsoft Word documents.

(iii) **Observations at city, provincial and district markets**: On a typical day of data collection in the provinces, the team started the data collection at a market, as obtaining information of processing sites and fishing communities were easier through the traders at the market. The team visited the markets initially, and if the traders were too busy, paid repeated visits. The traders seem willing to talk to the team late morning or midafternoon and the team targeted these time slots for the interviews. The observation notes were typed into Microsoft Word by Gayathri.

(iv) **Mapping of Orussey market**: The team first paid a few visits to Orussey market, in order to understand the rhythm of the market functions. Following these visits, the team mapped the section of the market that houses the processed fish stalls, manually, on a grid, by stall numbers. This enabled the team to get an accurate number of stalls that trade processed products at the market. Based on this, a mapping of products traded at each stall, comprising the number of products and type of products was done. These two sources formed the basis for the sampling of the rapid appraisal survey.

(v) **Survey via a rapid appraisal conducted in the Orussey, Derm Kor and central markets**: The tool for the survey was developed by DFM Cambodia, in consultation and with advice from Derek Johnson and Ben Belton. The final tool was translated into Khmer and two research assistants, recruited by CIRD, were first trained in using the tool, with the translation assistance of a CIRD staff member. Following this, the tool was piloted at the Orussey market, and changes made. The survey was then conducted over a week, starting with the Orussey market. When the research assistants reported that the respondents in the market seemed to have reached a point of saturation and were not willing to be part of the survey, two other wholesale and retail markets that trade processed products were selected. In total, 32 surveys were conducted at Orussey market, and eight surveys were conducted Derm Kor and central markets in Phnom Penh. Data was entered by one of the research assistants, into an Excel database, cleaned and supervised by a CIRD staff member. See Annexure 3 for the tool used.

(vi) **In-depth discussions with female traders at the Orussey market**: Women traders who were willing to engage with the research were engaged in in-depth discussions, focusing on their migration and occupation histories, the roles of family, relations and friends and work-related relations, including those with regular buyers and suppliers. (See Annexure 4 for the discussion topics and questions).

Quantitative data was analysed descriptively using Microsoft Excel and STATA, while qualitative data was coded by themes (based on the questions and themes outlined for the scoping study) and analyzed using NVivo, a computer-based data analysis software.

Map 1: Data collection locations[1]

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[1] The base maps used in this report were obtained from the Nations Online Project (www.nationsonline.org) and adapted by the authors for visualization purposes.

1.3.2 Limitations

The main researcher (Gayathri) lacked local language skills, which meant the research relied heavily on translations. In the early stages, unfamiliarity with both the context and the language limited the ability to probe during interviews. As the research progressed, this improved, but the verbal translations during the semi-structured interviews were often summarized rather than verbatim, leading to some data loss and affecting the overall quality of the data collected during the scoping phase in Cambodia.

Differentiating between retailers, wholesalers, and, in some cases, processors and traders, proved to be challenging. Traders often acted as both wholesalers and retailers, even in large city markets like Orussey. Identifying middlepersons was particularly difficult, as they did not operate from fixed locations like processors or traders. However, middlepersons play an important role in moving fish and processed products both within Cambodia and internationally, yet this remains a data gap in the research.

The respondent sample was predominantly female, which reflects the general demographics of the sector. However, this trend was also influenced by the fact that the research assistants and translators, who were all female, felt more comfortable approaching women than men for interviews. In general, traders were often unwilling to participate in the research, particularly due to their distrust of research and reluctance to provide financial information or sales volume details. Additionally, some traders were too busy with their daily activities, such as restocking and cleaning, to participate. Certain research locations were difficult to access, particularly floating villages where fishers and processors in the inland sector were based. The team spent long hours traveling to these locations, and the access routes connecting floating villages were challenging due to poor infrastructure.

2.0 Fish processing sites, processors, and their practices

As per Fisheries Administration data (Fisheries Administration, 2018), in general, the bulk of the processing of freshwater products in Cambodia happens around the Tonlé Sap (Kampong Chhnang, Pursat, Siem Reap, Battambang, Kampong Thom, Kampong

Cham and Phnom Penh) and to a lesser extent along the lower Mekong regions such as Kandal, Prey Veng and Takeo. Most of the previous studies have also focused on these areas. However, based on government fisheries administration data, a limited amount of processing is taking place in the upper Mekong region in Cambodia such as Steung Traeng and Kraties as well, which was not captured by the scoping phase of DFM Cambodia and had not been focused on by previous studies. The coastal provinces of Kampot, Kampong Som and Koh Kong produce marine fish based processed products, however, volume of production is smaller compared to the freshwater product

Map 2: The main fish-based processing sites in Cambodia

2.1 Types of products and species processed

Cambodians produce and consume a wide variety of processed fish products, derived from both freshwater and marine species. However, marine processed fish production represents only about one-seventh of inland freshwater processed fish production (inland processed fish volume was 72,601 tonnes in 2018, compared to 10,735 tonnes for marine processed fish), emphasising the dominance of freshwater fish production in Cambodia (Fisheries Administration, 2018).

Based on the primary data from the scoping phase, which included visits to water-based and land-based processing sites as well as various processed fish markets, the main freshwater fish-based processed products in Cambodia include *Trey ngeat* (salted or sweet cut/split sun-dried fish), *Trey brolak* (sun-dried whole fish), *Trey praherm* (meaning "swollen" fish, derived from the process of submerging the fish in water for a few hours before drying, causing it to swell), *Trey cha'eur* (smoked fish), *prahok sachs* (salted fish paste without bones), *prahok cha'eang* (salted fish paste with bones), *Pa ork* (fermented fish with sticky rice), *mam/mum* (fermented fish with roasted rice powder), *trey pat* (pulled or shredded fish), and *tak/tuk trey* (a term used for fish sauce made from both freshwater and marine fish).

The main marine processed products include *yahe* (fermented shrimp), *kappik* (fermented shrimp paste), *yiheu* (dried squid), *bangkea kream* (dried shrimp), Tak/Tuk Trey (aged fish sauce), and *tud trey* (non-aged fish sauce). In addition, small quantities of dried rays, imported dried squid from Thailand, and sprats seasoned with sesame can also be found in markets, particularly in coastal areas like Kampot. Table 2 lists these different products and the species used for processing in the inland water sector:

Table 2: Processed products and species utilised

Processed fish products	**Product name in Khmer**	**Fish species utilised**
Trey ngeat (salted/sweet filleted sun-dried fish)	ត្រីងៀត	(i) Trey dieb (Giant snakehead) (ii) Trey andaeng (Walking Catfish) (iii) Trey ros (Striped Snakehead)
Trey brolak (Sun dried whole fish)	ត្រីប្រឡាក់	A wide range of fish species are dried whole, usually with just the head removed
Trey praherm (directly translates to 'swollen' fish, derived from the practice of submerging the fish in water for a few hours before drying causing the fish to swell and for the fish oil to drip off)	ត្រីបង្ហើម	Information unavailable
Trey cha'eur (smoked fish)	ត្រីឆ្អើរ	(i) Trey riel (Lesser Silver Mud Carp) (ii) Trey andaeng (Walking Catfish) (iii) Trey kes (Reddish sheatfish) (iv) Bundu ompov fish (Thai River Spat)
Prahok chhaoeng (fish paste with bones)	ប្រហុកឆ្អឹង	A wide range of small sized low value fish are used for making *prahok* with bones, some common species include: (i) Trey riel (Lesser Silver Mud Carp) (ii) Trey chong va mol (Myer's Silver Rasbora) (iii) Trey kantuy moun (Longjaw Grenadier Anchovy)

Processed fish products	Product name in Khmer	Fish species utilised
Prahok sach (fish paste without bones)	ប្រហុកសាច់	(i) Trey ros (Striped Snakehead) (ii) Trey kanh pleanh (Three Spot Gourami) (iii) Trey chdao (iv) Trey dieb (Giant Snakehead)
Pa ork (fermented fish with roasted rice powder)	ផ្អក	Trey prah (Pangasius Mekongensis)
Mam/mum (fermented fish with sticky rice)	ម៉ាំ	(i) Trey bundu ompov (ii) Trey dieb (Giant Snakehead)
Trey phat (pulled/shredded fish)	ត្រីផាត់	Information available
Teuk trey (fish sauce)	ទឹកត្រី	Usually a by-product of prahok

Table 3: Processed products from the marine sector

Processed fish products	Fish species utilised
Yahe (fermented shrimp)	(i) Thunder shrimp (ii) Banana shrimp
Kappik (fermented shrimp paste)	Small shrimp (sometimes mixed with trash fish)
Yiheu (dried Squid)	Squid
Bangkea kream (dried Shrimp)	(i) Green tiger shrimp (ii) Thunder shrimps

The composition of the inland processed product had remained largely unchanged from 2014-2018, with prahok (fish paste) making up almost half of the total processed fish products. The importance of prahok in the Cambodian diet is well documented in published literature, especially in the rural agricultural households during the harvesting season and for lean fresh fish in the fishing households (see section 6 of DFM Cambodia literature review – Lokuge, 2021). However, qualitative discussions during the stakeholder workshop in Phnom Penh reveal the potential trend of youth, especially in the urban areas moving away from prahok. In the absence of comprehensive and detailed consumption data, this trend remains to be validated as a generalizable finding.

Figure 1: Inland processed products (2018) by product type

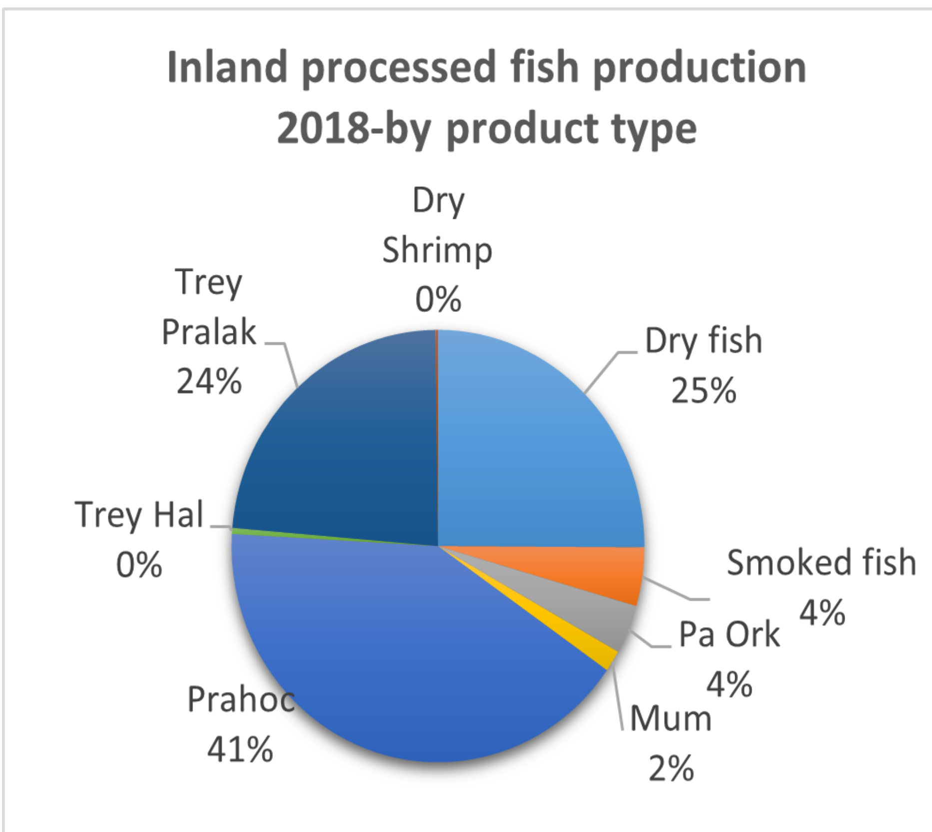
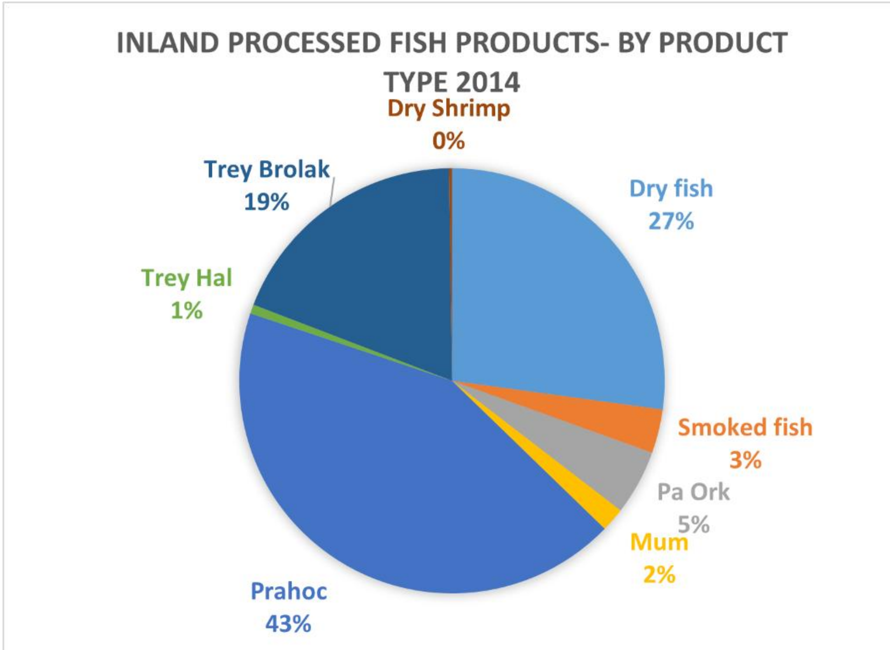
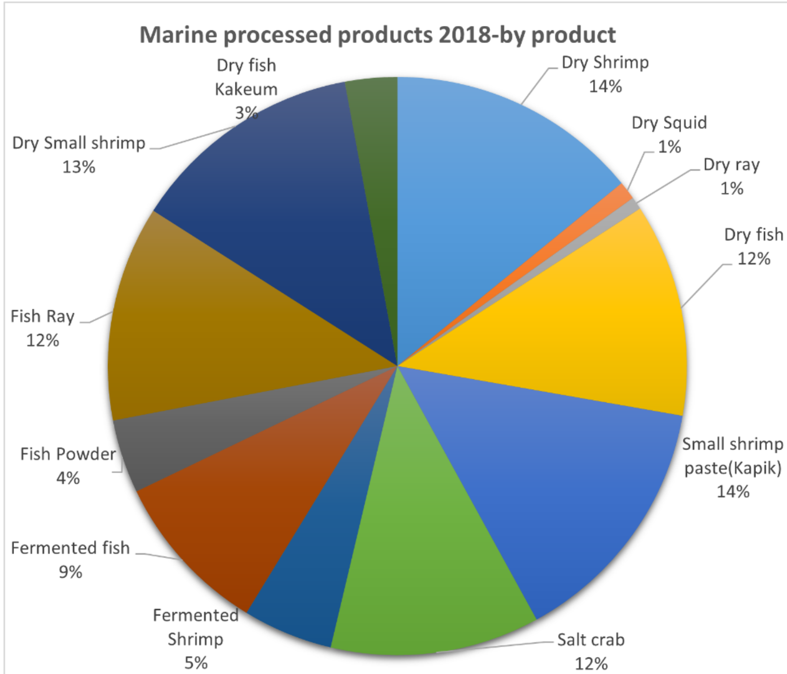


Figure 2: Inland processed products by product type (2014)



Compared to freshwater products, marine products are more diverse, although based on a few species. For example, shrimp-based products seem to dominate the processed products in the marine sector. In terms of volume of production, only about one-seventh of the inland processed fish production. The marine processed sector may have a better potential for scale-up. However, the supply of input and the market demand need to be considered when considering for scale-up

Figure 3: Marine processed products 2018 by product type



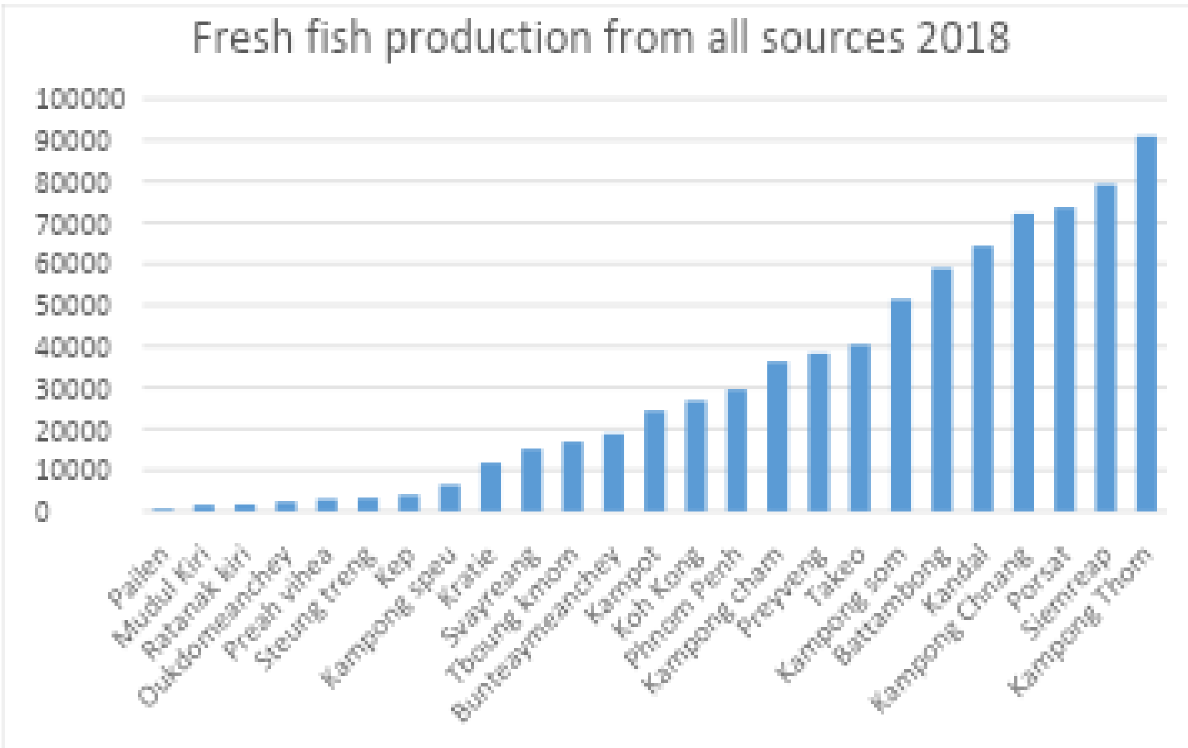
2.2 Fresh fish production in Cambodia

As discussed above, processed products from the freshwater fisheries dominate in Cambodia. As reported in the literature, the freshwater species for processing are sourced from a) inland capture fisheries a) in the Tonlé Sap Great Lake, in the Upper Mekong and the lowlands area in the lower Mekong, b) rice field fisheries, c) aquaculture and d) freshwater fish imported from Thailand and Vietnam. The marine fish species are sourced from the coastal and offshore fishing in the sea and there is no data or analysis to establish the potential role of marine fresh fish imports in the processing segment.

Among the provinces around the Tonlé Sap, Kampong Thom province dominated fresh fish production in Cambodia in 2018, followed by Siem Reap, Pursat, and Kampong

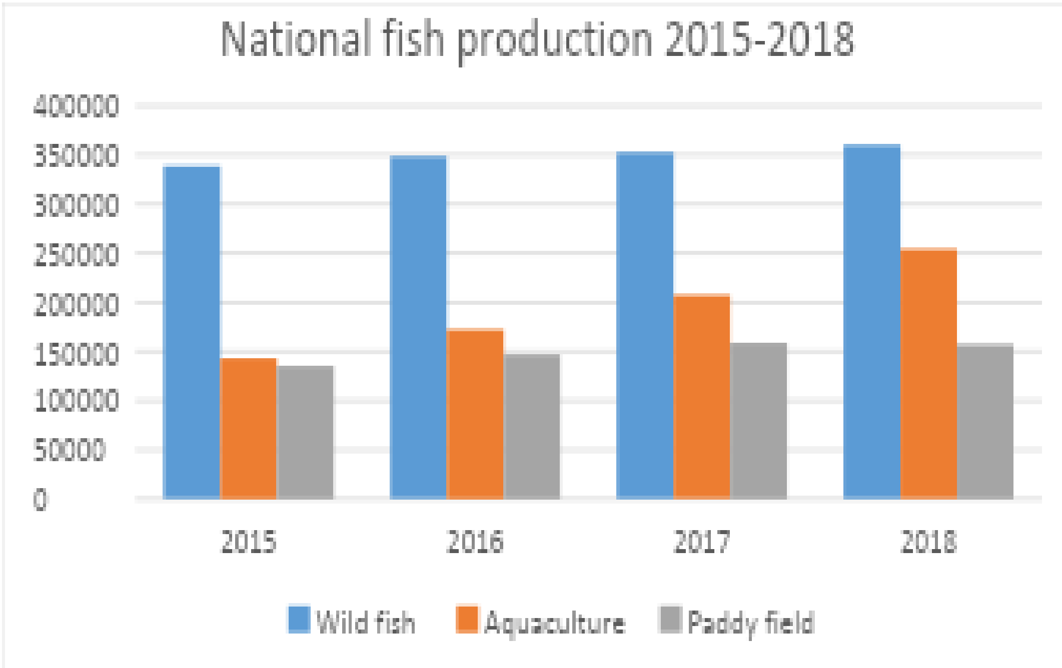
Chhnang (see figure 6)[2]. This had not always been the case; in 2015, Siem Reap, followed by Kampong Chhnang, Kandal and Kampong Thom are reported as the main fresh fish producing provinces.

Figure 4: Fresh fish production from all sources 2018 in tonnes



[2] The quantitative data presented here are based on Fisheries Administration secondary data sources and the data could not be triangulated with other sources.

Figure 5: National fish production 2015-2018



2.2.1 Rapidly diminishing freshwater wild fish catch and household level fish farming as a response

Although the available national and sub-national level data does not reflect diminishing wild-caught fish trends, qualitative interviews conducted around the freshwater bodies reveal a dwindling wild fish catch, especially over the last few years, as the extract below illustrates.

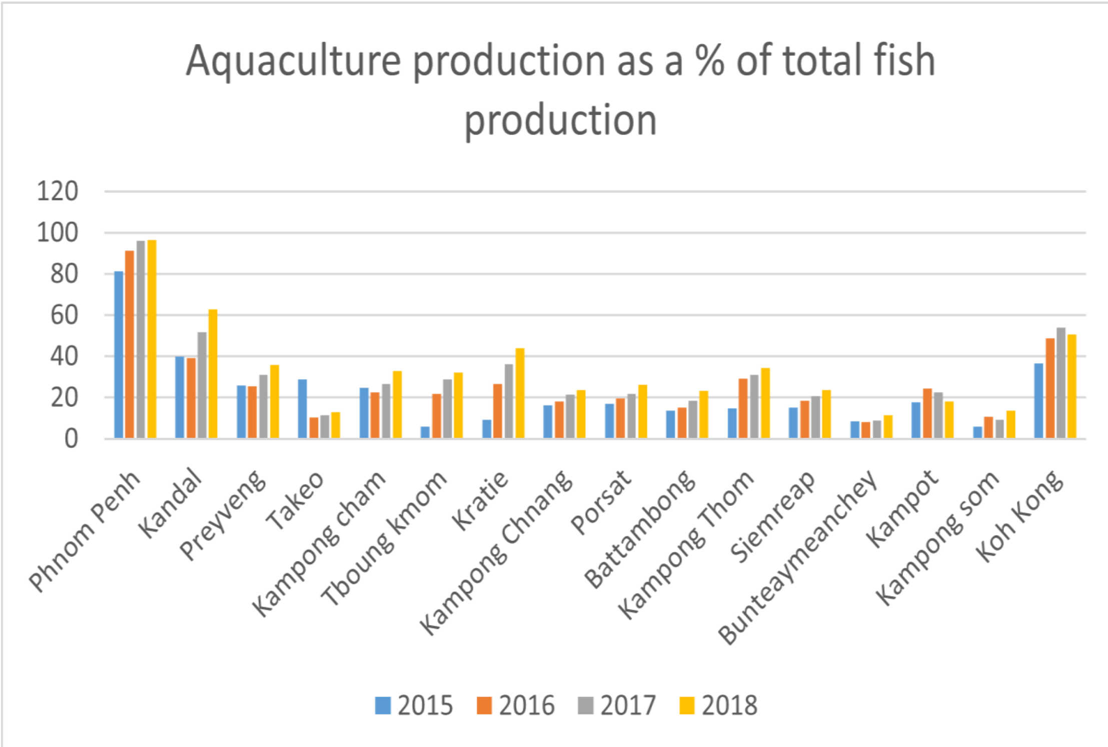
> *"I went fishing yesterday. I couldn't find any fish, and we came back home empty handed… Earlier there were many kinds of fish and it was easy to catch the fish. We get about 80-90% less fish. Since I go fishing every day, I can observe these changes. We worry for the next year, fish processing will also suffer, and we don't know what will happen…For two years now, the fish catch has been really low." (KD FP 01)*

Qualitative interviews for this scoping study indicate that households in floating villages on the Tonlé Sap are increasingly practicing fish culture at a household or micro level.

In households that combine wild fish capture from inland water bodies with fish farming, women tend to be more involved in fish farming, often with their spouses' support, while men primarily focus on wild fish capture, sometimes with assistance from their wives. Historically, these households have relied on wild fish capture during fishing seasons for their livelihood. However, in recent years, they have started to feel the impact of declining wild fish stocks. In response, many have begun to cultivate fish in floating cages, typically positioned alongside or beneath their floating homes. Fingerlings are sourced from local markets, middlepersons, or even other fishermen within the community.

The fish produced are sold to middlepersons who visit these communities, or the fish are transported to landing sites for further sale to traders, who then distribute them across Cambodia. Key landing sites for cultured fish include Phnom Penh (Prek Pnov and the 11th-mile post along the Siem Reap highway) and the New Market in Kampong Chhnang. Although aquaculture farms are densely clustered around Cambodia's main water bodies, particularly in Kandal, this scoping research did not cover these larger units.

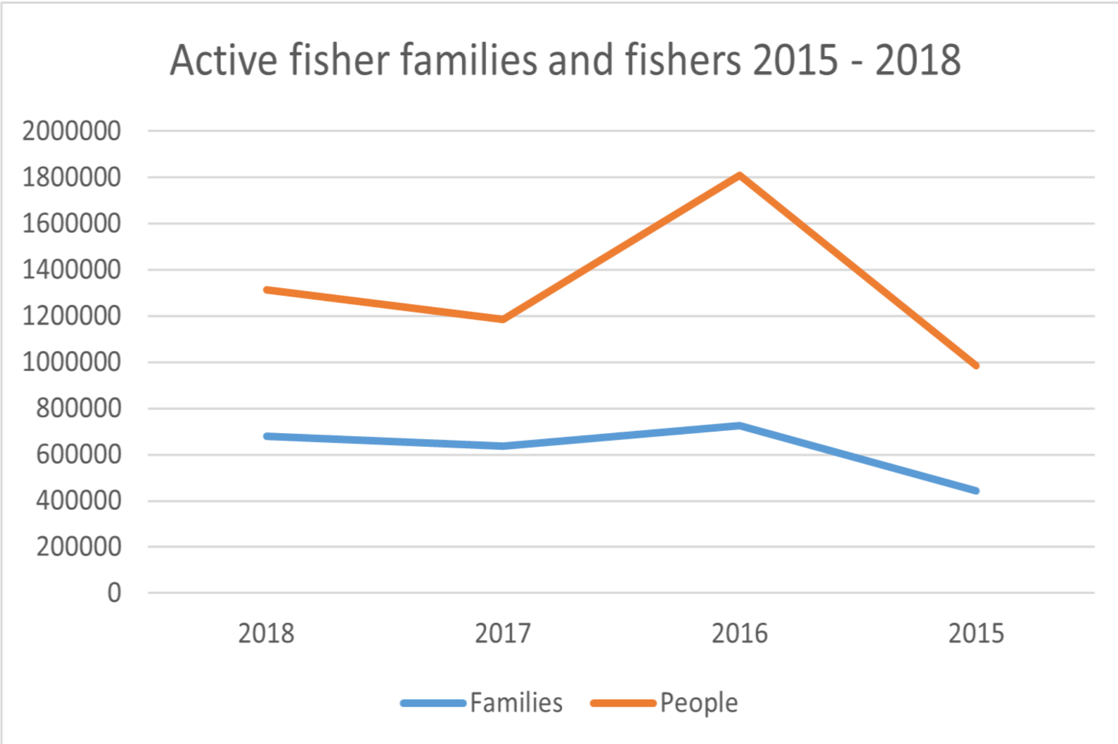
Figure 6: Aquaculture production as a percentage of total production (2015-2018)



2.3 Fishers, their families and fishing communities

Fishers and fish processors often overlap, particularly at the subsistence level: nearly all households near the Tonlé Sap process fish for their own consumption, especially during the peak fishing season from November to January. Qualitative interviews indicate that when these households produce more processed fish than they need, they may sell the surplus directly within their village or in neighbouring areas. However, the main purpose of processing is to secure a supply of high-quality fish for household use either for immediate consumption or for use during the lean season for fresh fish. The limited primary data collected in this scoping phase did not reveal a similar trend among coastal households in Cambodia.

Figure 7: Active fishers (2015-2018)



Field observations during the scoping phase revealed that most fishers in Cambodia's inland sector reside in floating villages or on land near inland water bodies. Their lives appear to follow the natural rhythm of seasonal rains, water levels, and floods. For example, during the peak flooding season, floating houses are often moved closer together, clustering at the highest point of the water body, which in some locations is near the temple. As water levels recede, the houses are repositioned, becoming more dispersed along the water bodies. The scoping team observed several of these shifts during field visits around the Tonlé Sap.

Some women living on these water bodies shared concerns about weathering storms in floating houses during the rainy season, though they also seemed accustomed to these conditions. Annual maintenance of these floating houses was frequently mentioned as a significant recurring household expense. Within this context, government plans to relocate some of these floating villages—particularly those in Pursat and Kampong Chhnang—have received mixed reactions. The excerpt below illustrates the strong connection between fisher identity and a lifestyle closely tied to the water.

> *"The government is asking fishing families living on water to go and live on land, and not live on water. There aren't enough fish now, and we are catching only 10% of what we used to catch in the past. We can't move to land, we are fishermen, we like to live here. I don't want to go anywhere. There are no jobs for us on land and we can't find enough money to educate our children if we go on land." (KC FP 01)*

In the coastal communities, especially those on islands, out-migration for work and education has become an increasing trend. A 56-year-old woman respondent from Koh *Kappik*, an island off Koh Kong, described her community as *"so silent now…not many people around*," referring to the large numbers who have migrated from these island communities either to nearby Thailand or to Cambodian cities like Phnom Penh. In the coastal communities, as in the inland areas, out-migration is linked to rapidly diminishing fish catches and the inability to support families with income from fishing. Fishing and fish processing are seen as livelihood options that keep men and women close to their family, with the alternatives being migration for work to the cities and bordering countries, disrupting the family unit.

> *"Earlier, more than 300 families were living here, but now they have migrated for work, and there are only about 100 families here. This started happening about 8 years ago. They started to migrate because this area is focused only on fishing, and when there are many members in a household, it is difficult to support all of them through fishing. There are no roads here, no agricultural land, no economic activities; they want to upgrade their lives, so they leave. Everyone here goes fishing; they go to the Dang Toung market in the morning and come back here. (KK PR 01)*

In terms of future plans, qualitative interviews show that the majority of fishers do not want their children to pursue the same livelihood, although they themselves seem uninterested in changing it. The preference for fishing, and by extension fish processing, was often rooted in the opportunity it provided to “stay close to the family.” Migration was still viewed with mixed perceptions. The preferred options for their children were typically to secure “salaried employment,” either in a private company or a government job.

> *“I don’t want my children to be like us, to be fishers. It is too risky and too tiring, I want them to do work on land, in a factory or a government job.” (KC FP 01)*

2.3.1 Identities of fishers

The scoping research identified individuals in fishing, fish processing, and marketing who self-identified as Cambodians (Khmer), as well as smaller numbers who identified as Vietnamese, Muslims, and second- or third-generation descendants of migrants from Mainland China. Those identifying as Vietnamese, or who spoke primarily Vietnamese with limited Khmer, were mainly found in the southwestern regions of the Tonlé Sap—particularly in Kampong Chhnang and Pursat provinces. Muslims were observed primarily in coastal areas like Kampot and in markets in Phnom Penh, while second- or third-generation Chinese descendants were primarily found in Phnom Penh markets, such as Orussey. However, this scoping research did not investigate these different identity groups in depth.

A certain level of animosity was expressed toward Vietnamese fishers regarding their fishing practices in inland water bodies, which were described as illegal to the scoping team. Since the team could not explore these practices in depth, this remains a one-sided narrative in the context of this research. Similar perceptions were shared by Muslim fishers in coastal regions, who noted that larger Vietnamese boats often used illegal fishing methods and, when confronted by Cambodian fishers with smaller vessels, sometimes resorted to violence. The perceived lack of governmental action to address illegal fishing was also highlighted by these fishers.

> *"This (allegedly done by Vietnamese) illegal fishing is called Uk Ku; we had a big protest against this here in Kampot, pressurising the government to stop Uk Ku. Then, the provincial Department of Fisheries stopped it for about three months, and then it started again. Those who do Uk Ku kill fishermen in the sea. There is corruption everywhere. We only have small Fisheries Associations and groupings here; these are too small to make a difference. Every fisher that respects the law gets together. Those who engage in illegal fishing don't go for these protests." (KP FP 01)*

2.4 Where is the fish going?

The scoping team was unsuccessful in establishing clear flows of fresh fish originating from fishers to fish processors within the available time and resources. Based on experience during the scoping phase, establishing these flows of fresh fish (both wild-caught and aquaculture) requires a presence at the landing sites during certain times of the day, continuously over a period of time, with detailed observations, estimating volumes being traded, understanding actors in the transaction and their destinations.

According to the qualitative interviews, the bulk of the fresh fish is sold to the middlepersons, who supply it to the processors throughout the Tonlé Sap region and in the coastal communities. This trend was confirmed by processors as well. A few fishers indicated that retailers of fresh fish in the district markets purchase their fish catch at the landing sites.

The scoping team's observations at landing sites in Kampong Chhnang and in Phnom Penh revealed the marketing of both freshwater fish and, to a larger extent, cultured fish to be transported to wet markets across the country and for processing. However, the team was not successful in distilling clear flows of fish.

2.4.1 Estimates of volumes of dried fish products produced and traded

In terms of types of processed fish produced, in the last five years, fish paste or prahok still dominates the processed fish sector, followed by salted/sweet dried fish (trey ngeat) and Sun-dried whole fish (trey brolac) as figure 11 below shows. In 2018, as per available data, 42% of the total processed fish production was prahok and Sun-dried whole fish (trey brolac), and cut and dried fish (trey ngeat). The main processed fish production provinces of Kampong Thom, Kampong Chhnang and Siem Reap follow similar production volume patterns as shown below, with Phnom Penh and Kandal producing a higher proportion of cut and dried fish (trey ngeat) and a smaller proportion of prahok, as per available data for 2018 (Figure 8).

Figure 8: Processed fish production by type of product 2014-2018

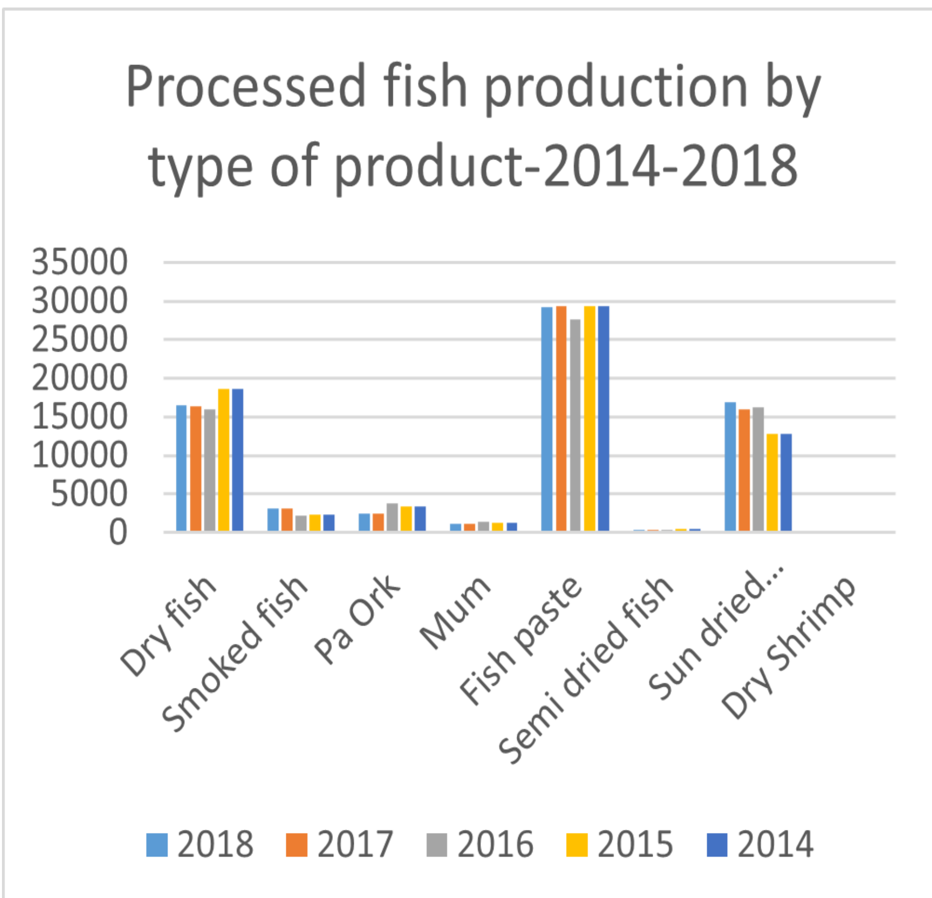


Figure 9: Processed products by type 2018

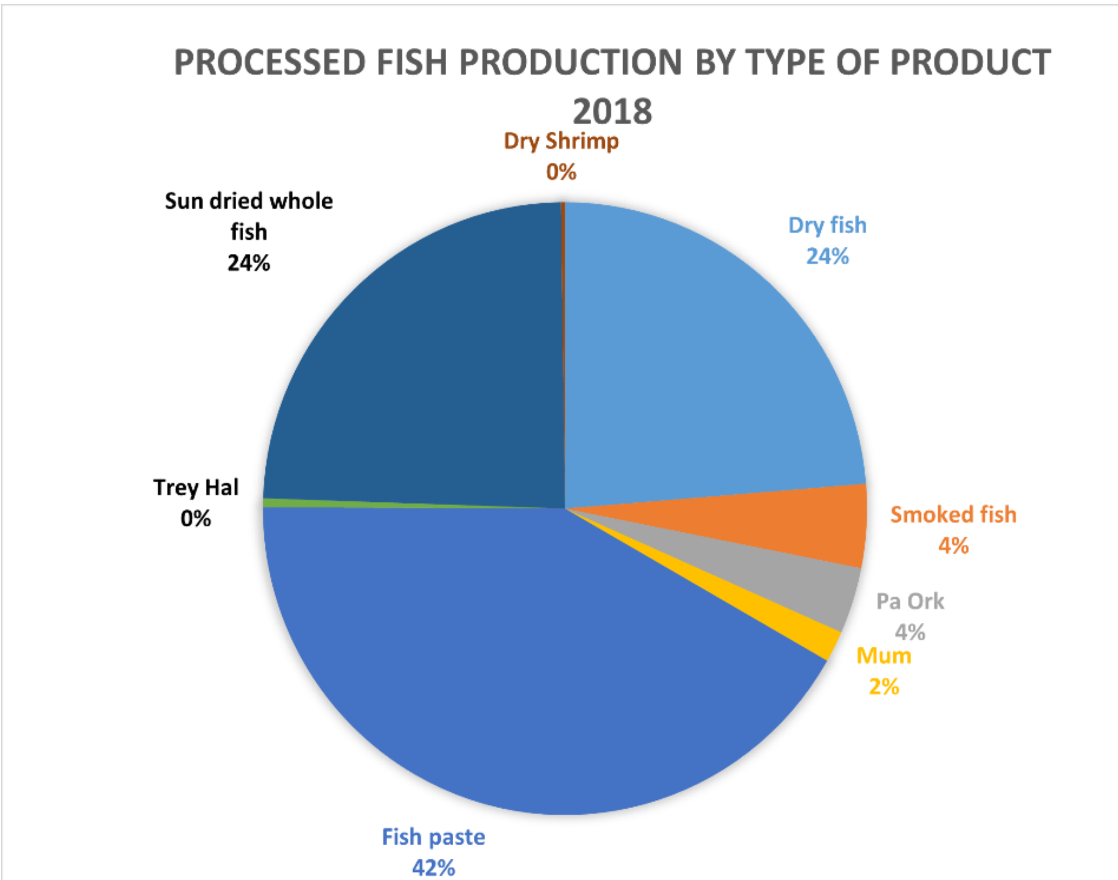
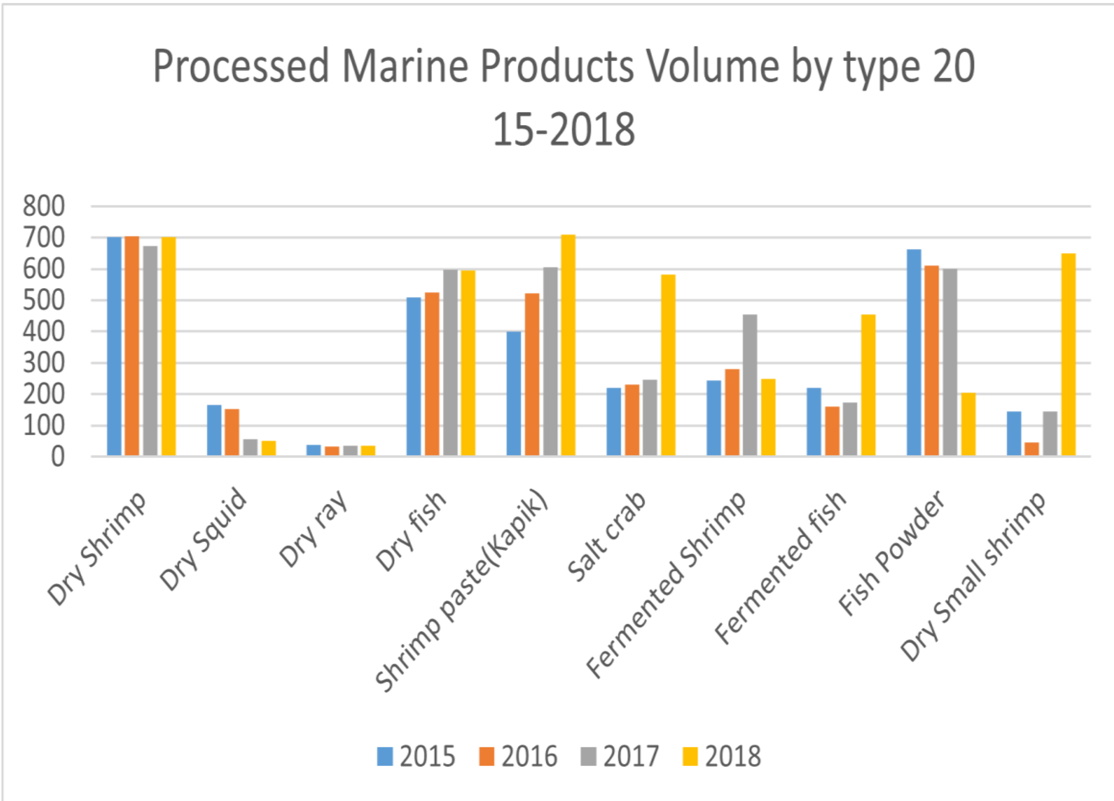


Figure 10: Processed marine products volume by type 2015-2018

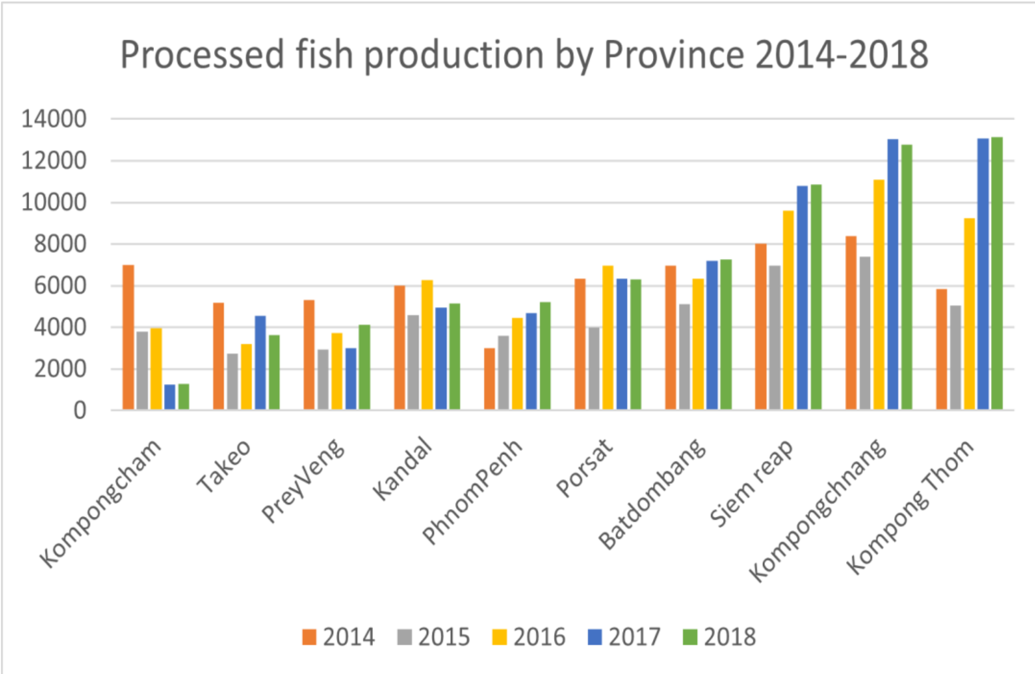


Source: Derived based on Fisheries Administration 2018

2.5 Fish processing sites: floating villages, urban neighbourhoods and coastal communities

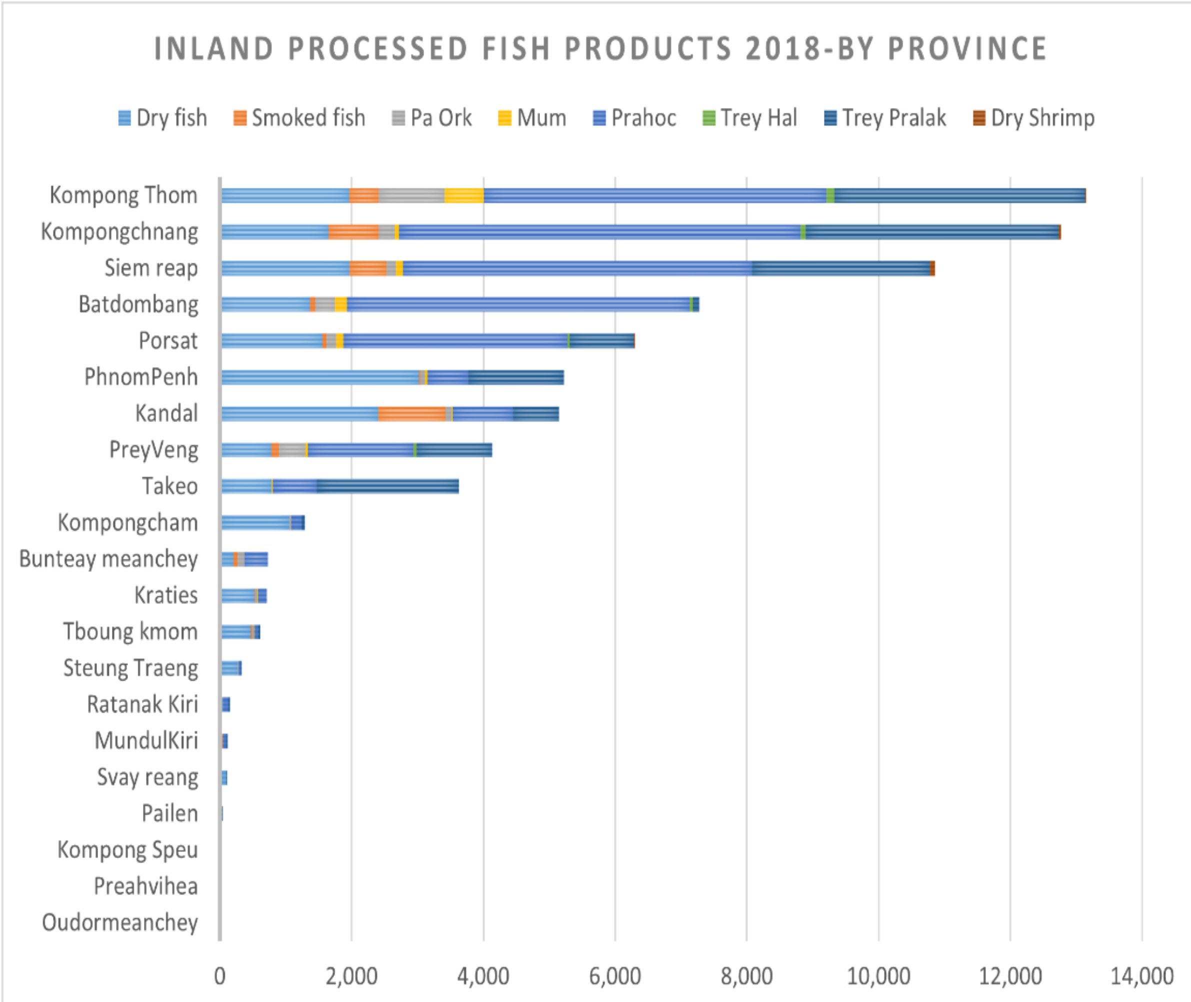
As per secondary data compiled by the Fisheries Administration, Kampong Thom, Kampong Chhnang, Siem Reap, Battambong and Pursat were the leading processed fish producers in Cambodia (Figure 11). The prominence of Kampong Thom in processed fish production appears to be relatively new based on the available production data, given that in 2014, the processed fish production had been dominated by Kampong Chhnang, Siem Reap, Kampong Cham and Battambong. The processed fish production volumes saw similar patterns to those of fresh fish production (from wild capture, aquaculture, and paddy field fisheries.

Figure 11: Processed fish production by province (2014-2018)



The three main processed fish producing provinces in Cambodia show a similar product composition: they produce mainly prahok and trey brolac. Battambang shows a slightly different pattern, to the other main freshwater production provinces in that, its production is primarily of prahok with minimal trey brolac production. Phnom Penh stands out as one of the main trey neart producing provinces, in the entire country.

Figure 12: Inland processed products by province (2018)



2.5.1 Processing in and around floating villages on the Tonlé Sap

(i) *Dai* (bagnet) fishing and small fish for prahok

The 2018-2019 dai fishing season yielded a notably low catch, as observed during the scoping phase. *Dai* nets set up along the edge of the Tonlé Sap were operational for only a few days between November and January, timed around the full moon. In January, the scoping team encountered groups of women from Takeo who had travelled to purchase fish for prahok processing for home consumption. Among them was a woman processor from Takeo and several "middlepersons" (Muslim women) who were buying and reselling fish from the dai catch as well as from Kampong Luang for processing.

Conversations with these processors and middlepersons indicated that the dai catch this season was extremely low, causing a surge in fish prices. Fresh fish that had sold for 5,500 riel per kilogram the previous year was now priced at 9,500 riel per kilogram. Some women, hoping to buy small quantities of fish to make prahok for personal use, were undecided whether to buy at this higher price from Phnom Penh or from Takeo, where prices were reportedly similar. The women had travelled in small groups of 5-6 in a hired car the previous day, spent the night, and planned to return the day we met them. The processor from Takeo had slept in a hut beside a house along the riverbank, resting on a wooden bed, while the others slept in hammocks hung in a vacant area by the river amidst houses. This practice reflects an age-old tradition where families from different provinces would travel to camp along the riverbank, buy small fish, clean it, and make prahok. However, prahok-making practices have evolved significantly over the decades. For instance, the cleaning, descaling, and beheading processes are now largely mechanized, with fish placed on a small conveyor belt connected to a sieve. In earlier times, these tasks were performed manually or by using feet.

(ii) Small scale *prahok* processing in Roka Koang- Kandal

In contrast to the prahok production around the Dai nets, the processing in interior Kandal remains less mechanized. Processors there explained that they produce around

500 kg of prahok annually, selling it at roadside stalls throughout the year. Fish sauce is also extracted as a by-product during the prahok-making process. They primarily process small fish which they purchase at 2,000 riel per kilogram, and sell 1 kilogram of fish paste for 15,000 riel. Fish sauce is sold for 5,000 riels per 1.5 litres. Labour is hired from within the community, mostly from among relatives, and is compensated at 10,000 riel per day.

(iii) **Semi-processed prahok for export to Thailand and local trade**

The semi-processed prahok was found around the Tonlé Sap, especially in Siem Reap and Battambang in the floating villages. These semi-processed products are produced both for local buyers and for export to Thailand. Semi-processing involves only cutting the fish head and cleaning it whereas pounding the fish into paste happens at a later stage, in a different location.

(iv) **Trey cha'eur (Smoked fish) processing under difficult conditions**

Smoked fish production was observed mostly in the floating villages on the Tonlé Sap and in certain areas in interior Kandal. Based on observations, the scoping team felt that smoking fish was one of the most hazardous processing activities, given the need to tend to the fire, control the smoke and arrange the fish for smoking. The men and women who were working on these fish-smoking plants wore clothing to protect them from the fire and heat, but they did not seem to provide adequate protection. None of the processors the team spoke to mentioned any long-term health hazards, such as respiratory illnesses. However, this remains a concern.

The firewood for smoking is rarely purchased; instead, family members are responsible for collecting driftwood, primarily during the flooding season. This wood is dried and stored for use throughout the year. The smoked fish is placed on racks situated just above the smoking racks and is typically moved out within a few days.

(v) **Psar prahok (prahok market) in Battambang**

Although referred to as a market, the collection of about ten units in Psar prahok resembles processing facilities rather than selling points. Located within one large building, along with a few outside, these units primarily process Pa Ork and prahok. The scoping team learned that the fish for Pa Ork is sourced from aquaculture farms in Thailand. Approximately 20 workers, both men and women, sit on the ground to cut the fish. The fish is then mixed with roasted rice powder and other ingredients before being stored in plastic bags or large wooden vats.

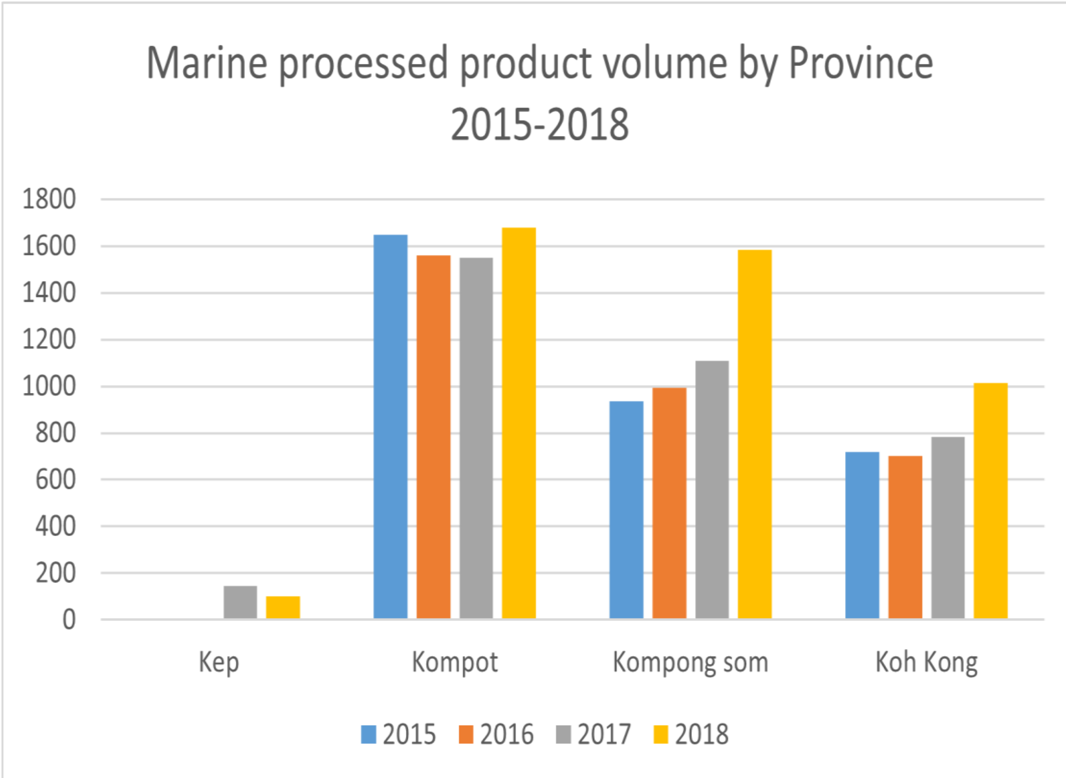
Small fish for prahok are crushed in large cement tanks, combined with salt and other ingredients, and stored accordingly. At least one unit employs a machine to grind the small fish into paste. These processing units operate on a medium to large scale, employing around 20 workers and averaging a sales volume of about 1 to 3 tons per week. Due to lower water levels in the rivers connecting to the Tonlé Sap, these processors reported difficulties in accessing floating villages like Prek Toal, which historically supplied them with fresh fish for processing. This could be one reason for the increasing reliance on farmed fish from Thailand.

2.5.2 Seafood processing in coastal communities

Processed marine products are produced in the coastal provinces of Koh Kong, Kampot and Kampong Som, with Kampong Som becoming an important player in 2018 as figure 15 below shows. The main production sites historically had been the small islands off the coastal belt of Cambodia and the coastal villages in the above provinces. In general, the communities in the islands were of the opinion that the number of processors was declining due to the decline in shrimp stocks and fisheries in general, which was driving the people living in islands to migrate either to Thailand or to Phnom Penh, in search of jobs. A smaller number of islanders, mainly women, continue to process primarily shrimp of three sizes, into dried shrimp and kappik (shrimp paste). Fresh shrimp was sourced from within the islands and other required ingredients such as salt was bought from suppliers from the mainland. Middlepersons from the markets in the close by mainland towns such as Koh Kong or from Phnom Penh markets were supplied with these products. Tourists that visit the islands were also targeted as buyers by these island processors, however tourist numbers were seen to decrease, given coastal infrastructure development, that was impacting the appeal of these coastal regions for tourists. In order to get a better price for their products, these processors in the islands were increasingly transporting their products to the mainland.

The scoping team observed yahe (fermented) shrimp processing mainly in the coastal communities of Kampot. Fresh shrimp was being bought from within Kampot or from Koh Kong and the islands, and the products were sold in Psar Samaki in Kampot or supplied to Phnom Penh markets via middlepersons.

Figure 13: Marine processed production volume by province 2015-2018



Note: No data available for Kep in 2015 and 2016

Source: Derived based on Fisheries Administration, 2018

2.5.3 Seasonality in processing and fresh fish sourcing

Fish processing has seasonal variations in Cambodia. In the freshwater fisheries, fish processing is closely shaped by the fresh fish supply which in turn is shaped by the monsoons which decide the efficiency levels of catching fish. The peak production period is between November and February.

For certain processed fish products, such as prahok, there is a clear season for processing, from October to February with December and January seen as the peak season. For other products such as trey ngeat, and trey cha'eur, the season for processing is not so clearly defined, as depending on the fish catch, the processing seems to continue throughout the year. Similarly, the season for making kappik (shrimp paste) using small shrimp was identified by processors in the coastal areas to be relatively clear-cut, from February to May, when the shrimp season is at its peak, in the coastal marine waters. Kappik was processed October and November as well, but to a lesser extent, when the small shrimp was harvested from the deeper waters off Koh Kong islands. The lower availability of fresh fish during year 2019-2020 fishing season was clear during the scoping phase, given the extremely low water levels in the Mekong and Tonlé Sap, impacting volumes of processed fish production and their prices. Analyzing this trend in the years to come will prove vital to understand the impact of the wide range of natural and man-made phenomenon on livelihoods such as fish processing and food security.

In general, based on the semi-structured interviews conducted, the scoping phase research finds that when fish is brought from outside the province, the fresh fish tend to be from aquaculture farms; either in Cambodia or from Thailand or Vietnam. Those who buy fresh fish within the province/district/commune exclusively, tend to be the micro and small-scale processors. In general, for smoking, fish seems to be sourced locally. For example, in Kampong Chhnang fish caught within the district/province is used for smoking and the same trend was observed in interior Kandal. Imported farmed fish, along with a certain proportion of locally sourced farmed fish, is used for making pa'ork for commercial purposes. A variety of fish, from diverse sources was used for drying (trey neart and trey praham) whereas for trey broma, primarily medium size farmed fish seemed to be used. For prahok with bones, locally sourced low value fish is used while some imported fish is used for prahok sachs.

The general perception of the processors who responded to the semi-structured questionnaire during the scoping phase research was that in general, availability of farmed fish, brought over from Vietnam was higher, compared to local wild capture fish, as the following extract shows. There seems to be a clear demand for processed products using wild caught fish, discussed below.

"You can get fish very easily from aquaculture in Vietnam, through middlepersons based here in Cambodia. But wild fish here is difficult to get, you have to call 2-3 times for them to bring it." (KT PR 01)

A data and research gap that remains is: what is the volume of fish that is imported from Thailand and Vietnam for processing in Cambodia, especially faced with declining wild caught fish catch.

Map 3: Fresh fish buying sources by processors (inter-provincial)

Note: This map does not capture the movement of fish within the provinces

2.5.4 Processing methods, ingredients used and associated costs

Processing methods have regional variations and seem to be shaped by family traditions. The scoping study could not capture all these variations. Following are some of the generic methods used and steps followed, as explained by the processors.

(i) Prahok (fish paste) with bones

The fish is first decapitated, scaled, and thoroughly cleaned with water before being placed in a pot and left overnight until it becomes swollen. The following morning, the fish is crushed, cleaned again, and mixed with salt. The mixture is then kept for two additional nights until it becomes dry and free of moisture. Once properly dried, it is stored in a large pot. To ensure better quality, the fish paste is pressed down using a bamboo mesh placed on top. It is used as an ingredient in dips/sauces, prahok ktis (prepared with coconut milk), prahok chamhoi (steamed prahok), prahok aang (grilled wrapped in Banana leaf) as an accompaniment to rice.

Table 4: Fresh fish buying and product selling price for prahok (r = Cambodian riel)

Fresh fish buying price (kg):	**Selling price (kg):**
Rof (semi processed): 8000r Kampleang (fresh/unprocessed): 1500-2000r Kampleang (semi processed) 4000r Riel (unprocessed): 2000r-6000r Chdao (*for prahok* without bones)-7000r	10,000r 12,000-20,000r 6000r 15,000r 25,000r

Photo 2: Processing of prahok

Photo 3: Medium-large scale prahok production process

(ii) Fish sauce

About 10 kg of low-quality fish is mixed with 4 kg of salt and dried in the sun for approximately two hours. The mixture is then placed in a pot, where water, palm sugar, and 500 g of MSG are added. It is boiled while being continuously stirred until it turns into a sauce. Finally, the mixture is strained twice to ensure a smoother consistency and better quality.

Photo 4: Fish sauce processing (left) and retail trade (right)

(iii) Pa ork (fermented fish mixed with roasted rice powder)

The fish is first cleaned, cut, and scaled, and then left to sit until the strong fish odor subsides. Salt is added as required, and the mixture is stored for 15 days. After this period, it is opened, mixed with roasted rice powder, and stored for an additional 3–4 months. Boiled palm sugar is then added and mixed with the fish before it is sold.

In larger-scale processing units, however, the cut fish is mixed directly with roasted rice powder immediately after preparation and then stored in wooden vats.

Photo 5: Pa-ork processing steps

(iv) Mum (Fermented fish mixed with palm sugar syrup or mixed with papaya)

The fish is mixed with a sour sauce, such as one made from raw papaya, along with salt, and then stored in a bucket. Palm sugar is boiled for about 10 minutes and allowed to cool before being mixed into the fish. The mixture is then kept for one day. To improve the taste, cane sugar and MSG are added. Its selling price is 7000r/kg.

Photo 6: Mum (fermented fish mixed with palm sugar or papaya)

(v) Trey ngeat (salted sun-dried fish)

Method 1: Water is first extracted from the fish. Separately, 15–20 kg of salt, 30 g of MSG, and 1 kg of palm sugar are boiled together until the mixture turns dark red and is then left to cool. This mixture is combined with 100 kg of fish and stored for around 12 hours to dry. Additional ingredients such as chili flakes and soy sauce may also be added. However, the inclusion of these ingredients reduces the shelf life of the product when refrigeration is not available.

Method 2: Water is first extracted from the fish, after which 100 kg of fish is mixed with 15–20 kg of salt and 30 g of MSG and stored for around 12 hours. The fish is then spread out under the sun to dry, covered with a mosquito net to protect it from flies. It is kept under the sun until completely dried, resulting in a product that can be stored for a longer period. Approximately 100 kg of fresh fish is required to produce 35 kg of dried fish. For every 100 kg of fish, around 12 kg of salt, 2 kg of MSG, and 1–2 kg of sugar are required.

Trey ngeat mixed with extra ingredients such as Soy sauce is grilled. Regular Trey Neart is used as an accompaniment for breakfast with porridge, it is added to clear sour soup mixed with gourd and other vegetables and used as an ingredient in salad.

Table 5: Fresh fish buying price and selling price for trey ngeat (r = Cambodian riel)

Fresh fish buying price	**Selling price (product)**
Trey diep 3000-8000r per kg Pro ompov 2000r per kg Kompleanh 2500r per kg	Trey diep 24,000-30,000r per kg Pro ompov 3500r per kg Kompleanh 130,000r per kg

Photo 7: Trey ngeat processing

(vi) Trey praherm (translates into swollen fish)

After being cleaned, the fish is first soaked in water for 2–3 hours. It is then washed, after which salt is applied inside the fish before it is dried. MSG is later applied or glazed on top of the dried fish. Approximately 2.5 kg of fresh fish is required to produce 1 kg of swollen fish.

Photo 8: Trey praherm processing

(vii) Trey cha'eur (smoked fish)

The fish are first decapitated and washed, after which they are skewered in rows of 5–7 fish each. They are then sun-dried until the fish become attached together by their tails. The fish are subsequently arranged in batches on racks and smoked. The duration of smoking depends on the type of firewood used and may last for up to three days. It is used as an ingredient in salad.

Photo 9: Trey cha'eur processing

(viii) Kappik (shrimp paste)

The small shrimp are first cleaned and sorted by removing snails, insects, leaves, and other unwanted materials, retaining only the shrimp. Salt is then mixed with the shrimp, after which the mixture is placed in a jar and kept overnight. The shrimp are subsequently dried for one day and then processed in a machine to produce a paste. The paste is tightly packed into jars and stored until it is sold.

Photo 10: Processing of kapik

(ix) Dried shrimp

The shrimp are first cleaned and then boiled for approximately 20 minutes, although the boiling process may extend up to two hours. Salt is added along with optional ingredients such as MSG and food colouring. The shrimp are then dried for 1–3 days, although in some cases drying may last only around four hours. After drying, the shrimp are cleaned through deshelling and then prepared for sale. Approximately 1000 kg of fresh shrimp is required to produce 100 kg of dried shrimp. In general, dried shrimp are graded according to size and quality, including large, medium, and small categories.

Table 6: Buying price of fresh shrimp and selling price of dried shrimp

Buying price of fresh shrimp	**Selling price – dried shrimp**
6000r-7000r per kg (mixed quality)	Big size: 75,000-160,000r per kg Medium size: 60,000-130,000r per kg Small size: 50,000r-120,000r per kg

Photo 11: Processing of dried shrimp



(x) Yahe (fermented shrimp)

The prawns are first mixed with salt and stored in a covered jar for one week. They are then thoroughly cleaned and mixed with boiled sticky rice, sugar, and MSG. The mixture is subsequently stored for more than one month before being ready for consumption or sale.

Photo 12: Processing of fermented shrimp

2.5.5 Labour arrangements: Ownership, paid labour and family labour

Almost all the processors involved in the scoping phase study indicated that family members contributed to the processing through labour, financial support for day-to-day operations, and the passing down of processing skills through generations—usually from mother to daughter, sometimes as part of family food preparation rather than as a primary income-generating activity. Initial capital was often supplied by family members, along with social capital and networks in the form of suppliers and buyers. In some households in the floating villages, very young girls could be seen caring for their younger siblings while their mothers were engaged in cleaning fish for processing. This observation supports the trend identified by Estepa et al. (2016), where young children, particularly girls, are socialised into engaging in processing activities.

Mostly women were employed in fish processing, while men worked in small or medium-scale operations, performing tasks such as lifting fish baskets from one processing step to another, weighing fish, and transporting fresh and processed products to and from external locations. In all processing spaces, including medium-scale operations, we observed the female owner engaged in various processing or support functions, such as removing fish waste, weighing fish, and bookkeeping. Both male and female children were seen cleaning and packaging small, low-value fish for *prahok* processing or as a semi-processed product, with girls primarily working at the household level and both genders participating at the processing plant level. Wages and payment terms for hired labour appeared to vary across different types of processing units, depending on allocated tasks and, relatedly, gender. The table below summarizes the various wages and payment terms identified during the scoping phase of this study.

Table 7: Labour arrangements in the processing sector

Type of processed product	Type of processing activity	Payment term	Payment value	Comments
Semi processed fish paste	Cutting head, gutting and cleaning	Per kilogram	300r	Approximately 100kg processed per day per worker (BT PR 01)
Pa ork	Mixing with salt	Per tonne	30,000r	Approximately 3-4 tonnes processed per day per worker (BT PR 03)
Smoked fish	Cleaning fish and smoking	Per day	40,000r	They work throughout the year
Dried prawns	Cleaning prawns	Per vat/container	9,000r	8-10 vats of prawns cleaned per day per worker (KP PR 01)
	Cleaning prawns	For 2-3 hours per day	10,000r	

Similar to processing, family members work in processed product trade businesses. According to the rapid survey conducted at the Orussey market, 16 traders among 40 stated that family members contribute their labour for the trade, while 12 traders stated that they have hired labour to work in their stalls. Male workers are paid 800,000r to 1,200,000r per month while female workers are paid 600,000r per month for their work in the stalls at Orussey. These workers are from the neighbouring provinces of Takeo, Prey Veng, Kampong Chhnang and Pursat.

2.5.6 Quality of fish used for processing

Semi-structured interviews generally indicated a lower preference for processed products made from farmed fish. Processors and traders who make these products revealed that they themselves do not consume them. Farmed fish was generally perceived as having a lower taste quality, being raised in unhygienic and unclean conditions, and being “too oily” compared to wild-caught fish. Some processors and traders also noted a perceived quality difference between fish farmed on the Tonlé Sap in Cambodia and fish farmed in Thailand and Vietnam, as highlighted in the extract below.

> *“The fresh fish I buy is from aquaculture farms on the Tonlé Sap. I don’t buy farmed fish from Thai middlepersons. River fish is tastier than fish from aquaculture. Farmed fish has too much oil, and the Trey neart made from farmed fish can’t be kept for too long because of this." (SR WS 02)*

This perceived quality difference is reflected in demand, as certain products made from farmed fish sold for about 10,000–15,000 riel less than the same products made from wild-caught fish, such as *Trey neart*. A price difference is also observed in fresh fish purchasing, with a kilogram of wild-caught *Prah* fish priced at 9,000 riel per kg, while the farmed version was priced at 6,000 riel per kg in Kandal.

Additionally, as noted in the second extract below, processed products from Vietnam were perceived to be of lower quality and cheaper in price compared to Cambodian products, often seen as competition with locally produced items.

> *"The fish and the processed products exported from Vietnam are cheaper than what is produced here in Cambodia. The processed products (referring to 'Vietnamese prahok', which she buys from a Vietnamese woman who lives on the border) are cheaper from Vietnam because they mix the big and small fish together and make the products; they use mixed fish. But the Cambodian products are special, and they are more expensive. Therefore, it is difficult to sell the Cambodian products. The quality of the Vietnamese products is lower." (PR WS 02)*

2.5.7 Processed product marketing routes and strategies

In certain cases, the decision on the destination of the product was based on weight, as the extract below illustrates. For certain other processors, Phnom Penh was the first choice for supplying their products, with the local district or provincial market being supplied only based on specific orders from traders in those markets. At least in the case of one respondent, the buyer linked to Phnom Penh markets was a relative, which hints at the potential role family networks play in moving fish from the processor to wholesalers and retailers.

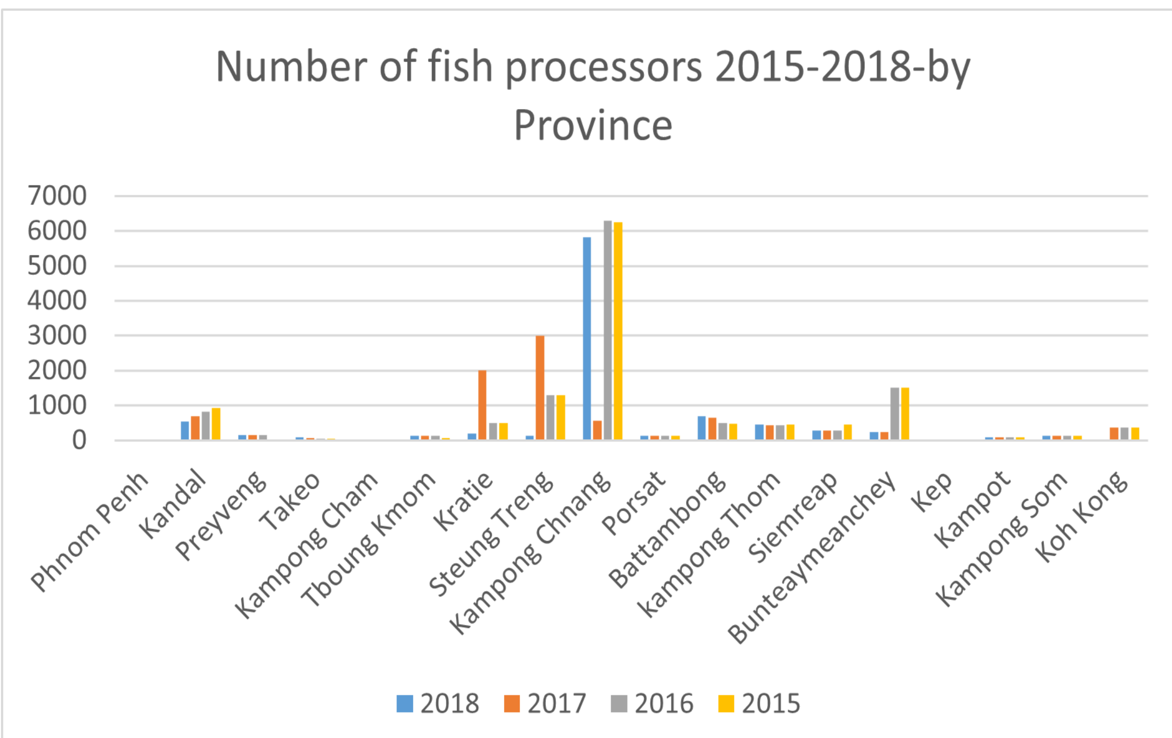
> *"We transport the processed products by boat to land (landing site/jetty) and lorries come to transport the products, if it's going to Phnom Penh. If there is about 70-100kg it is transported to Phnom Penh and most of our products go to Phnom Penh. If the products are going to the Krakor market, then they are transported by Motorbike. This is about 30-50kg of dried fish and it costs 40,000r one way for the motorbike." (PU PR 03*)

Studying the movement of processed products from processor to consumer in Cambodia and the role of family or social networks in processed fish trade remains an unaddressed research gap in Cambodia.

2.6 Fish processors

According to data from fisheries authorities (see below), Kampong Chhnang province hosts the majority of fish processors in Cambodia. Other key provinces producing processed products, such as Kampong Thom, Siem Reap, and Battambang, show relatively fewer individuals engaged in processing. This may indicate a shift towards more “industrialised” medium- to large-scale operations that produce higher volumes compared to smaller, home-based production units. However, neither the scoping phase research nor other published literature provides further analysis on this trend.

Figure 14: Number of fish processed by province-2015-2018



2.6.1 Typology of fish-based product processors: link with MSMEs

Published literature so far on Cambodian fish-based products seem to use two types of categorisations in their analysis; a) based on the nature of their primary livelihood: fisher, fisher cum farming and farming and b) based on the scale of operation; small/household scale, medium and large and modern processing plants. There are overlaps between these two types of categorisations: fisher families that engage in household scale or medium scale processing and farming families that engage in household scale processing.

The scoping phase analysis reveals that processing serves diverse roles within a (micro) household socio-economy: as a means of subsistence that contributes to food security and nutrition (particularly for farming households), as a source of supplementary income for processors or workers at processing units, and as a primary income source that supports not only household economies but also the regional and local economy through job creation and potential exports.

The analysis of the scoping study data, combined with published literature, suggests the following typology, to be verified further. The criteria used for the typology include type of primary livelihood, scale, location of processing, labour arrangements, quantity processed and selling patterns. This typology can be complemented by the MSME defining characteristics of number of employees and investment capital (excluding land and property).[3] While the body of published literature on the processed fish sector does not include linkages with the MSME sector in Cambodia, the body of studies and implementation on MSME development in Cambodia could include fish-based products as part of the food-based industries and therefore warrants further attention in the next phases of DFM Cambodia.

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[3] As per presentation by Mr Chea Layhy - Director of SMEs Department, Ministry of Industry and Handicraft, Cambodia. Source: https://www.unescap.org/sites/default/files/SME%20Financing-Chhea%20Layhy%202019.pdf

Table 8: Typology of processors

<table>
<tr><th>Type of processor</th><th>Characteristics</th><th>Comments</th></tr>
<tr><td>Fishing families</td><td>‘Worse off’ households who use processing as a secondary income source for the family (ex: elderly women supporting themselves, and their family through fish processing). Processing happens at home, primarily by household member/s. Processed fish volume is less than 100kg per day during the peak season. Products are mostly sold to consumers in the village. (household/small scale)</td><td>The scoping phase covered these households.</td></tr>
<tr><td colspan="3">Case 1: A 78-year-old woman from Prek Toal, Battambang (smoked fish processor)

“I stopped processing 10 years ago for sale (to sell to people from outside the community). Now I only sell to consumers around here. I sell 1 batch of small smoked fish for 1500-2000r.

Sometimes if I get a lot of fish, I smoke 20-30kg per day… I was born here. I am 78 years old, and I have been making smoked fish for 60 years now. I am a widow, I have only one child, a daughter and I live with her and her daughter here. I go to the Pagoda every day. I ride the wooden canoe with an oar, go to the fishermen, and buy the fish. I also support my family by selling candles, especially for grand child’s education. My daughter works as a labourer cleaning and gutting fish for semi processing. I would like my child to do this fish smoking. I can make only 500r profit per batch. I buy firewood, fish and bags for this. I use Kan Chao and Leng fish for processing. I buy 1kg of fresh fish for 1500-2000r, whatever price that they tell me. I don’t have a choice, so I work.”</td></tr>
</table>

Type of processor	Characteristics	Comments
Fishing families	Households with a steady income from fishing or engaging in fishing but primary income being from another source such as remittances, engaging in processing as a secondary livelihood activity. Processing happens at home by household member/s mainly and in the peak season, with 1-3 hired workers. Products are traded within the village and sold to middlepersons. (household/small scale). Volume of production is 200-500kg per day during the peak season.	The scoping phase covered these households.
Case 2: 35-year-old woman from Keo Por in Siem Reap (prahok processor) "I started processing about 10-20 years ago. There are five members in our family, one daughter and two sons. My husband is a tourist boat driver. I process fish at home and feed the fish in the pens. We also have a souvenir shop… We row the boat by hand and buy the fish from fishermen here. We buy about 50kg of fresh fish. We clean all the fish by ourselves. Middlemen come here to buy the *prahok* and sell it to villagers. We sell 1kg for 20,000r. We make about 100-200kg fish paste per batch. The *prahok* is bought by middlepersons, and we have 1-2 regular middlepersons. We give the same price for consumers and middlepersons. Middlemen come from the Pouk market and other places. We do this processing every year, Oct-Dec. We keep it only 1 year, consumers buy about 1kg per year."		
Fishing cum farming families	Farming primarily in small islands on the water bodies, during the season. Farming is seen as a secondary income source, during the dry season. Fish processing activities often take subsistence form, and in case of a surplus production, is sold off to middlepersons.	The scoping phase covered these households.
Case 3: A 45-year-old woman, from Keo Por in Siem Reap (fisher and processor of prahok)		

Type of processor	Characteristics	Comments
"I studied up to Grade 5. I started fishing 20 years ago. Before my marriage, I was planting vegetables. We have agriculture land, but these days it is covered with water. When the water level recedes, we cultivate it. We earn about 1-2million per year from this cultivation. We plant in February and harvest by May. The land is 20 X 50 square meters. We will move this house to the location where we have that land this afternoon."		
Farming families	Subsistence purposes only	The scoping phase did not cover this type of households.
	Subsistence purposes mainly, but sells a certain proportion based on surplus production	The scoping phase did not cover this type of households.
Processing families	Households with no members involved in fishing or farming. (small to medium scale). Processing happens at home, involving household members and hired labour during peak season. Volume of production ranges from 100-500kg per day, during peak season.	The scoping phase covered these households.
Case 3: A woman of about 45 years of age at Stoung, in Kampong Thom (Dried fish processor)		

<table>
<tr><th>Type of processor</th><th>Characteristics</th><th>Comments</th></tr>
<tr><td colspan="3">“I have 10 hired workers, seven women and three men and I pay them 500,000r per month. I pay them advances if they make requests. It depends on them. They are all from the area, in walking distance to the place of work. My hiring of workers depends on the fish supply, if the supply is higher, I get more workers and if it is low, I don’t hire anyone.
I buy ice from a factory close by and put the fish in the freezer for 1-2 days. I keep it like this when the stock is big. Sometimes I buy 500-1000kg, but nowadays it is less.”</td></tr>
<tr><td></td><td>Households with no members involved in fishing or farming, processing or semi-processing plants located in a separate location from their homes. (small to medium scale). Volume of production per day is 500kg-10Tonnnes per day during peak season. At least some of the fish species are sourced from Thailand/Vietnam and the rest from floating villages around the Tonlé Sap Lake. Products are sold to middlepersons/traders within the province and outside the province, including Phnom Penh markets. At least some of the processors at this scale pay taxes to the government.</td><td>The scoping phase covered these households.</td></tr>
<tr><td colspan="3">Case 4: 50-year-old woman from Psar prahok in Battambang (Pa Ork processor)

“I manage this place by myself, there is no one else in my family to help me. My husband works in the Police, and my daughters are still studying, they are at the university. I have one son and he is in high school, grade 11. I started this processing more than 20 years ago. I started in 1992/93. My husband, in his work with the Police, used to come here to work with the Fisheries administration. I used to come with him, I observed it and slowly started doing the processing myself. I started getting a lot of Mooi, and I grew my business slowly like this. Now I do all the processing here, earlier I used to do it at home too. About 1-3 tons of processed fish are ordered from us per week. I have lots of Mooi in Phnom Penh</td></tr>
</table>

Type of processor	Characteristics	Comments
and Pursat. There are 10 people per day who work here, for cutting and cleaning the fish. They are paid by kg… I have to pay 100,000r per year for this place as rent to the Ek Phnom district government office. I order Prah fish from Thailand, I order from few people, more than one. Sometimes I take advances from middlepersons, they also need to wait until the stock is sold out before settling the cash.”		
Processing factories		Not covered by the scoping phase data collection

Source: Primary data

2.6.2 Gendered and generational processing practices

Almost all the processors, primarily women, have a family history of processing, usually passed down through the generations from their mother, in processing, especially for household consumption. Processing is usually associated with food preparation traditions at home and according to anecdotal evidence, the current generation of mothers still possess the skills and knowledge of fish drying or making fish paste, especially in the rural areas. In the more urban areas and cities, this skill seems to be diminishing, and the younger generation does not possess this skill. According to primary data, almost all of those who engage in processing stated that they learnt the processing skills from their mother, at a young age, combined with trial-and-error methods and observing how others in the neighbourhood process.

2.6.3 Relocation on 'land' and impact on fish-based livelihoods

Respondents around the Tonlé Sap, particularly in Kampong Chhnang, Pursat, and parts of Siem Reap, discussed government-led relocation efforts to move floating villages onto adjacent land. In general, there was resistance to this policy, as these communities have lived on the water for generations. However, some respondents expressed a willingness or anticipation to relocate, citing the rising costs of maintaining floating homes and a preference for the safety and stability of land-based housing. A land-based home was seen as more secure than a floating house, which requires periodic relocation on the lake to accommodate changing water levels and is vulnerable to extreme weather. This sentiment was especially common among respondents in Siem Reap. The topic of land tenure did not arise during the scoping phase, though it may have significant implications for livelihoods based on processing activities.

Relocation had resulted in very practical difficulties for processors, to continue their enterprise, as the following extract from a smoked fish processor in Kampong Chhnang shows. Trade networks do not seem to be disrupted; however, traders and middlepersons seem to continuously visit this community, as per the processor.

> *"Before, we smoked the fish on the river, but now we do it on land because the government doesn't allow processing on the river. This year only we moved here. We have a big problem with water here, we can't access fresh water here… It is difficult to transport fresh fish here because there isn't enough water in the river." (KC PR 01)*

2.7 Past, present and future of processing: processor perceptions

As discussed above, processing is seen as a gendered, generational practice, among most respondents. Women, like the processor illustrated in the extract below, seem to take pride in their processing practice. For them, it is not just a livelihood activity, but a part of their own identity as well.

"This is my birthplace. I am not yet married (35years old) and I am living with my parents. My parents used to do this business, so I am now continuing it. Both parents were involved in this. I have been doing this business for 20 years now, and I don't know when my parents started this…It was a long time ago…I have hired labour; 20 women for fish drying and 10 men for making fish paste and fermented fish… I categorise this business as a large-scale one. This location is good and popular for selling processed products. We send it out to other provinces also. I am the only big wholesaler trader here; the others here buy from me… I know everything about this trade and I do it by myself… I think it is an easy job, I take care of my parents, I like it. I like trading but not the processing part of my job that much. It is a dirty job, it smells bad, and the process is very difficult." (PU WS 02)

At the same time, the processors feel that their job is a 'bad-smelling and difficult job'. Therefore, according to the respondents of the scoping phase research, while the current generation of processors will likely continue their processing activity, there is a big question mark on whether the next generation would continue the processing activities, as the extract below illustrates. Overall, there was a strong perception among most processors that they prefer their own children working for the government or private sectors, and not be involved in processing activities.

"I don't know whether the younger generation will come into this, the younger generation doesn't like this smell, it is a bad smell here. Sometimes they don't even like to come and help here because the smell is so bad." (BT PR 05)

3.0 Markets, traders, and their practices

According to primary data from the current scoping study, processed products are sold through different channels by the processors:

a) directly sold to organised markets (traders with permanent or temporary stalls in markets), both retailers or wholesale traders, within the province and outside the province
b) directly sold to consumers in the village either from home or from a village/district market
c) sold to middlepersons who sell to retailers, wholesalers or exported to Vietnam/Thailand either directly or via other middlepersons

According to Rab et al. (2006), there are six main trading channels, including direct export to Thailand or sales to exporters. However, the scoping phase of the current study did not find evidence of processors who export directly or sell to exporters. Instead, processors believe that the middlepersons to whom they sell their products are the ones dealing with exporters. The link to exporters appeared strongest among those involved in semi-processing small, low-value fish for *prahok*; in this case, processing plant owners sold their products to middlepersons at a local market, who in turn sold them to processors in Thailand for further processing into *prahok*.

Table 9: Trade channels

Type of Marketing	Number of Processors (n=61)	% of Processors
Sell directly to customers in local markets	3	4.92
Sell to middlepersons/traders who collect from processors	3	4.92
Sell to wholesalers within province	42	68.85
Sell to wholesalers in different cities outside the province	30	49.18
Sell to exporters	2	3.28
Export directly to Thailand	6	9.84

Source: Rab et al., 2006

(i) Sales to consumers at home or in village/district markets

Fish processing and trading has a crucial role in supporting some of the most vulnerable people: Petty traders and hawkers.

> *"I had 3 children, 1 son and 2 daughters. They are dead. I am now living alone, doing this small trade. I have 7 grandchildren. One is a fresh fish seller in the market, 4 of them are married… Consumers come to me because they pity me. They know that I need to feed small grandchildren, so they come and buy from me… There are no problems in the family, I don't have enough money to feed my grandchildren." (KC RT 01)*

(ii) Trade through organised markets

Published literature categorises processed fish traders/markets into three types: City markets, provincial markets and district markets (Rab et al., 2004). In the processed fish value chain, wholesale traders, their trade practices, socio-economic characteristics and trade networks remain among the least studied areas. In contrast, retail traders have received some attention (See Rab et al. 2004 and Rab et al. 2006).

In addition to the previous categories, the scoping phase of DFM Cambodia identified instances of 'roadside selling,' where clusters of stalls sell processed fish products at specific locations along major Cambodian roads. These include Stoung district in Kampong Thom province (on the Siem Reap-Phnom Penh main road), Mukh Kampul district in Kandal province (along Rokakung Road connecting Kampong Thom and Phnom Penh), Krakor district in Pursat province, and the 9th-kilometer post on the A5 highway in Prek Pnov, just outside Phnom Penh. Prek Pnov is a significant freshwater market, featuring fish from aquaculture farms in Cambodia and Vietnam, with processed fish stalls lining the roadside.

Psar prahok in Battambang was the only market noted in the DFM scoping phase that does not engage in retail trade. Instead, this market specialises in processing Pa ork, prahok, and, to a lesser extent, Mum, and focuses on wholesale trade to markets in Phnom Penh and Siem Reap. The scoping phase also examined several other markets, including major City markets in Phnom Penh and Siem Reap, provincial markets like Kampong Chhnang and Koh Kong, and district markets such as Krakor and Stoung.

3.1 Organisation of processed fish markets

Observations and stall count in City, provincial, and district markets around the Tonlé Sap, Mekong, and coastal regions during the DFM Cambodia scoping phase reveal that, in general, each market has at least 3-4 stalls trading processed fish products. These stalls are typically clustered together and are often located near the wet sections of the markets, alongside fresh fish and meat stalls. In addition to these clustered stalls within the market's permanent structure, a number of 'petty traders' operate outside the main market area, trading from plastic sheets or tarpaulins laid on the ground. Some of these outdoor stalls have temporary coverings, like large garden umbrellas, while others have no roof cover.

In terms of stall numbers, Orussey Market in Phnom Penh, Psar Leu in Siem Reap, and Kampot Market were the largest, as shown in the table below. Orussey Market and Psar Leu are categorised as city markets, while Kampot Market is a provincial market. Orussey Market trades both freshwater and marine products, Psar Leu specialises in freshwater products, and Kampot Market focuses on marine products sourced from Cambodia's coastal regions and imports from Thailand. The 'roadside' trading clusters are located directly beside main roads, often extending toward the road with umbrellas in front and permanent structures behind. Processed fish products are displayed at the front, while the permanent structures at the back are used primarily for storage. Psar prahok features approximately 5-6 sections dedicated to fish processing and storage, housed in a long, narrow building. Some processing activities also occur in a small cluster of buildings behind the main market building.

Table 10: Markets visited during scoping phase

No:	List of market spaces visited- outside PP	Number of processed fish stalls/traders
1	Krakor market	5
2	Krakor roadside selling	8
3	Chouk market, BT	3
4	Psar Leu, SR	30
5	Ponley market, KC	4
6	Psar Chhnang, KC	5
7	Psar Leu, KC	4
8	Poipet market, BM	5
9	Psar Nat, BT	7
10	Old market, SR	4
11	Psar prahok, BT	6
12	Stoung market, KT	6
13	Stoung market-road side, KT	15
14	Kampong Thom market	Information unavailable
15	Pouk market	4
16	Dong Toung Market-KK	5
17	Psar Samaki- Kampot	26
18	Crab market-Kep	8
	List of market spaces visited in PP	
1	Kandal province-road side prahok	8
2	Prek Pnov (roadside)	12
3	Orussey	80
4	Central market	6
5	Tuol Tom Puong	6
6	Psar Derm Kor	10

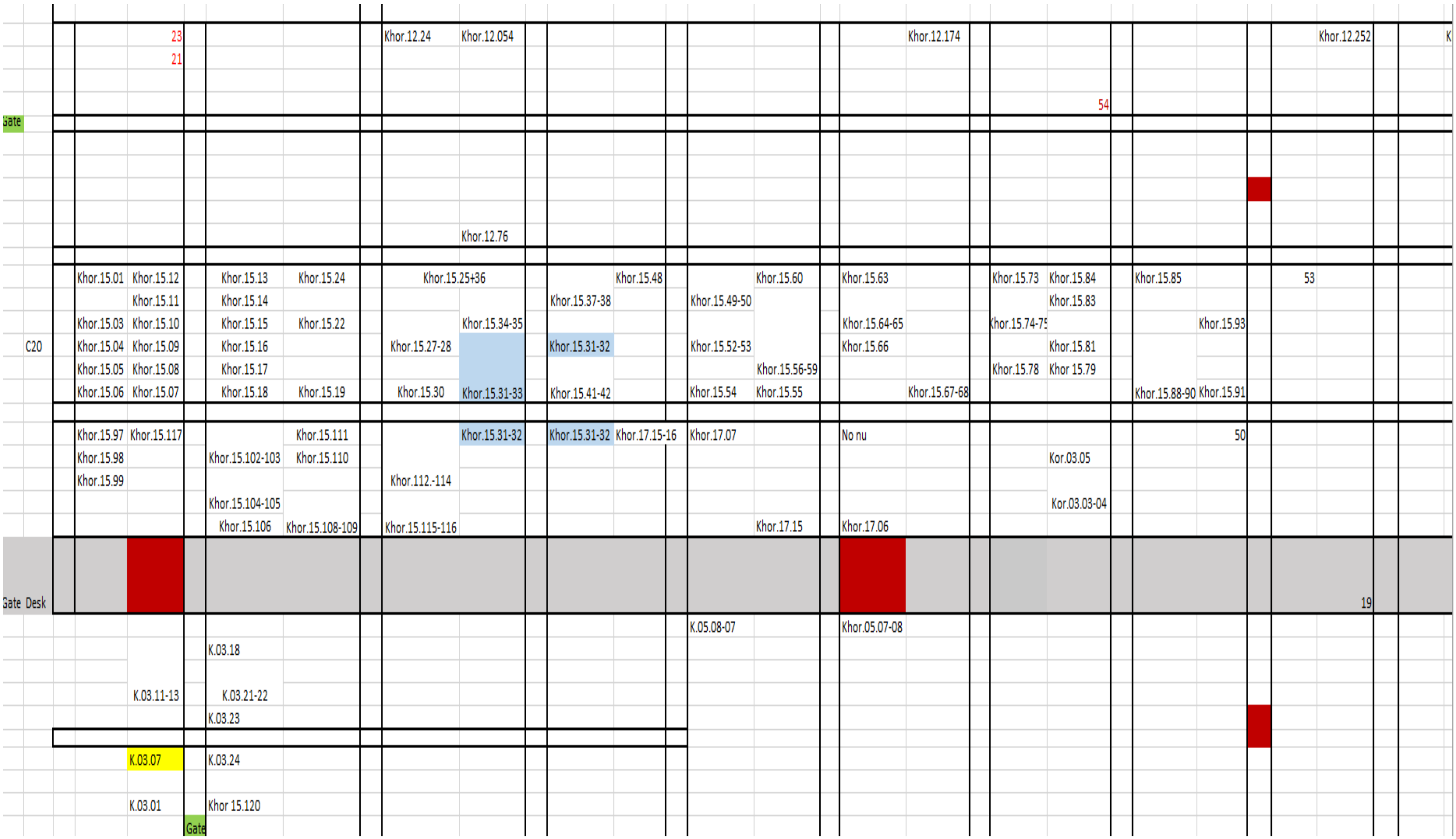
No :	List of market spaces visited- outside PP	Number of processed fish stalls/traders
7	Chbar Ampov	6
8	Olympic market	0

Source: Primary data (semi-structured interviews with processors)

Similar to the provincial and district markets, processed fish stalls are clustered together at the Orussey market in Phnom-Penh, between the wet products and the grocery products (see figure below). Most of the stalls that sold dried marine fish products were located along two main aisles of the market; the top two rows of the map below. Certain traders seemed to have acquired the stall right next to theirs[4].

[4] The staircases are marked in blue and the entrances or main entry points into the aisles are marked in red.

Figure15 : Mapping of stalls at the Orussey market



Source: Primary data

In general, the dried fish products were hung in the stalls, the fermented products and paste were kept in plastic buckets, and the smoked products were stacked. Most traders with stalls in permanent market buildings use the stall as storage, while some of the small-scale traders that operate on the roads just outside the market area transport all their products each day to the market and back. None of the traders in any of the markets mentioned the use of warehouses; if required, their homes were used for storage purposes. Some traders in the city markets kept deep freezers in their stalls, which were used to store dried fish. A trader at Orussey market stated that if the dried fish is kept in the freezer, it can be kept for about a year. If it is kept at room temperature, it will stay for only about six months.

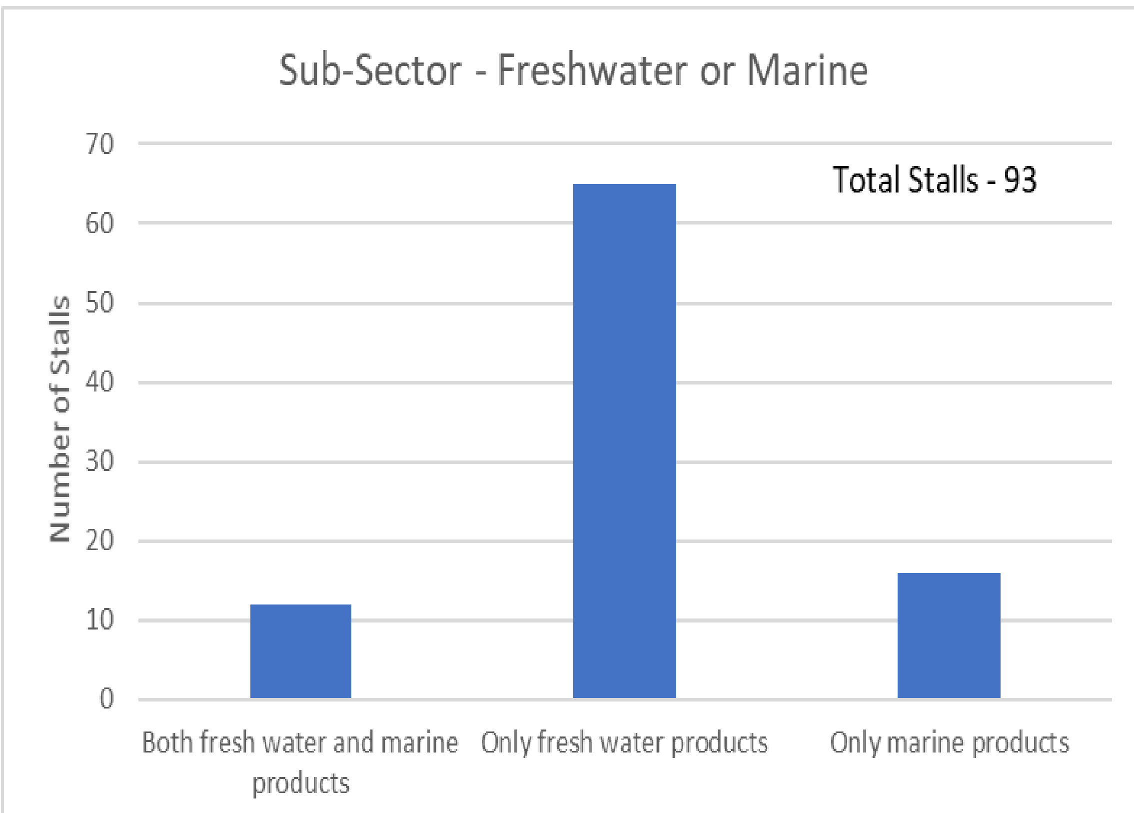
3.1.1 Types of products and volumes sold

Both marine and freshwater products are sold in the same market, and in some stalls, both types are available together. Generally, however, district and provincial markets in coastal areas focus on marine-based products, while markets around the Tonlé Sap and the Mekong primarily trade freshwater products. At least one stall in coastal markets traded processed freshwater products, and at least one stall in markets around the Tonlé Sap and the Mekong combined marine and freshwater processed products. These traders primarily engage in retail sales within their district or province.

Certain stalls in the ‘roadside’ selling areas in Stoung (Kampong Thom) and Krakor (Pursat) offered a wide variety of products. For example, one wholesale trader in Krakor had over 20 different types of processed fish products in her stall, and a stall in Stoung featured 15–20 processed fish products. However, not all stalls along these ‘roadside’ stretches offered such a wide range; some stalls sold only 2–4 types of products. In contrast, the roadside selling areas along Rokokung Road in Kandal province were more specialised, focusing primarily on *prahok* and fish sauce, often combined with *Mum* and *Pa Ork*, which they processed themselves.

In the Orussey market, a total of 93 stalls traded fish-based processed products. Of these, only 33 stalls sold exclusively fish-based processed products. Another 38 stalls sold processed fish products alongside other processed animal products, such as dried beef and pork sausages. In total, 80 stalls traded fish-based processed products (sometimes mixed with non-fish products), while the remaining 13 stalls sold fish-based products alongside items like dried mushrooms, salted bamboo, dried tofu, dried seaweed, soybean sauce, and grocery items such as noodles and spices. A conversation with a woman trader in the Orussey market revealed that the decision to include other animal-based products, such as dried beef and pork sausages, was based on buyer demand.

Figure 16: Products traded at Orussey market

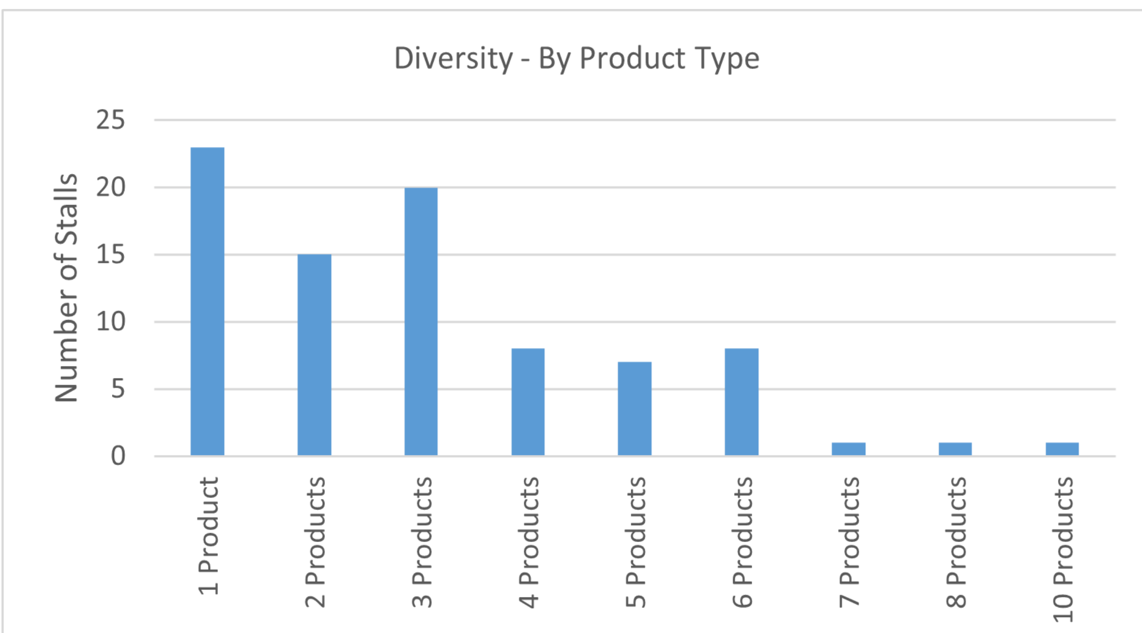


Source: Primary data

In certain specific cases, traders sold products that were regarded as regional specialities in their processed fish stalls. This trend can be observed in Kampot, a region close to the coastal belt of Cambodia, where processed fish traders sold marine processed products primarily, in combination with different types of pepper from the region: 10 stalls out of 26 processed fish stalls in the market sold peppers. In areas such as Stoung, almost all the stalls in the 'roadside' collection of stalls had dried beef combined with processed fish products.

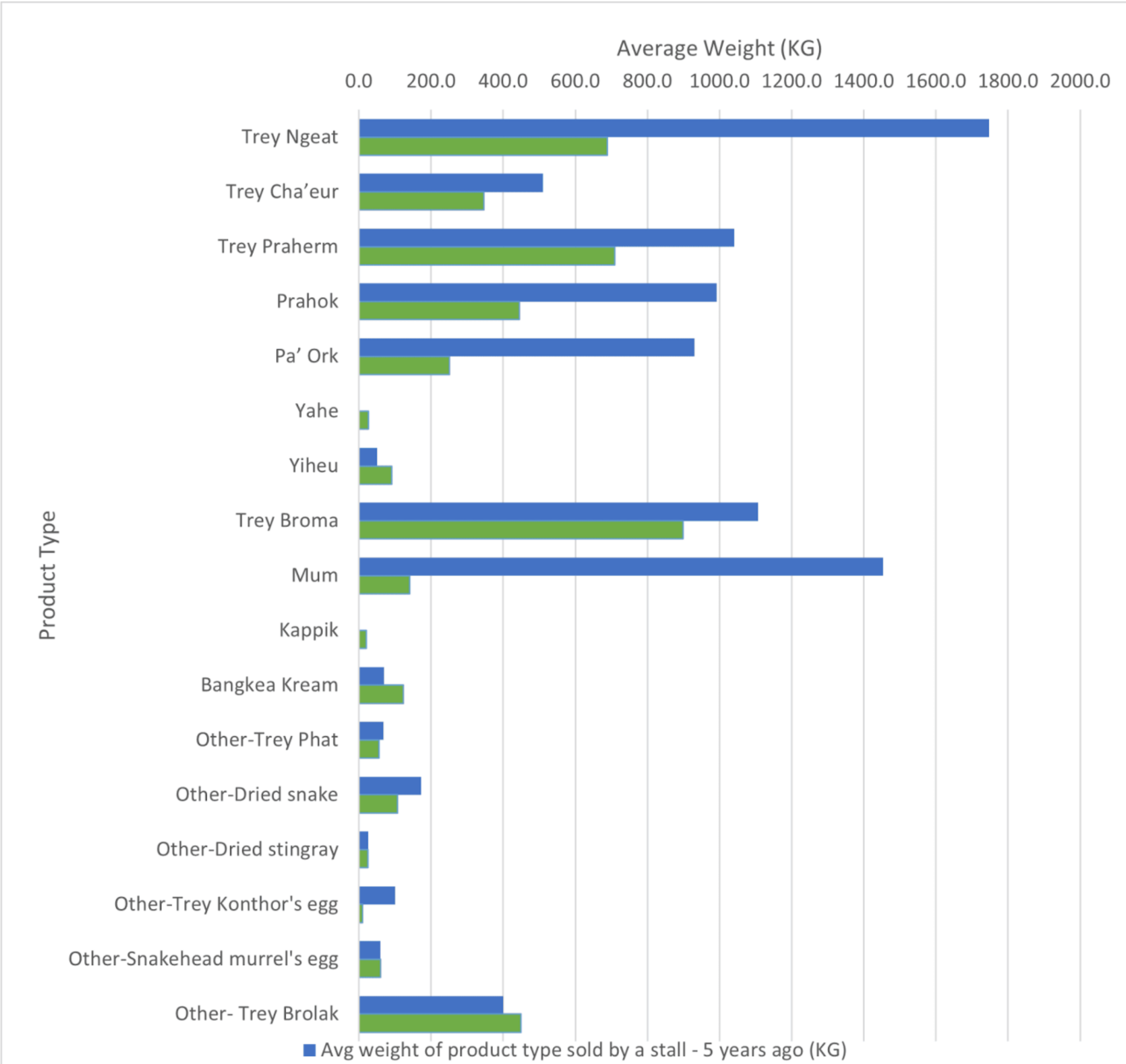
At the Orussey market, as the graph below shows, a relatively high product specialisation can be observed: 23 stalls out of 93 stalls sold only one product and more than half of the stalls sold less than three products. However, 18 stalls traded 5 or more than 5 products and out of these 18, only 6 traded marine products and the rest were trading freshwater products.

Figure 17: Diversity/specialisation of products at Orussey market



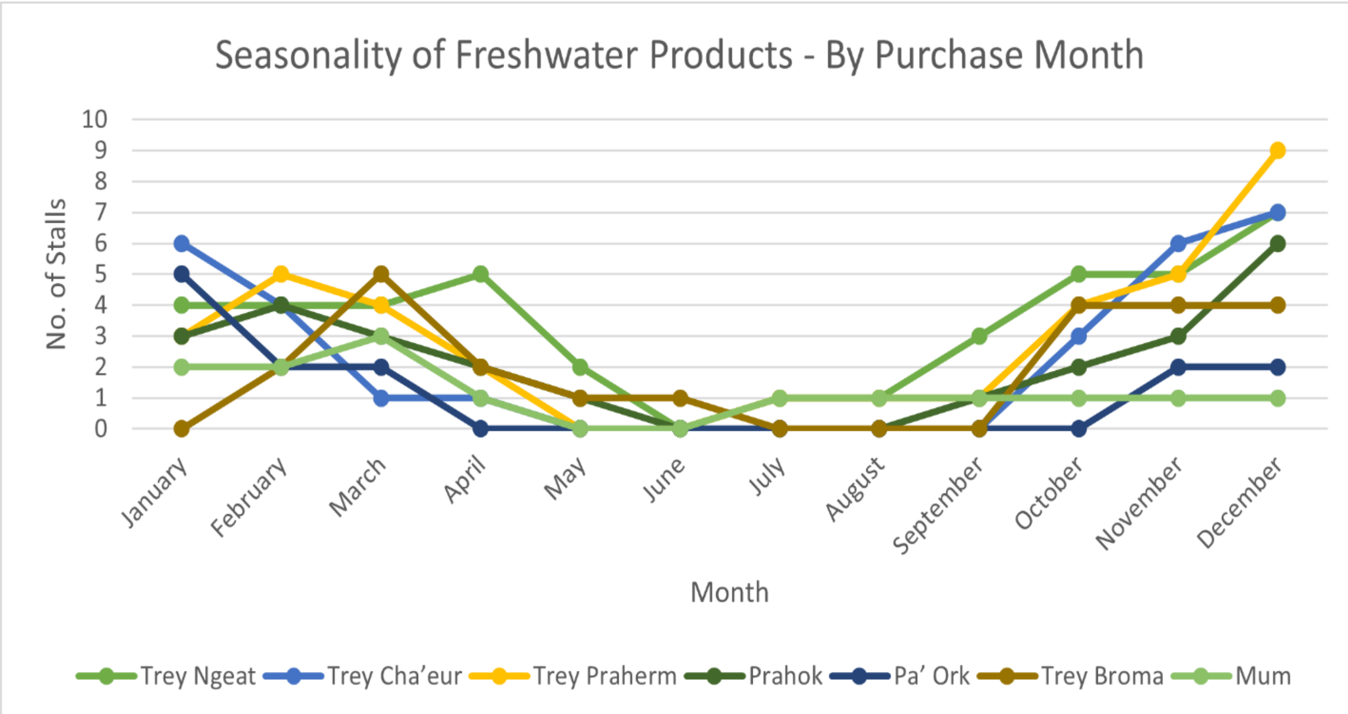
Source: Rapid appraisal of 40 processed fish traders at Orussey, Central and Derm Kor markets in Phnom Penh

Figure 18: Estimated volumes traded at Orussey market- per trader, per year



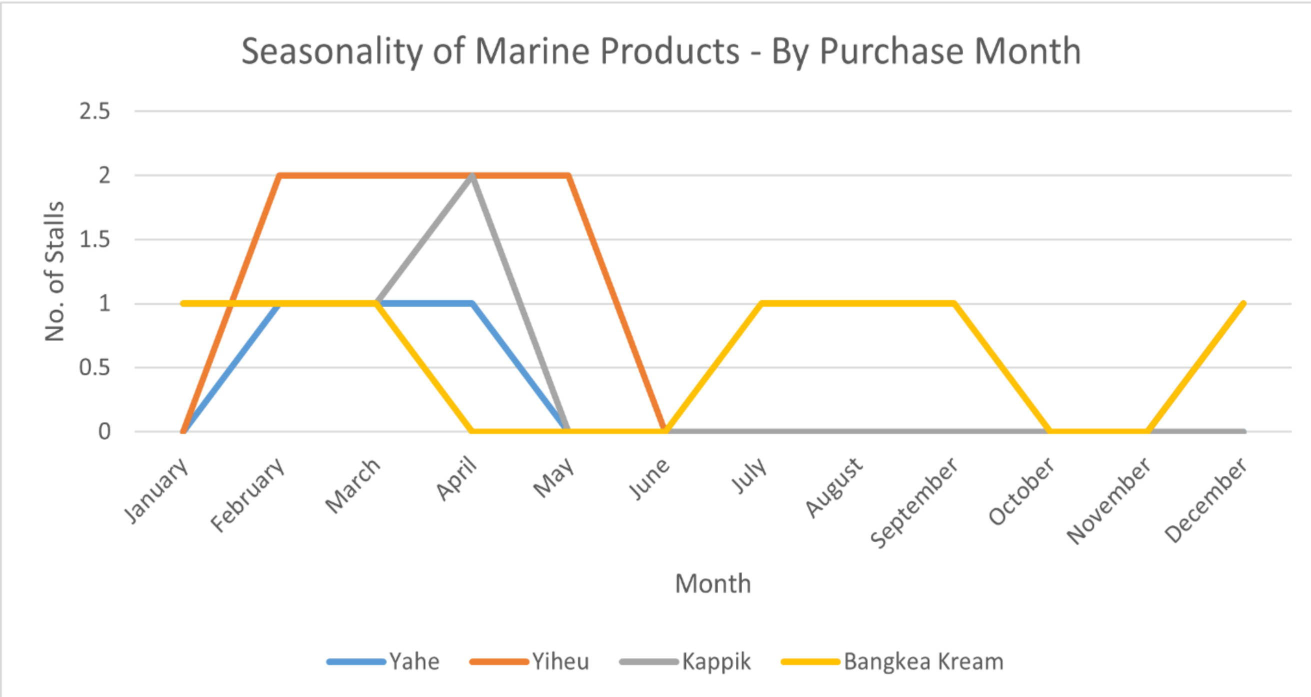
Source: Rapid appraisal of 40 traders at Orussey, Central and Derm Kor markets in Phnom Penh

Figure 19: Seasonality of freshwater products-by purchase month



Source: Rapid appraisal of 40 traders at Orussey, Central and Derm Kor markets in Phnom Penh

Figure 20: Seasonality of marine products by month of purchase



Source: Rapid appraisal of 40 traders at Orussey, Central and Derm Kor markets in Phnom Penh

3.1.2 Demand and seasonality in sales of processed products

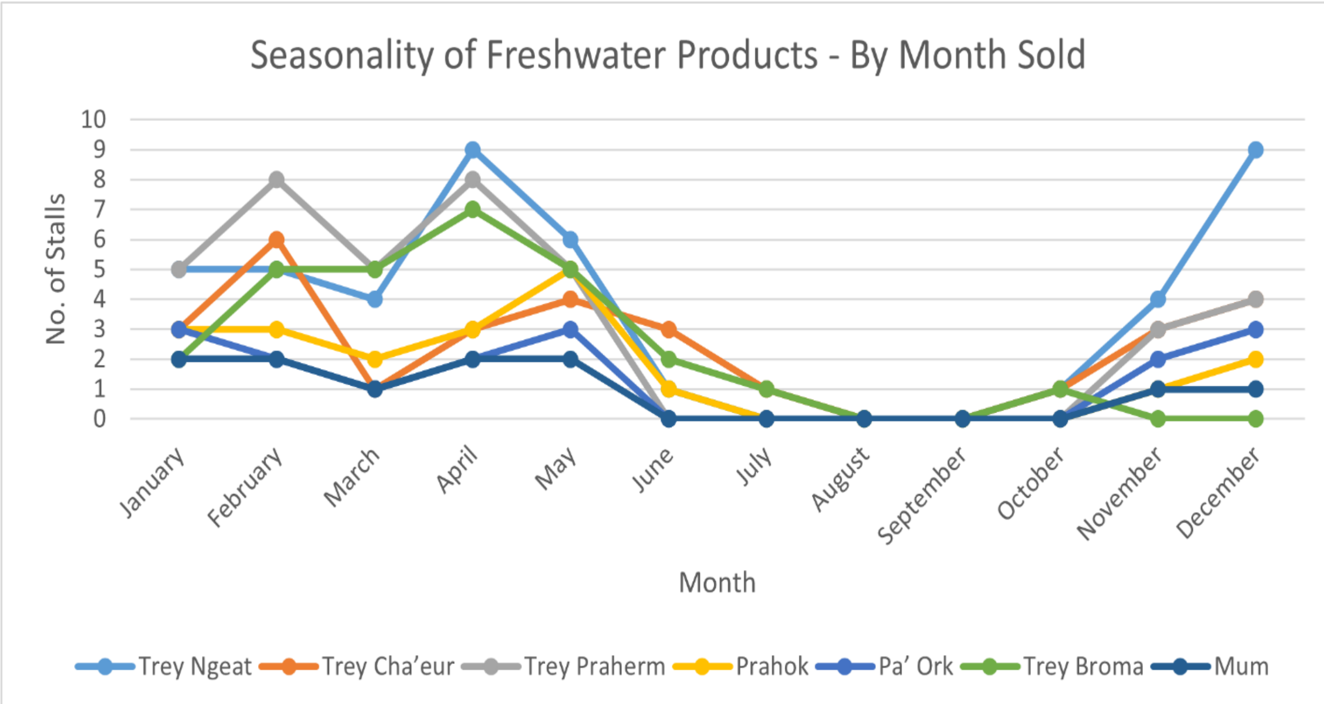
There are differences between the peak season for selling at the Orussey market and the peak season for selling in the provincial and district markets outside the capital, Phnom Penh. As the graph below shows, the peak selling months at Orussey are December, February, and April, with sales declining from July to November. However, in the provincial and district markets, the peak selling months were reported as May to July/August. Traders in the district and provincial markets stated that the peak season results from increased demand for processed/dried fish during the dry season, when the fresh fish supply is at its lowest.

The difference in peak seasonality between city markets, such as Orussey, and provincial and district markets could perhaps be explained by the fact that to meet increased demand from May to August, traders in the district and provincial markets stock up by purchasing their products from main city markets such as Orussey before May.

Further, all the traders at the district and provincial markets stated that they trade higher volumes during the Chinese New Year in January and during the traditional Khmer New Year in April. These trends hint at the cultural food preferences among the Cambodians, for processed fish products, especially linked to traditional festivals. An interesting research question to be explored linked to this preference in Cambodia would be the role played by processed fish products in traditional festivals, whether there are any changes in this preference of processed fish products during such festivals and whether there are any within-group differences in food preferences observed above (For example, differences within rural and urban people, generational differences etc.).

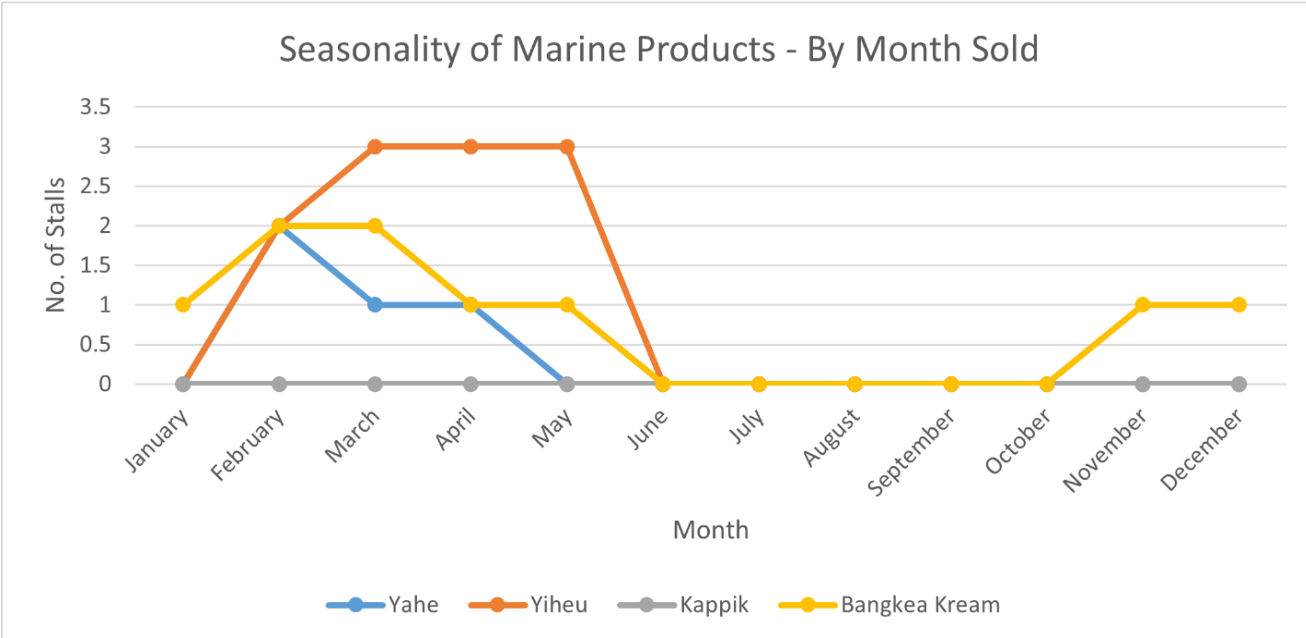
Most of the district and provincial traders also attributed this increased demand to migrant workers (to the urban areas and across the borders such as Thailand) who were returning home for the holidays. They were seen to purchase the products for consumption with family during holidays and purchasing these processed products to take with them when they migrate for work following holidays.

Figure 21: Seasonality of freshwater products by months sold



Source: Rapid appraisal of 40 traders at Orussey, Central and Derm Kor markets in Phnom Penh

Figure 22: Seasonality of marine products by months sold



Source: Rapid appraisal of 40 traders at Orussey, Central and Derm Kor markets in Phnom Penh

In terms of change in demand or volume of products sold, all the traders, irrespective of the market location or type, stated a decline over the last five years. The graph (Figure 23), based on the rapid survey results show a clear decrease in sales of all the main processed fish products, and especially those of dried fish (trey ngeat) and fermented fish (mum and pa ork). However, this result itself may not mean that the overall consumption patterns may have changed in Cambodia. One of the reasons for this decline could be more processed products moving or being traded within the provincial and district markets, without making their way to Orussey or Phnom Penh markets.

With connectivity infrastructure improving in Cambodia, including in certain rural areas, the trade links within the provinces and districts may have strengthened, reducing the need to trade products through middlepersons and traders in Phnom Penh. However, most of the main processing sites of freshwater products in Cambodia continue to take place on and around floating villages, and these areas still remain very poor in connectivity infrastructure; during the flooding season, the roads still go completely underwater. Further, with some of the dwellers on floating villages, especially in Pursat and Kampong Chhnang provinces being relocated onto 'land', based on a decision by the government of Cambodia, connectivity infrastructure (and other basic services such as drinking water) had deteriorated even further. The level of influence of connectivity infrastructure in processed fish-based product trade in Cambodia was not studied in any detail within the scoping phase of this research. Potential link between connectivity infrastructure and transport, and processed fish trade remains a research gap in Cambodia

3.1.3 Migration for work and demand for processed fish products

Further, qualitative data collected from traders and processors across the Tonlé Sap and in the coastal provinces highlight an observation of a decreasing trend in demand for processed fish products-both fresh water and marine. Traders in both regions highlighted the out-migration of youth, both men and women- to urban areas and to countries such as Thailand, for work on construction or in the apparel sector, to be triggering this drop in overall demand, as family sizes have shrunk noticeably. This trend was most obvious in the islands off the coastal regions of Cambodia.

> *'Youth after getting married, migrate to Thailand to sell their labour. So, this area is very silent now.' (BT WS 01)*

> *(Compared to 10 years ago) Not many consumers now. Everyone had migrated to Korea, Thailand as factory workers. So not many consumers buy from me. Fish catch is also low now, so the price is higher. I can make only a small profit from my sales now. (KC WS 02)*

The scoping phase research could not conduct any data collection targeting these groups that had migrated from the rural areas into Phnom Penh and surrounding areas of the city. Discussions with traders within Phnom Penh markets revealed a group of mobile sellers, who purchase processed fish products from the main markets or the processing units in Phnom Penh and supply street food vendors that provide meals for those migrant workers who work in the apparel factories in and around Phnom Penh, as the extract below illustrates.

> *I am also a retailer; I go by motor bike near to the airport and sell dried fish there. That area has a lot of garment factories…I sell to the eateries where the garment factory workers eat, these are my main customers, the workers also buy from me. (PP PR 01)*

The literature review conducted for DFM Cambodia highlighted a few studies that focus on nutrition intake levels of these apparel sector workers, as experimental research, focusing on the provision of ‘Low-Price Model Lunch sets’ (Makurat et al. 2017, Makurat et al, 2019). However, these studies only focus on the intake levels of different nutrients, and do not capture any of the trade, consumption preferences or purchasing patterns of traditional processed fish-based products and these migrant workers. Studies that focus on the linkages between (gendered/intersectional) trends of migration for work and change in demand and consumption patterns of traditional processed fish products remain a gap in Cambodia.

3.1.4 Tourism, diaspora and processed fish products

Processed fish trade has linkages with tourism- both local and international. The section above on market organisation highlighted the important demand trends from tourists that visit, in creating ‘roadside selling’ clusters. These tourists or travellers were both Cambodians and people from outside the country.

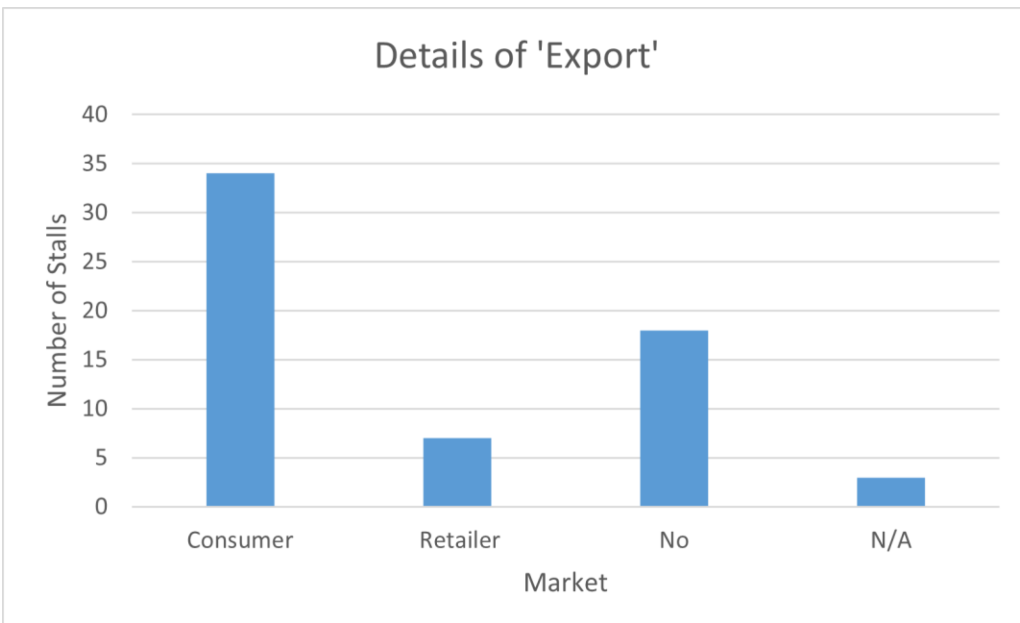
> *“Foreigners come to visit this area, they buy my products and if they like the taste, they call me and order more and I transport it. Foreigners who come to visit the islands are brought here also, after visiting the other islands.” (KK PR 04)*

Another important consumer category highlighted by traders especially in the city markets, the provincial markets, and the ‘roadside’ selling clusters were Cambodians living abroad who are visiting their relatives in Cambodia (also called diaspora) and friends and family of those diaspora, as the extracts below illustrate.

> *“Sometimes relatives living in Battambang of those who live in the USA or other countries come and buy Smoked Kes, Broma and Trey Praham and take it to the US.” (BT WS 01)*

The rapid survey results show that these members of the diaspora are an important customer base, as the bulk of the ‘export’ that they reported to the survey team, was actually comprising this segment, who purchase primarily for their own consumption or to be used in specialty restaurants of Cambodian food abroad.

Figure 23: Details of products being sold outside the country



Source: Rapid appraisal of 40 traders at Orussey, Central and Derm Kor markets in Phnom Penh

While markets such as those located in Siem Reap and Phnom Penh seem to continue to experience relatively steady demand for their products from foreign travellers, the scoping phase highlighted a markedly decreased demand from such travellers in the coastal areas of Cambodia. The excerpt below from a trader in the Koh Kong market illustrates the changing tourism trends in the coastal areas, with new ‘developments’ coming into the area, and as a result the changing nature of demand for their processed products. Therefore, any intervention that targets marketing these products to foreign travellers, who are in general seen as with high spending segments (for good quality products), should pay attention to these changing trends.

> *“Seven years ago, many foreigners used to visit the natural parks here in Koh Kong, but now there are only Chinese tourists coming here. They are not interested in buying these marine products. Not many Khmer people also come to visit this area now. Some tourists are still coming to the Tatai area, but that is a bit far from here and it is a hilly area. A casino is opened in the national park, so foreigners are only going to the islands, instead of coming here.” (KK RT 02)*

3.1.5 Changing consumer demand and potential linkages with food safety and health

The scoping phase research clearly established food safety related concerns from all the actors along the value chain of processed products, including consumers. However, a clear trend was also to point the blame at another actor along the value chain, rather than admitting to compromising food safety in any way, by themselves. These concerns of food safety were expressed mostly when questioned about personal or family food preferences. Quality checks of products by government authorities, even at the bigger city markets, did not seem periodic or systematic, with most traders mentioning that there is an annual inspection by trade related authorities. However, instances of fines or any violations of food quality standards were not mentioned by any of the value chain actors.

In certain cases, especially in the preparation of trey ngear, kappik and pa ork, the use of food colouring was mentioned by the processors and traders. They explained that these are not harmful for consumers in anyway, and in most cases, the colouring was used because of specific requests by middlepersons buyers, who communicated the demand preferences of consumers. For example, in Kampong Chhnang, a woman processor and trader explained to us how she prepares one batch of trey neart with food colouring because the order is for a specific middleman who requested it thus, and another batch, without food colouring. The same case was explained to us for *kappik*, as illustrated by the extract below.

> *"Earlier we used to make kappik as natural, without using any food colour and it wasn't mixed with small shrimp. But now retailers want it mixed with colour and small shrimp and salt. So, this Kappik can be kept only for 1 year. Otherwise, it can be kept for 3-4 years. These days it is easy to sell it if it is mixed with colour, but it has bad effects on health. But people want that colour and that taste now." (KK PR 01)*

All the actors in the value chain denied using pesticides or any other chemical agents to extend the shelf life of their products. However, the team encountered cases where a wholesale trader explained that retailers might use such chemicals due to the sub-standard storage conditions and limited retail space available to them. This is illustrated by an excerpt from a wholesale dealer at the Orussey market. Similarly, a woman processor the team met in Phnom Penh, who had traveled from Takeo to purchase small fish for prahok processing, explained that a particular *prahok* processing factory in her area uses these chemicals, leading to skin diseases among its workers due to continued exposure. This processor grew very cautious during the conversation, as it was being documented in writing, and she refused to continue discussing the matter. In a few instances, fishers and aquaculture farmers were also alleged by processors to be using pesticides to catch and kill fish.

> *"Checkers from the government checked some other stalls here. If they find any chemicals in the products, they confiscate those products. We don't use*

chemicals and pesticides in this market. We keep our products in these bottles, but in the smaller markets the products are kept in buckets and there are lots of flies. So, in order to keep the flies away they use chemicals." (PP WS 01)

A youth group the team met mentioned their concerns about food safety and hygiene concerns in relation to processed products, which they explained was shaping their food preferences. However, a detailed survey on consumer perceptions and experiences of food safety and production/processing hygiene conditions, of different segments of consumers (urban/rural, local/diaspora, younger/older) were beyond the scope of this phase of the research and remains a gap. Consumer perceptions and experiences of food safety, and hygienic processing and trading related conditions of processed fish remain a research gap in Cambodia. Understanding these trends will inform policy on food safety and quality assurance and certification processes, which will be prerequisites for expanding processed product markets, especially into higher value products.

3.1.6 Trade routes for processed fish

As per primary data collected for this scoping study, the movement of processed products in Cambodia takes place at different levels: a) within the community, b) within the district, c) within the province, d) across districts and provinces and f) across national borders. The two figures below are derived from primary data collected from the scoping phase and they do not include sourcing and selling routes within the provinces and districts.

At a very micro level, data collection during the scoping phase identified processors who were 'trading' their products within their own communities, specifically in the floating village where they reside. Most processors and traders, however, were selling their products to middlepersons or *mooi* from outside the province, or to those based in district or provincial markets. Generally, trading products via middlepersons to Phnom Penh was common, though there was also some trade with other fish or processed fish-producing provinces like Siem Reap and Battambang, albeit to a lesser extent. Minimal trade occurred with non-fish-producing provinces such as Takeo and Prey Veng from the provincial and district markets. Trade between provincial and district markets around Tonlé Sap, which produce inland water products, and coastal provinces producing marine products was also minimal. These trade routes appear to be dominated by Phnom Penh markets, as indicated in figure 27. Cross-border trade directly from the provinces was uncommon, except in Battambang, where medium to large-scale producers reported some trade with Thailand.Phnom Penh markets, especially Orussey, emerge clearly as a hub for processed fish product trade in Cambodia, based on trade route mapping of district and provincial traders and the rapid survey data of Orussey and Derm Kor markets. Products were coming to these Phnom Penh markets from both the freshwater regions around the Tonlé Sap as well as the coastal regions and in turn, products were flowing from these markets out to all these regions. Orussey market also acts as a gateway between freshwater regions and products, and coastal regions and marine products, as products pass through the market, probably based on its geographic location and established transport and logistics networks.

As explained above, Cambodians living abroad, or those visiting their relatives living abroad and to a lesser extent foreign visitors, also formed an important customer base for these products from the Phnom Penh markets. Another trade route extends to Vietnam and Thailand, primarily via middlepersons, both Cambodian and non-Cambodians. This trade route, as explained in box 3 remains one of the least studied and therefore a research gap, with potentially important policy and practice implications.

Samaki market in Kampot represents an important regional hub for the trade of processed fish products. Comprising approximately 25–28 stalls, the market channels products from multiple sources, including Phnom Penh, Koh Kong, other parts of Kampot province, and neighbouring countries such as Vietnam and Thailand.

The market functions not only as a receiving point for marine and freshwater processed fish products, but also as a redistribution centre connecting regional and national trade networks. Marine processed fish products are traded onward to markets such as

Orussey Market in Phnom Penh, while freshwater fish products are circulated primarily within the region through trade linkages connected to Phnom Penh. As a result, Psar Samaki demonstrates a dynamic flow of products moving both into and out of the market, creating complex value-chain and market-chain linkages across local, regional, and transboundary scales.

Map 4: Processed fish selling sources by processors and traders in the provincial and district markets

Source: Primary data, semi structured interviews with processors

Map 5: Processed fish buying routes (green) and selling routes (blue) by traders at the Orussey market

Source: Rapid appraisal of 40 traders at Orussey, Central and Derm Kor markets in Phnom Penh (Trade with Vietnam is only for dried snake, as per rapid appraisal)

3.1.7 Export of processed fish products and reflections on cross-border fish trade in Poipet

Field observations in Poipet highlighted the complex and highly informal nature of cross-border fish trade between Cambodia and Thailand. Following directions from a passerby, a large compound functioning as a probable transit and distribution point for fish products was visited. Although the site initially appeared relatively inactive, closer observation revealed ongoing loading and unloading activities involving both fresh and processed fish products.

At the site, two workers were observed loading very small fresh fish packed in ice into a cart already carrying 25-litre water bottles. The fish had been packed in small plastic shopping bags and placed inside white styrofoam boxes with ice. According to the workers, the fish originated from Kampong Thom and had been sourced through a middleman before being transported across the border to Thailand. During a brief conversation, the workers indicated that “tax” payments had to be made at seven different points along the route. However, they declined to specify the amounts involved. These observations suggest the existence of layered informal payment systems embedded within the cross-border trade process.

The compound also contained a large uncovered pile of Prah fish placed directly on the ground near a pickup truck, with several individuals moving around the area. Informants indicated that this fish consisted of farmed fish imported from Thailand. The contrast between the export of small wild-caught fish from Cambodia and the import of larger farmed fish from Thailand points toward differentiated market demands and trade flows operating across the border.

A subsequent visit to the same location later in the morning revealed more intensive logistical activity. At the rear of the compound, approximately three container-style trucks carrying metal storage boxes filled with fish were being unloaded by a large workforce of roughly 20–30 workers. Most workers wore rubber boots, while some appeared to be in uniform. Nearby, another group of individuals appeared to be overseeing or recording the transactions, suggesting the presence of bookkeeping or coordination functions within the trade operation.

Observations at the formal border crossing further highlighted the intensity of movement between the two countries. Trucks covered with tarpaulin continuously entered the Cambodian side, while large numbers of people queued for passport clearance. On the incoming side, a long line of moto taxis was waiting for passengers, indicating rapid turnover and continuous mobility across the border. Many of those crossing into Cambodia appeared to be women workers, accompanied by a smaller number of men who appeared to be engaged in construction labour.

Further discussions with a tuk-tuk driver near the border crossing provided additional insight into the timing and informal regulation of processed fish trade. According to the driver, processed fish is commonly moved across the border during the morning hours. However, when informal "tax" demands become too high, traders may delay transportation until later in the evening, around 6–7 pm, when border personnel change shifts. This indicates the strategic adaptation of traders to shifting enforcement environments and transaction costs at the border.

These observations point toward the existence of a "fuzzy space" between the two nation states, where formal and informal systems coexist and where traders actively negotiate opportunities and constraints. This aligns with the observations of Kusakabe et al. (2008), who describe how border spaces create "room to manoeuvre" for men and women engaged in cross-border fish trade.

The field visit ultimately reinforced the methodological challenges associated with documenting volumes and flows of processed fish across the Cambodia–Thailand border. Given the highly informal and adaptive nature of the trade, reliable data collection would require a carefully designed and sustained strategy similar to the approaches adopted in earlier cross-border fisheries trade studies.

Photo 13: Dried fish packed in bags in Poipet

3.1.8 Selling prices of processed products

The following table summarises the buying and selling (by retail and wholesale) prices of processed products, across the country. There are large variations in prices, which are largely attributed to the quality (size and freshness of fresh fish used) and source of fresh fish, i.e.: wild caught fish vs. cultured fish. Certain products such as the smoked big Kes fish was primarily targeted for Cambodians living abroad or tourists.

Table 11: Buying and selling of processed products

Processed product		Buying/kg	Selling/kg		Market	Source
			Wholesale price/	retail price/kg		
Smoked fish						
Kes	Big			65 USD	Chouk market, BT	BT WS 01
Taun		50,000	55,000r	60,000	Chouk market, BT	BT WS 01
Catfish		35,000-40	37,000	40,000	Psar Leu, SR	SR WS 02
Walking cat fish (small)		29,000	30,000	33,000	Chouk market, BT	BT WS 01
Walking cat fish (big)				270,000-280,000	Krakor road side, PU	PU WS 02
Riel and Lingh				2500-4500 per batch	Ponley market, KC	KC WS 02
Fish paste						
Rof Fish paste				12,000	Hawking outside Psar Chhnang, KC	KC RT 01
Trey Riel without bones		9000	10000-11000	10000-11,000	Chouk market, BT	BT WS 01
Trey riel paste			8,000	10,000	Krakor road side, PU	PU WS 02
Trey Riel With bones		6000	7000-8000	7000-8000	Chouk market, BT	BT WS 01
Kampleang		5000-600(	7000-8000	7000-8000	Chouk market, BT	BT WS 01
Kampleang				15,000	Psar Leu, SR	SR WS 02
Rof		5000-600(	7000-8000	7000-8000	Chouk market, BT	BT WS 01
Rof				16,000-20,000	Psar Leu, SR	SR WS 02
Prahoc with bones		12,000		15,000	Psar Leu,KC	KC WS 03
Pa Ork						
Prah Pa Ork				15,000	Hawking outside Psar Chhnang, KC	KC RT 01
Prah Pa Ork				7000-10,000	Krakor road side, PU	PU WS 02
Mum						
Mum (not mixed)				9000-10000	Chouk market, BT	BT WS 01
Mum mixed with Papaya				7,000	Psar Chhnang, KC	KC RT 02
Mum half cooked				20,000	Psar Chhnang, KC	KC RT 03
Trey Ngeart						
Trey Ngeart				25,000r	Poipet market, BM	BM WS 01
Trey Ngeart				30,000-40,000	Ponley market, KC	KC WS 01
Trey Ngeart			35,000	40,000	Krakor road side, PU	PU WS 02
Trey Ngeart				40,000-45,000	Psar Leu, SR	SR WS 02
Chdao Trey Ngeart-without bones			45,000		Psar Nat, BT	BT WS 02
Yahe				20000	Psar Chhnang, KC	KC RT 02
Kappik			4000		Chouk market, BT	BT WS 01
Bangkea Kream-Dried Shrimp						
Big		6000-700(	160,000			KK PR 03
Medium			130,000			KK PR 03
Small			120,000			KK PR 03
Nu 1			75,000			KP PR 02
Nu 2			60,000			KP PR 02
Nu 3			50,000			KP PR 02
Yahe						
Nu 1 quality				30,000		KP PR 01
Medium quality				25,000		KP PR 01

Source: semi-structured interviews

3.2 Traders, trade histories and trade practices

It is often difficult to distinguish between wholesale traders and retail traders, in all types of markets. As per primary data collected during the scoping phase, at the city markets, there were a few traders that engaged in their own processing, at least of some products, however in general, there were less traders engaged in processing at the city markets, compared to the provincial and district markets. Those traders who engaged in processing were sometimes purchasing semi-processed products such as cleaned and salted fish and making mum/mam and pa'ork by mixing the fish with ingredients (ex: fish wholesale trader from the Chouk market).

At district/processing sites level, it is sometimes difficult to distinguish between processors, retailers and wholesalers, as all three of these roles are played by the same person or family unit. As per primary data from the scoping study, 27 respondents out of the total 58 play multiple roles within the processed fish value chain. There was only one respondent who was a fisher and a processor, the rest were all processors/retailers/wholesalers. There were only 3 that played the roles of both retailer and wholesaler. Therefore, there was a higher proportion of those who played the dual role of processor and trader.

In the 'roadside' selling stalls, almost all of the traders were processing at least some of the products that they were trading, and they were wholesale traders as well as retailer. Almost all of them traded with Phonm Penh markets and/or middlepersons trading with Phnom Penh. Further, local and foreign travellers that travel between the main cities and tourist attractions such as Phnom-Penh, Siem Reap and Battambang were also an important segment of the buying segment of these 'roadside' trading clusters.

According to the primary data collected from the Orussey market traders, out of the 40 traders interviewed, 32 of them procure their processed products from processors directly and 14 of them procure the products from middlepersons. However, these categories often overlapped, and traders were procuring from more than one particular source. 26 of them were selling to retailers, in combination with engaging in retail trade by selling to consumers whereas only 3 of the traders were selling exclusively to other wholesalers.

Figure 24: Supplier and buyers

Source: Rapid appraisal of 40 traders at Orussey, Central and Derm Kor markets in Phnom Penh

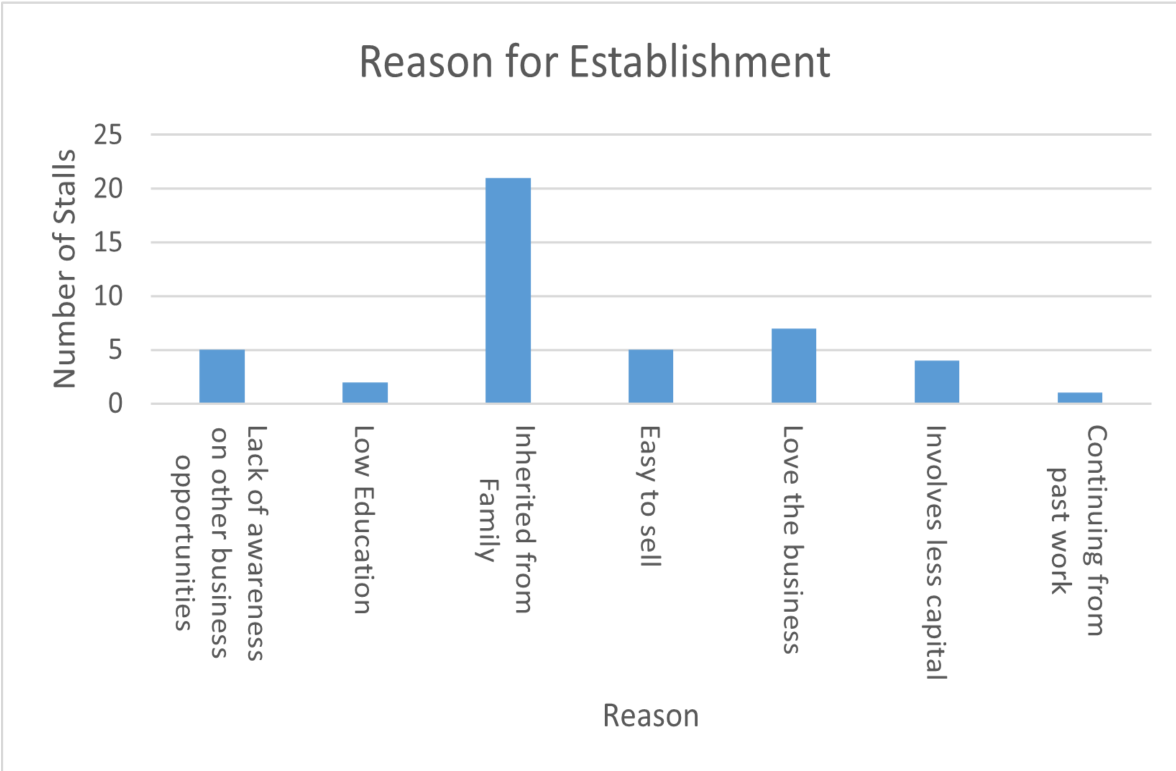
Similar to the trends discussed above, drawing distinctions of processed fish traders into wholesaler and retailer categories was a complex process at the Orussey market. In fact, as the graph above shows, wholesalers in the biggest processed fish market in Cambodia sell to a combination of primarily retailers and consumers; playing the role of both the wholesale traders and the retailers who sell to the consumers at the end of the market chain.

3.2.1 Business and trade history

Those who engage in processed fish trade have at least a general history of trading in their previous generations and more specifically trade of processed fish products or fresh fish. We could assume that the family tradition of processed fish trading is even stronger among wholesale traders of processed fish traders. For example, out of the 40 traders interviewed as part of the rapid appraisal in three Phnom Penh markets, 21 of the traders stated that they are continuing the business from their parents/mother (See figure 25 below). Further, almost half of the 40 traders surveyed indicated that at present, there is family involvement in the business at present, as the figure 31 shows. Others stated requirement of relatively low capital, ease of trade, low levels of education and the ability to stay close to their families, without migrating to work, as reasons for starting up processed fish trading (See figure 26 below).

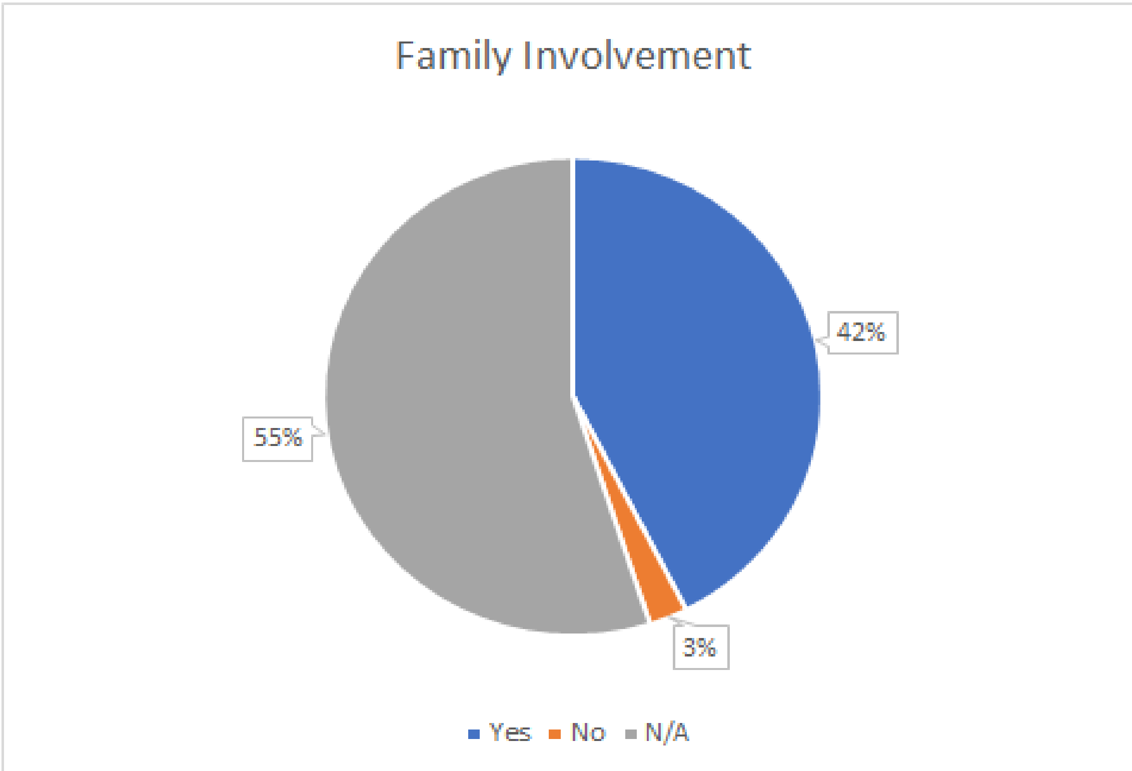
The in-depth discussions with the traders at Orussey market reveal that in most cases, daughters have been helping out their mothers with the trade and they take the trade over, at first under the supervision of the mother and then on their own. Some of these traders were still looking up to their mother for guidance and for business ethics, while some others manage the trade on their ow, even if their mother is present at the stall. In the latter case, the woman trader had a business management degree and had chosen to manage the family trade as this gave her independence.

Figure 25: Reason for establishment



Source: Rapid appraisal of 40 traders at Orussey, Central and Derm Kor markets in Phnom Penh

Figure 26: Family involvement in trade



Source: Rapid appraisal of 40 traders at Orussey, Central and Derm Kor markets in Phnom Penh

There is also a trend of siblings or extended family members being involved in processed fish trade. According to the rapid appraisal survey data, there are seven traders who have other family members owning stalls in the same Phnom Penh markets or other markets in Phnom Penh, among the total of 40 traders. This trend could be a result of siblings following on from their mother/parents in business and starting up their own trade after marriage. We found two such family networks at the Orussey market and two such family networks at the Kampot market.

3.2.2 Who are the processed fish traders in Cambodia?

Processed fish trade in Cambodia shows clear gendered patterns: almost all the trader cum processors the team met outside of Phnom Penh markets were women. For example, out of the 29 traders that the scoping study team conducted semi-structured interviews with, 28 were women. The majority of the traders identified themselves as 'Cambodian/Khmer', however, in certain areas, the general ethnic demographics were reflected in the trader composition of a market too. For example, some of the traders in the markets in the Pursat and Kampong Chhnang identified themselves as Vietnamese. About half of the women traders that were selling processed products at the 'roadside' Prek Pnov market were Muslims. The majority of the traders from the regions interviewed by the scoping study were in the 45-60 age categories, with the highest education level being reported as High School completion and most stating that they studied upto Grade 6 or 7. Most of these traders were born in the place that they live currently or moved a short distance.

The demographic analysis of the Orussey and other Phnom Penh market traders' rapid survey are similar to the trends identified above (see figures 27 & 28).

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Figure 27: Traders at Orussey market based on sex

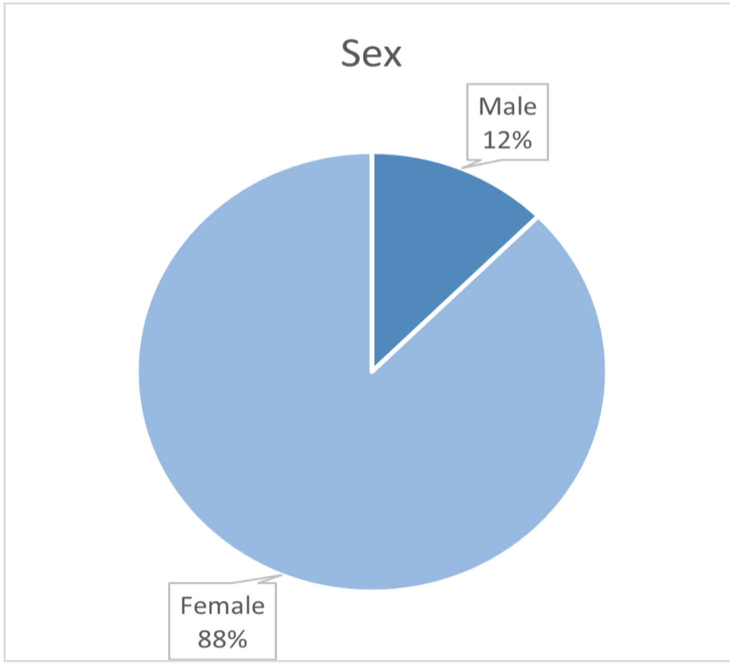


Figure 28: Traders at Orrusey market by age

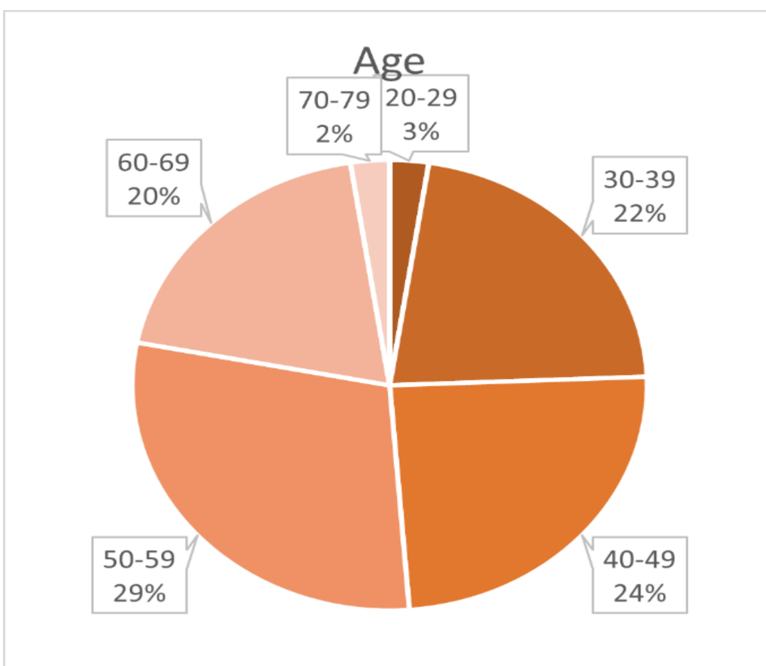
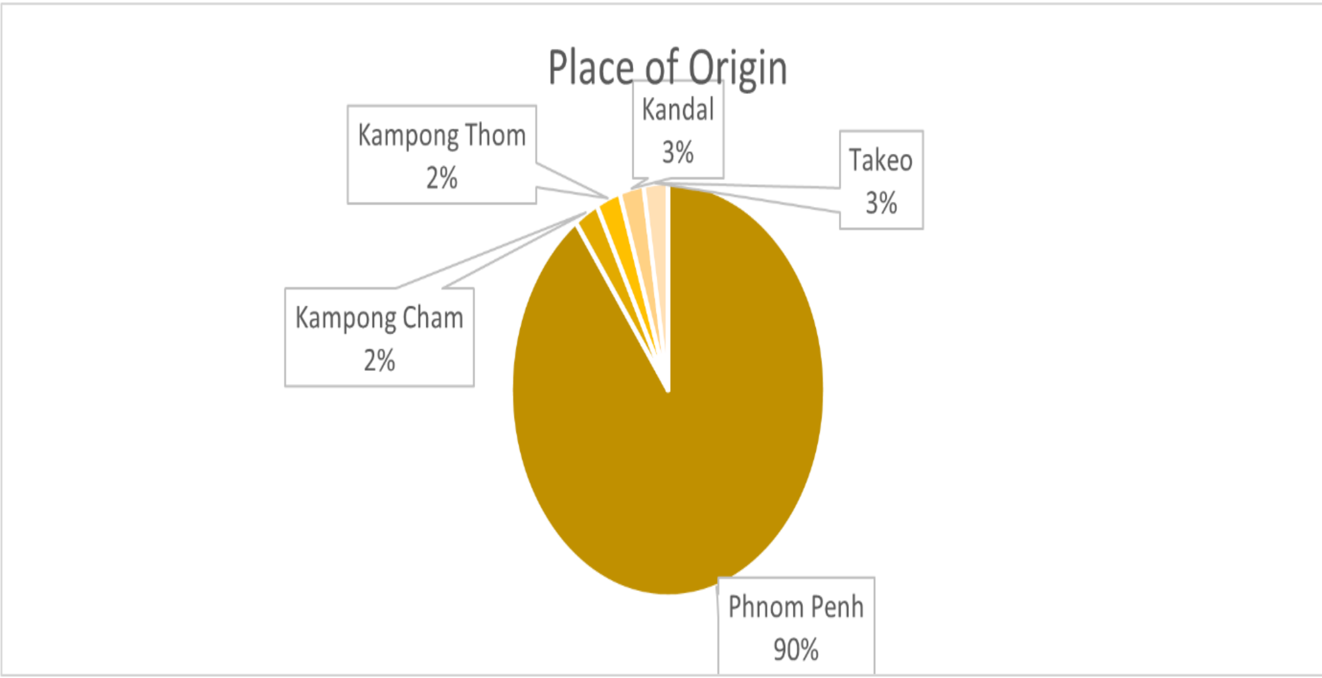


Figure 29: Traders at Orussey market by place of origin



Source: Rapid appraisal of 40 traders at Orussey, Central and Derm Kor markets in Phnom Penh

3.2.3 Middlepersons

There are several middlepersons in the processed fish value chain: middleperson suppliers from within the province, from outside the province, and from other countries, such as Vietnam and Thailand. They supply other middlepersons, including first-level and second-level middlepersons, who in turn supply other provinces, including Phnom Penh markets, as well as middlepersons or traders from other countries like Thailand and Vietnam.

It appears that the role and reach of middlepersons have expanded within the processed fish value chain, which warrants further exploration and analysis in the next phases of DFM Cambodia. The scoping phase of the current study did not include middlepersons in the processed fish market chain, which remains a gap in the published literature as well. The role of the middleperson in the processed fish value chain in Cambodia is relatively under-studied, given the importance of the role within the value chain in ensuring the movement of products.

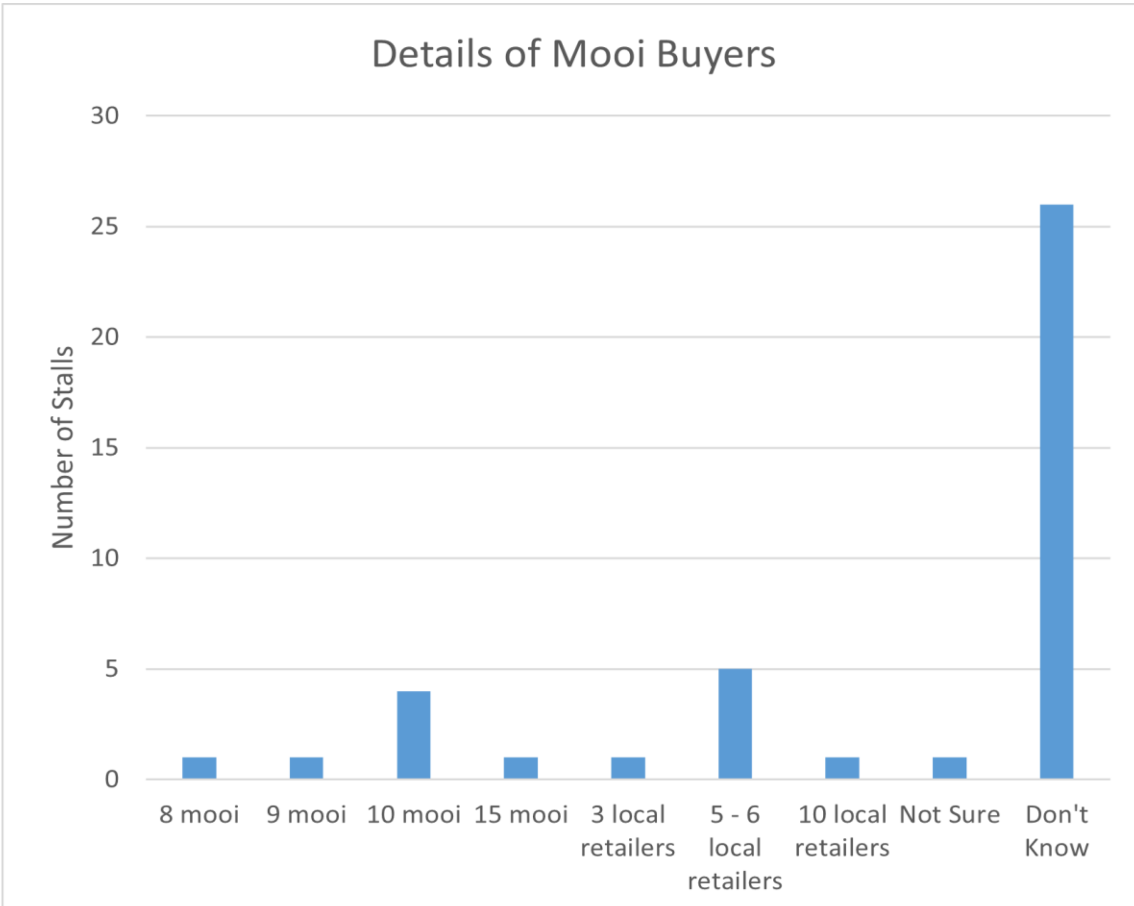
(i) Concept and practice of Mooi

Regular, returning and trusted customers or suppliers are identified by the Khmer term mooi. Some traders stated that their mooi are in fact inter-generational, their mothers traded with the parent of the current mooi as the extract below shows. Mooi could be fishers that supply to processors, middlepersons that supply to or buy from processors, processors that supply to retailers and wholesale traders. The following figures illustrate the traders' interactions with mooi, based on the rapid survey.

> *"Five middlepersons supply prahok to us. They have been working with us for a long time, from their previous generations to this generation." (BT PR 03)*

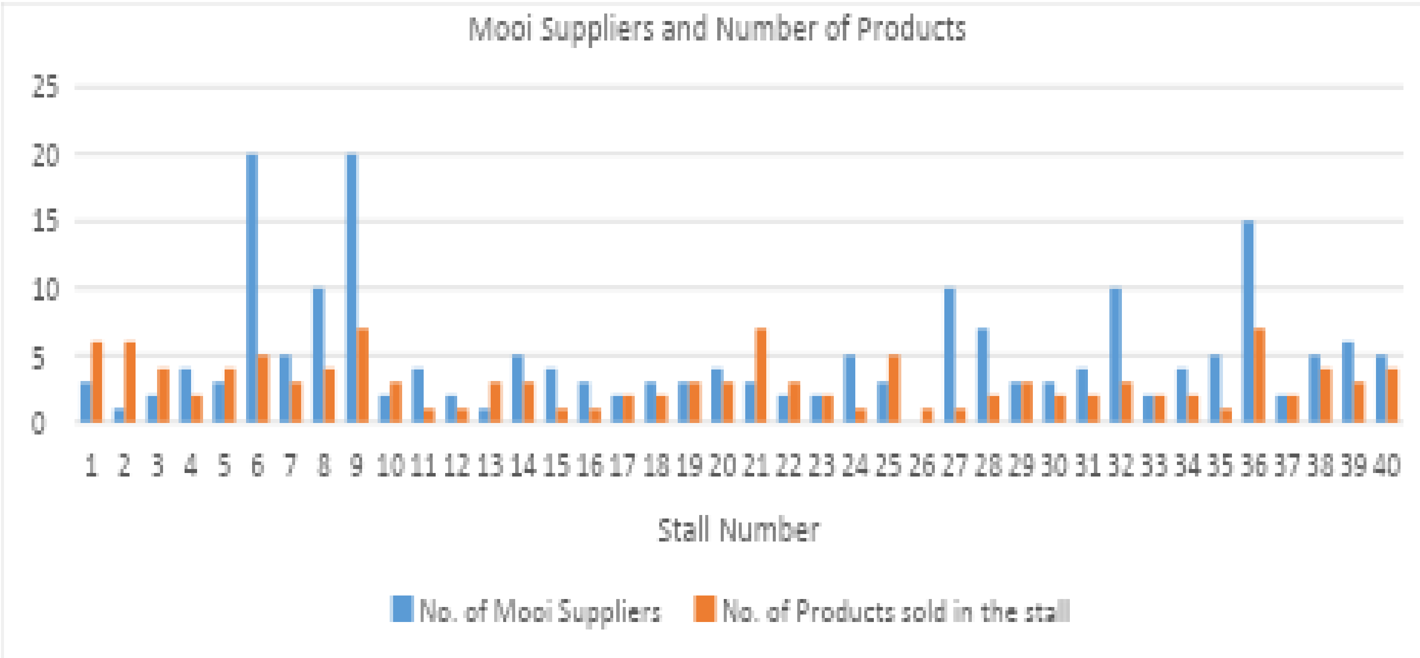
The in-depth discussions with the women wholesale traders at the Orussey market reveal that there is a certain level of social engagement with mooi. Most of these traders stated that they would participate in a social event of their mooi such as a wedding or a funeral, if it is in Phnom Penh and if the event is outside of Phnom Penh, then they would either participate in person, if time permits, or provide cash. The practices and identity of mooi remain an important research gap to be filled within the fish and processed fish value chains in Cambodia

Figure 30: Details of regular buyers



Source: Rapid appraisal of 40 traders at Orussey, Central and Derm Kor markets in Phnom Penh

Figure 31: Regular suppliers and number of products



Source: Rapid appraisal of 40 traders at Orussey, Central and Derm Kor markets in Phnom Penh

4.0 Conclusions & the way forward

The conclusions section begins by focusing on the flows of processed fish and the socio-economic characteristics of fish processors, wholesale traders, and retail traders. The flow of fresh fish, both wild-caught and cultured, from within Cambodia and abroad, destined for processing forms a complex web involving numerous players operating at different scales and from various locations. The literature review highlighted a lack of analysis regarding how processed products flow through markets. To address this gap, this scoping study conducted mapping of product movements at the Orussey market in Phnom Penh and qualitative interviews with traders in regional markets in the provinces around the Tonlé Sap and coastal regions.

As explained earlier, qualitative interviews revealed that the bulk of fresh fish is sold to middlepersons, who supply processors throughout the Tonlé Sap region and coastal communities. This trend was confirmed by processors themselves. Furthermore, clear patterns of product flows through central markets, such as the Orussey market in Phnom Penh and Siem Reap, emerged during this study. Kampot market, for instance, functions as a trade node, supplying processed marine products from coastal regions and purchasing freshwater fish processed products in bulk from areas around the Tonlé Sap. There are potential cross-border trade links between these coastal markets and Thailand, though these connections require further exploration.

The literature review also underscored a lack of quantitative data and estimates regarding product supply and movement through the value chain, both domestically and internationally. Due to time and resource constraints, the scoping team did not aim to quantitatively disaggregate the flows of fish for processing, including estimates of volumes and destinations. However, establishing these flows and understanding the interconnections between value chain segments and their associated actors remains a critical research gap in Cambodia.

Despite the initial intent not to conduct quantitative surveys, the research team conducted a rapid survey at Orussey market, which provided valuable insights into trade volumes, sourcing destinations, and the basic socio-economic characteristics of traders. If similar surveys were conducted in major wholesale markets across the country, a more comprehensive picture of trade volumes, flows, and socio-economic characteristics could be developed. Such surveys are relatively less resource-intensive and likely to encounter less resistance from traders, who are generally hesitant to engage in lengthy surveys. However, these surveys would only capture data from the trading nodes of the value chain, leaving gaps in information on production, processing, and consumption segments.

The volume of fresh fish imported from Thailand and Vietnam for processing in Cambodia, especially given the decline in wild-caught fish, is another area warranting further study. Based on experiences from the scoping phase, establishing these flows of fresh fish (both wild-caught and farmed) requires a consistent presence at landing sites at specific times of the day, over an extended period. Detailed observations would be needed to estimate trade volumes, identify the actors involved in these transactions, and understand their destinations, including exports and price fluctuations. Further research on the concept and role of mooi in the processed fish value chain could provide valuable insights into the vertical linkages within the chain. However, identifying mooi willing to participate as study respondents over a prolonged period will require a strategic approach, leveraging local networks and ‘gatekeepers’ to build trust.

The scoping study also highlights a trend of men and women moving in and out of fish processing, particularly in coastal areas and, to some extent, in inland water regions. Additionally, the majority of processors indicated that they would prefer their children pursue alternative livelihoods, ideally in steady, monthly paid employment. For the current generation of processors, and to a lesser extent traders, fishing and fish processing remain livelihood options that allow men and women to stay close to their families. Alternative work options often involve migration to cities or neighboring countries, which can disrupt family units. Consequently, the movement of men and women into and out of fish processing and trading may directly affect the volume of production and the organization of production units in Cambodia's processed fish industry.

At a broader level, this could signal a shift in Cambodia's processing sector, from predominantly home-based, micro-scale enterprises using traditional methods to medium- to large-scale industrial processing operations. A related trend identified in the literature review is the role that medium- and large-scale processing units play in Cambodia, including their operational models, supply chains, trade routes, and future plans. Any study designed to examine these units should include a strategic approach to address potential issues of mistrust regarding surveys and research into their business practices, particularly with respect to income, sourcing, and sales routes. From a demand perspective, further study of the linkages between (gendered/intersectional) trends of migration for work and change in demand and consumption patterns of traditional processed fish products will provide useful basis for any decisions and interventions regarding value chain strengthening of processed products in Cambodia. Some specific research questions include:

- What is the role of the processing sector in providing livelihoods for vulnerable and very poor groups? (both in terms of food security and income)
- How 'secure' is this livelihood, considering current and future social, economic and ecological conditions?
- Who depends on fish processing for livelihood and why?
- What is the difference in people who are involved in different types of fish processing? Why?
- Who is able to thrive in dried fish livelihoods, if any, and why?
- How do middle persons form business relationships? Who do they reach out to? How do they maintain trust with suppliers and buyers? How do they make buying and selling decisions?
- What are the linkages between (gendered/intersectional) trends of migration for work and change in demand and consumption patterns of traditional processed fish products?

The rest of this conclusions sub-section presents gaps identified through the literature review and the scoping phase analysis.

4.1 Ecological changes and development

The lower availability of fresh fish during the 2019-2020 fishing season was clear during the scoping phase, given the extremely low water levels in the Mekong and Tonlé Sap, impacting volumes of processed fish production and their prices. This trend is attributed in an emerging body of work by ecological scholars to construction of dams in the Upper Mekong area and to changing weather patterns. Fishing communities have clearly noted a drastic decline in their catch, as discussed above. Analysing this trend in the years to come will prove vital to understand the impact of the wide range of natural and anthropogenic phenomenon on livelihoods such as fish processing and food security. Further, there is a need to validate and triangulate Cambodian national level data through multiple sources.

Despite the relative importance of the aquaculture sector in Cambodia and its predicted increase as a proportion of overall fish production, at present, there is no comprehensive data or analysis available for the proportion of aquaculture fish that is used for fish processing in Cambodia. This gap was made apparent during the review of literature. Addressing the gap was beyond the scope of this phase of the research, as it would require specific methods including representative samples of different value chain segments and market analysis of supply routes, volumes etc. Therefore, assessing the proportion of fish from aquaculture being used for drying (for human consumption) remains an important research gap to be addressed in future research.

4.2 Socio cultural aspects: Dried fish as food and culture

The scoping research found some indications of processed fish preferences embedded in and mediated by generational and perhaps urban/rural location differences. These indicative findings should be followed up and built on, to understand within-group differences in food preferences observed above. These might include, for example, differences within rural and urban groups generational cohorts, men and women, etc. Research on preferences should also address the factors that shape them and include attention to transnational influences through the Cambodia diaspora and other channels. . Further, an interesting research question to be explored linked to the traditional preference in Cambodia for processed products would be the role played by processed fish products in traditional festivals, and whether there are any changes in processed fish product preferences during such festivals. Further, while an emerging body of literature documents the value of fish, including small fish in strengthening nutrition especially of vulnerable socio-economic groups, this body of work could be strengthened by focusing on food safety, food quality assurance and use of modern technology for food processing. Some specific research questions include:

- How has knowledge of fish processing changed in recent generations?
- How have preferences for processed fish (e.g.: fish paste or *prahok*) changed over the past few generations? Do younger people also enjoy processed fish? Why or why not?
- How are processed fish viewed – as food during food shortage? As a local delicacy? As a component of local identity?
- What are the within-group differences in food preferences observed above (For example, rural / urban / generational differences)? What foods are seen as alternatives to processed fish products?
- What is the role of processed fish products in traditional festivals (For ex: Khmer New Year)? Is this changing with time?
- How consumption patterns vary by class, region, gender, estimate of relative importance of the small fish across these groups and the full population?
- How can modern technology be used to ensure food safety and quality assurance?

Consumer perceptions and experiences of food safety, and hygienic processing and trading related conditions of processed fish remain a research gap in Cambodia. Related to this, understanding these trends will inform policy on food safety and quality assurance and certification processes, which will be prerequisites for expanding processed product markets, especially into higher value products. Specific questions include:

- How is processed fish viewed by consumers, processors/producers, traders and relevant authorities, from a food safety perspective?

- What are the effects of labelling, quality assurance, food safety standards etc. for processed fish production and market expansion?
- Would increased food safety measures and certification processes introduce processed fish products to new markets? What would these markets look like? How best to tap into these markets?
- What are the technological gaps in fish processing? How can these be enhanced for more inclusive and secure livelihoods development?

The role of kinship networks in processed fish value chains Studying the 'movement of processed products' from processor to consumer in Cambodia and the role of family or social networks in processed fish trade remains an unaddressed research gap in Cambodia.

- How do gendered socialization processes continue to shape young girl and boy children's engagement with fisheries and fish processing?
- What is the role of (gendered/intersectional) kinship and social networks in processed fish value chains?
- When fish processing is scaled up, do such social networks continue to be important? Do the gender dynamics shift?

4.3 Geographical Indication (GI) for Siem Reap Prahok

An important development emerging from the research associated with this report has been the advancement of efforts to establish a Protected Geographical Indication (PGI) for *Siem Reap Prahok* in 2025. More recent research supported by the Dried Fish Matters (DFM) project has further highlighted the significance of prahok from a gender and food culture perspective, demonstrating that its value extends beyond purely economic and nutritional dimensions (Oun and Kusakabe, 2025). Building on these findings, the DFM research team identified the need to strengthen quality assurance mechanisms and improve the communication of product quality to consumers through more recognizable and trusted forms of certification.

Through the knowledge, networks, and value chain insights generated DFM supported research, the DFM Cambodia team agreed that introducing a participatory guarantee system (PGS)[5] would facilitate direct linkages across different actors in the value chain – producers, consumers, distributors, government officers, researchers, and NGOs. However, DFM's partner organization - Cambodian Institute of Research and Rural Development (CIRD) subsequently was able to leverage additional support through a United Nations Industrial Development Organization (UNIDO) funded initiative to establish and register Siem Reap Prahok as a Protected Geographical Indication (PGI) product. Based on historical evidence, market reputation and interest of producers/processors and market operators, Siem Reap Prahok was selected by the Ministry of Commerce of Cambodia as a product to be developed as a Geographical Indication product.

For this purpose, with funding support from UNIDO and EU, CIRD was selected to provide technical and facilitation support to Siem Reap Prahok value chain actors to meet and work together in order to develop a Book of Specifications of Siem Reap Prahok and to form an inter-professional association managing the Siem Reap Prahok GI that was soon after registered as Protected Geographical Indication in Cambodia. The scoping study supported financially by DFM and logistically by CIRD helped to shape a subsequent survey in 2024 by CIRD. These two research initiatives then allowed CIRD's GI experts team to identify key value chain actors of Siem Reap Prahok GI, particularly fish producers and market operators in the provinces around the Tonle Sap. Although the GI is named Siem Reap Prahok, the geographically delimited processing area extends beyond Siem Reap Province to include Prahok processors who utilize fish catches sourced from designated areas across the Tonle Sap Lake

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[5] Participatory Guarantee Systems for Sustainable Local Food Systems, https://openknowledge.fao.org/server/api/core/bitstreams/271c894c-7eb3-45fd-8f7a-e00f17133ac1/content

region. The specific localities included within each province are detailed in the Book of Specifications.

Following the delimitation of the geographical area, relevant value chain actors were mobilized to form a Task Force responsible for coordinating the development and registration of the Siem Reap Prahok GI. The Task Force facilitated a series of consultations, meetings, and workshops to develop the Book of Specifications, draft the statutes governing the GI association, and organize a founding assembly to formally establish the GI management association. Once established, the association proceeded with the submission of the GI registration application and undertook the development of the institutional and management tools necessary for the implementation, governance, and protection of the Siem Reap Prahok GI. In alignment with the findings of this report, the Book of Specification frames prahok not only as a food product, but as part of Cambodia's culinary and historical heritage with connections to the Angkorian period.

Photo 14: Foundation Assembly for Siem Reap Prahok Tonle Sap Conservation Authority (SPTA) – the GI management association (Source: Prek Sereyvath)

The GI initiative demonstrates how context-sensitive research on dried fish value chains can contribute to longer term governance and development interventions that support small-scale processors, strengthen collective action, enhance product quality and food safety standards as well as increasing the visibility as well as viability of traditional food systems. At the same time, the operationalization and implementation of GI systems requires sustained context-sensitive and gender-sensitive research that recognizes the differentiated roles, labour burdens, and market positions of actors across the value chain, particularly women involved in processing and trade. Effective implementation of GI initiatives also depends on long-term investments in institutional strengthening, producer organizations, training, quality assurance, traceability and capacity building toward a gradual self-sustained model. While such implementation-oriented interventions extend beyond the mandate of the Dried Fish Matters project, the knowledge and research generated through DFM can provide an important evidence base for think tanks, government agencies, civil society organizations, and development partners seeking to support inclusive and locally-grounded value chain development initiatives.

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Annexure 1 – List of key informants

Sr No.	Title	Name	Designation	Organisation
1.	Ms.	Yumiko Kura	Former Country Director, Cambodia	World Fish
2.	Dr.	Olivier Joffre	Scientist	World Fish
3.	Dr.	Sarah Freed	Post Doctoral Fellow	World Fish
4.	Mr	Dyna Eam	Researcher	World Fish
5.	Mr	Om Savat	Executive Director	FACT
6.	Ms.	Sothira Seng	Project Management Specialise	USAID
7.	Mr	Sopheap Sreng	Project Design and Gender Specialist	USAID
8.	Mrs.	Hap Navy	Social Development and Gender Specialist	IFReDI
9.	Dr.	Peng Bun Ngor	Fish Community Ecologist	IFReDI
10.	Dr.	Touch Bungthang	Acting Director IFReDI	IFReDI
11.	Mr	Linden Paul	General Manager	Vissot
12.	Mr	Proyuth Ly	Planning, Monitoring and Reporting Specialist	FAO
13.	Mr	Kosal Oum	Assistant FAO Representative (Programme)	FAO
14.	Mr	Nor Vanndy	Director, Department of Economic Statistics	National Institute of Statistics, Ministry of Planning
15.	Mr	Men Sothy	Chief of Agriculture Statistics Office, Department Planning and Statistics	Ministry of Agriculture, Forestry and Fisheries
16.	Mr	Hem Rady	Statistician	Fisheries Administration

Annexure 2 – Semi-structured interview location and respondent details

No	Ref No	Province	Age	Education	Sex	Ethnicity	Type of livelihood	Type of processing	Traded products	Type of fishing
1	PU PR 01	Pursat	53		M	Vietnamese	Processor	Smoked fish	NA	NA
2	PU PR 02	Pursat	Not asked		M	Vietnamese	Processor	Salted dried	NA	NA
3	PU WS 01	Pursat	30	High school completed	F	Khmer	Wholesale and retail trader	NA	Smoked fish	NA
4	PU WS 02	Pursat	35	High school completed	F	Khmer	Processor, wholesale and retail trader	All products	All processed products	NA
5	PU PR 03	Pursat	Not asked		F	Vietnamese	Processor	Salted dried	NA	NA
6	PU PR 04	Pursat	Not asked		M	Vietnamese	Processor	Salted dried	NA	NA
7	PU MM 01	Pursat	Not asked		M	Khmer	Labourer for middleperson	NA	NA	NA
8	KC WS 01	Kampong Chhnang	47		F	Khmer	Wholesale and retail trader	NA	Dried fish	NA
9	KC WS 02	Kampong Chhnang	53		F	Khmer	Processor, wholesale and retail trader and Fresh fish trader	Smoked fish	Smoked fish and Fresh fish	NA
10	KC RT 01	Kampong Chhnang	69		F	Khmer	Processor, retail seller	Fish paste and femermented fish	Fish paste, fermented fish, vegetables	NA

No	Ref No	Province	Age	Education	Sex	Ethnicity	Type of livelihood	Type of processing	Traded products	Type of fishing
11	KC RT 02	Kampong Chhnang	61		F	Vietnamese	Processor, ratailer	Yahe, Mum, Prahoc , Fish Sauce	Yahe, Mum, Prahoc , Fish Sauce	NA
12	KC WS 03	Kampong Chhnang	34		F	Vietnamese	Processor, wholesaler and retailer	Mum	Mum and Prahoc	NA
13	KC FP 01	Kampong Chhnang	41		F	Khmer	Fishing (husband), Aquaculture	NA	NA	Oun (Seine nets)
14	KC PR 01	Kampong Chhnang	74		F	Khmer	Processor	Smoked fish	NA	NA
15	KD PR 01	Kandal	45	Grade 5	F	Khmer	Processor, retailer	Fish paste and fish sauce	Fish paste and fish sauce	NA
16	KD RT 01	Kandal	Didn't want to tell	No schooling	F	Khmer	Processor, retailer	Fish paste, fermented fish and fish sauce	Fish paste and fish sauce	NA
17	KD FP 01	Kandal	23	Grade 7	M	Khmer	Fisherman	NA	NA	Oun (Seine nets)
18	KT WS 01	Kampong Thom	46	Completed high school	F	Khmer	Processor, wholsaler, retailer	All products	Dried fish	NA
19	KT RT 01	Kampong Thom		Grade 11	M	Khmer	Processor, wholsaler, retailer	Dried, smoked fish, dried beef	Dried fish	NA
20	KT PR 01	Kampong Thom	41	Not asked	F	Khmer	Processor, retailer	Dried fish, dried beef	Dried fish	NA

No	Ref No	Province	Age	Education	Sex	Ethnicity	Type of livelihood	Type of processing	Traded products	Type of fishing
21	KT RT 02	Kampong Thom	51	Grade 3	F	Khmer	Processor, retailer	Dried fish	Dried fish, fish paste	NA
22	KT FP 01	Kampong Thom	31	Not asked	F	Khmer	Fisher	NA	NA	Push net
23	SR WS 01	Siem Reap		Grade 6	F	Khmer	Hired worker at wholesale stall	All products	All	NA
24	SR FP 01	Siem Reap	32	Greade 3	F	Khmer	Fisher	NA	NA	Lob
25	SR FP 02	Siem Reap	33	Grade 3	F	Khmer	Fisher wife	NA	NA	Lob
26	BT PR 01	Battambang	32	Not asked	F	DK	Semi processor for export	Semi processing for export to Thai for Prahoc	NA	NA
27	BT PR 02	Battambang	78	No schooling		Khmer	Processor	Smoked fish	Smoked fish	NA
28	SR PR 01	Siem Reap	20, 35	Not asked	F, F	Khmer	Processor	Fish paste	Fish paste	NA
29	SR PR 02	Siem Reap	37	Not asked	F	Khmer	Processor	Fish paste	Fish paste	NA
30	SR FP 03	Siem Reap	45	Grade 5	F	Khmer	Fisher	NA	NA	Lob
31	SR PR 03	Siem Reap	32	Grade 4	F	Khmer	Processor	Fish paste and Smoked fish	Fish paste and smoked fish	NA
32	SR PR 04	Siem Reap	60	Not asked	F	Khmer	Processor	Fish paste and Smoked fish	Fish paste and smoked fish	NA
33	SR WS 02	Siem Reap	38	Grade 9	F	Khmer	Wholesaler and processor	Trey Nearg	Fish paste, Fermented fish, Mum, dried fish, kappik, dried	NA

No	Ref No	Province	Age	Education	Sex	Ethnicity	Type of livelihood	Type of processing	Traded products	Type of fishing
									squid, smoked fish	
34	BM WS 01	Bantey Meanchey	Around 55	Not asked	F	Khmer	Wholesaler and processor	Trey Nearg	Trey Nearg	NA
35	BT PR 03	Battambang	29	Not asked	F	Khmer	Wholesaler and processor	Prahoc, Pa Ork and Mum	Prahoc, Pa Ork and mum	NA
36	BT PR 04	Battambang	Around 50	Not asked	F	Khmer	Wholesaler and processor	Mum and Pa Ork (final stages only)	Prahoc, Pa Ork and mum	
37	BT PR 05	Battambang	Not asked	Not asked	F	Khmer	Worker at Wholesaler	NA	Prahoc	NA
38	BT WS 01	Battambang	Around 35	Grade 7	F	Khmer	Wholesaler and processor	Mum and Pa Ork (final stages only)	All	NA
39	BT WS 02	Battambang	50	Not asked	F	Khmer	Wholesaler and processor	Trey Nearg	Trey Nearg and fresh fish	NA
40	PP PR 01	Kandal	Not asked	Not asked	F	Khmer	Processor and retailer	Trey Nearg	Trey Nearg	NA
41	PP PR 02	Kandal	Not asked	Not asked	M	Khmer	Processor	Trey Haem	Trey Heam	NA
42	PP PR 03	Kandal	32	Not asked	F	Khmer	Processor, retailer	Trey Nearg	Trey Nearg	NA
43	PP PR 04	Kandal	Not asked	Not asked	M	Khmer	Machine operator for preparing fish for Prahoc	Prahoc	NA	NA

No	Ref No	Province	Age	Education	Sex	Ethnicity	Type of livelihood	Type of processing	Traded products	Type of fishing
44	PP PR 05	Kandal	Not asked	Not asked	F	Khmer	Dried marine product wholesaler and retailer	NA	NA	NA
45	PP RT 01	Kandal	Not asked	Not asked	F	Khmer	Processor and retailer	Prahoc, Pa Ork and Mum	Prahoc, Pa Ork and mum	NA
46	PP PR 06	Kandal	55	Not asked	F	Khmer	Processor	Prahoc	NA	NA
47	KK RT 01	Koh Kong	Not asked	Not asked	F	Khmer	Retailer	NA	Marine products	NA
48	KK RT 02	Koh Kong	32	Grade 6	F	Khmer	Retailer	NA	Marine products, bit of Trey Nearg and Swollen fish	NA
49	KK PR 01	Koh Kong	58	Finished High School	M	Khmer	Processor and fisher	Kappik	NA	Sea fishing
50	KK PR 02	Koh Kong	56	No schooling	F	Khmer	Processor	Kappik and Dried Shrimp	NA	Sea fishing
51	KK PR 03	Koh Kong	early 40s	Not asked	F	Not asked	Processor	Dried Shrimp	NA	NA
52	KK PR 04	Koh Kong	39	Grade 3	F	Khmer/Thai	Processor	Dried Shrimp	NA	NA
53	KP RT 01	Kampot	23	Not asked	F	Khmer	Retailer	NA	Marine products	NA
54	KP WS 01	Kampot	early 30s	Not asked	F	Khmer	Wholesaler and processor	Yahe	Marine based products and pepper	NA

No	Ref No	Province	Age	Education	Sex	Ethnicity	Type of livelihood	Type of processing	Traded products	Type of fishing
55	KP RT 02	Kampot	50	Grade 6	F	Khmer	Retailer and processor	Mum, and salted squid	Salted squid, Fermented marine fish, Mum, Prahoc, Pa Ork, salt, Yahe, Kappik, scraped coconut	NA
56	KP PR 01	Kampot	52	Grade 7	F	Not asked	Processor and wholesaler	Yahe	Yahe	NA
57	KP PR 02	Kampot	30s	Not asked	M	Not asked	Processor	Dried shrimp	Dried shrimp	NA
58	KP FP 01	Kampot	38	Not asked	M	Muslim	Fisher	NA	NA	Sea fishing

Annexure 3 – Rapid appraisal question guide

Dried Fish Matters- Cambodia

The primary objective of this survey is to understand the traded volumes of processed fish, number and geographical spread of sources/suppliers, number and geographical spread of buyers, volume traded during peak season- per month, volume traded during low season-per month, volume traded per year.

As a secondary objective, this appraisal will very briefly try to understand the business history, involvement of family and social perceptions about trade.

Demographic details (To be asked at the end of the interview, if it is felt more appropriate, to be recorded and stored separately. Stress confidentiality)

Interview location: Date:

Name (code/pseudonym):

Stall nu/s:

Phone number:

Sex:

Age:

Place of origin. If different from Phnom Penh, when did you move here?

1. **Buy/sell/store**

What are the species/products that you trade? (Note-Observe the stall when filling out the form and ensure all the products currently present in the stall are included. General codes- don’t know-99 and not applicable-88

1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	1.12
Product type	**Traded in past 12 months**	**Peak months for purchase**	**Average quantity procured per month in peak months (kg)**	**Total procured last yr (kg) (2019)**	**Provinces procured**	**Pr. 5 yrs ago**	**Average quantity procured per month in peak months (kg) 5 yrs ago**	**Storage time in your stall/ home (in months)**	**Peak months for selling**	**Average quantity sold per month during high season (kg)**	**Province sold**
	1 Y 2 N	1 – Jan 2 – Feb 3-March 4-April 5-May 6-June 7-July 8-August Etc… 13 = all 12			Seim Reap-1 Battambang-2 Kampong Chhnang- Pursat-4 Kandal-5 Kampot-6 Kamong Som-7 Koh Kong-8	1 Y 2 N			1 – Jan 2 – Feb 3-March 4-April 5-May 6-June 7-July 8-August Etc… 13 = all 12		Same codes as for buying

					Other-specify						
Trey Ngeat											
Trey Cha’eur											
Trey Brolak											
Trey Praherm											
Trey Broma											
prahok											
Pa’ Ork											
Mum											
Yahe											
Kappik											
Yiheu											
Bangke a Kream											
Tuek Trey											

Other-specify											
Other-specify											
Other-specify											
Other-specify											

2. ***Buy*/who does what**

2.1 Is any of the fish you buy imported from abroad? If yes, where?

2.2 What type of suppliers do you usually procure these from (e.g. traders in this market, fish processors, middlepersons etc)?

2.3 How many regular (mooi) suppliers do you have?

2.4 How about 5 years ago? Why has this changed? (Note to enumerators: mooi suppliers are different to mooi buyers, please make the distinction clear to the traders and confirm the response)

3. **Sell/who does what/who gets what**

3.1 Did you sell all the products you bought/procured last year?

3.2 Is any of the fish you sell exported? Give details

3.3 What type of customers do you usually supply fish to (e.g. traders in other wholesale markets, local retailers, consumers etc)?

3.4 How many *mooi/regular* buyers do you have in total?

4. **Make/who does what/who gets what**

4.1 How do you store fish products?

4.2 Do you experience any product losses during storage? Why/how much?

4.3 Do you grade or clean the fish you store?

4.4 Do you use any preservatives?

4.5 How many male workers do you employ (permanent and temporary)?

4.6 How many female workers do you employ at this stall (permanent and temporary)?

4.7 How many workers are family members (if any)?

4.8 Where do your workers originate from?

4.9 How are workers paid (e.g. daily, monthly, piece rate)? How much are they paid?

4.10 Would you categorize your trading business as small, medium or large? Why?

5. Assets/who has what/who does what/what do they do with it

5.1 When did you establish this dried fish trading business?

5.2 Why did you decide to start this business?

5.3 Is the business a family firm? If so, in what capacity are family members involved in the firm?

5.4 In the past, did any other family member have a similar trading business or business related to fishing (ex: your mother, father, mother-in-law etc.)?

5.5 At present, does any other family member have a similar trading business (sister/sister-in-law)? If yes, are they in Orussey?

6. Perceptions of the dried fish sector/wholesale and trader segment

6.1 How do you think people in society generally perceive your profession?

6.2 Would you be happy for your children to carry on this profession?

Annexure 4 - Question guide for in-depth research at Orussey market

Objectives of the in-depth research:

This research activity forms part of the broader DFM Cambodia. The overall objective is to understand the role of 'social relationships/capital' in the processed fish trade in Phnom Penh-mainly Orussey market, through the lived realities of women traders. The focus on women is derived from the previous data collection activities where women seem to dominate the trade activities at the Orussey market. Social relationships in this specific context is understood as 'horizontal and vertical human relations' that these women traders are part of, either directly or indirectly linked to their fish trading activities. This framing may draw parallels with the value chain approach that the overall DFM project follows in that vertical linkages may refer to the linkages/relationships between/among actors along the value chain, such as processors, middlemen/mooi etc. and the horizontal linkages may refer to the linkages/relationships between/among peers such as fellow traders.

However, rather than following all the elements of a product value chain, this activity will only focus on the socio-cultural elements that shape women's trade activities. We are also interested in understanding the inter-generational (matrilineal) linkages of women traders, the 'passing down' of trade knowledge, contacts/networks through generations. Some of the more specific concepts that this activity is interested in exploring are:

- How does the concept, experience and expression of trust between traders and the different actors that they come into contact with shape their trade?
- What is the role of family, both the nucleus family of 'father-mother-child' and the extended family/generations of grand-mother, mother and grand-daughter relationships in shaping processed fish trade?
- How has trade and trader's experience of trade changed across generations?

Notes to research team:

- This research activity builds on the previous data collection activities conducted by DFM Cambodia in the Orussey market. The research team should be familiar with the preliminary findings of these activities. (ex: stall mapping, product diversity mapping)

- This is only a set of guiding questions, further probing is required along 'story lines' that occur during the conversation.
- An iterative research process is preferred, where possible a respondent is approached more than once, based on their availability and interest levels. The research team is to look for such openings as much as possible.
- If it is not possible to cover the broad categories outlined below in one conversation, breaking it up and returning to the same respondent should be attempted.
- As in the case of in-depth research activities, building rapport with the research respondent is the fundamental step in the process. Therefore, if deemed necessary, opening the conversations with casual conversations about topics such as sales these days, could be attempted, which could be followed by a more formal introduction of DFM research in Cambodia.
- Pick one broad topic from the list below and try to go as much in-depth as possible before moving to the next broad topic. The selection of broad topics to start a conversation can vary from respondent and is entirely up to the interviewer to select which topic to start with.
- Take as much detailed notes as possible, verbatim preferred, within the boundaries of the need for translation. Jot down any interesting phrases/expressions/comparisons in Khmer, to be translated later.
- Observe the surroundings and take notes as much as possible; Ex: the way the products are laid out, the interaction of the trader with customers, other traders, workers in the stall etc.
- If possible, try to talk to a first generation trader, in order to get an understanding of the 'social hierarchy' of the way the processed fish stalls are organised at

Orussey and whether this hierarchy has changed over the years and why. This may also be possible with an experienced worker/representative of market commission at the market.

Selection of respondents:

- We primarily target women traders
- We need to interview women from different age categories (grandmother, mother and daughter), and 1^{st} generation and ideally 3^{rd} generation traders

Guiding questions

Note: Further probing is needed

Introduction to research: We are both students trying to understand how processed fish trade is organised. We are interested in processed fish because we thing this is an important part of Cambodian culture and society- that many Cambodians like to eat processed fish such as Prahoc and also because Cambodia is well known for these products such as Prahoc.

Important to stress that the research is trying to understand social relationships linked to trade, focusing on women traders. We are interested in women because our previous work show us that women seem to dominate the trading in general in Cambodia.

We are not interested in personal details/names etc., but more interested in the stories that they have to tell us. We assure confidentiality, none of this information will be shared/reproduced with names or any identity markers attached to them-they will be anonymized.

Pick whichever topic from below, as appropriate.

The core sub-section is the ‘social, psychological and cultural history’ sub-section. If there are time constraints, this sub-section should be prioritized.

Question/s and topics

Name of the community:

District:

Date of interview:

Facilitator:

Note Taker:

Name: Age:

Sex: Marital status: Household size:

Relationship to the Head of the HH:

Main source of livelihood/income at present:

Main source of livelihood/income 10 years ago:

Main source of livelihood/income of your husband:

Main source of livelihood/income of your mother:

Main source of livelihood/income of your grand-mother:

1. Overall wellbeing

1.1 Do you think you are better off, the same or worse off than 10 years ago? Why?

2. Migration History

2.1 Where were you born?

2.2 Where else have you lived?

2.3 Were your parents born here? If not where? Were your grand parents born here? If not where?

2.4 *[For each move,]* When did you move there? Do you recall why you moved there? Did anybody help you or did anybody make things difficult for you? Did life get better or worse for you once you got there?

2.5 Do you plan to stay here or do you plan to move? Why?

3. Occupational History

3.1 Tell me about your working life. When did you start working?

3.2 Why did you start working? When did you start working? What did you do? How and why did this change over time? Did anybody help you or did anybody make things difficult for you?

3.3 Did you use to come to your mothers'/grand mothers' stall? How often? What are your earliest memories of coming to the stall?

3.4 If you are continuing this from your mother/grand-mother, do you remember any advice that they gave you about this trade and for you as a woman engaging in this trade? Do you still seek advice from them?

3.5 *[For every change in livelihood activity]* What did you do? Do you recall how you got the work?

3.6 How did you learn the skills required for the work?

3.7 About how much were you earning?

3.8 Did you earn more as you got more experienced?

3.9 Did life get better or worse for you?

3.10 Why did you leave this work?

3.11 How did this experience help you? Do you think it helped you find work? How?

3.12 Currently, what is your main occupation/main source(s) of income? What was your main occupation/main source(s) of income ten years ago?

3.13 How do you feel about this work? Are you satisfied with it? What are your plans for the business? Do you want to improve/expand it?

3.14 Do you think that your children will enter this trade? Why?

3.15 Do you belong to any economic organizations such as a union or a cooperative? If so, tell me how has this organization helped or hurt you.

4. Social, Psychological and Cultural History

Note: This sub-section is at the core of this research, careful attention should be paid when administering this section and in deciding at which point in the conversation these questions should be asked. If there is a time constraint, then this sub-section should be prioritized above everything else.

4.1 What have been the most important relationships in your life that have helped you along the way? Why? How have they made a difference?

4.2 Let's focus on your family and relatives

4.2.1 Who live in the same house as you?

4.2.2 Do you have any family/close relatives living within 15mins of your house?

4.3 What relationships in your family life have been most important? Why? What kind of help have you gotten along the way? How did this make a difference in your life? What family events may have hindered you? Is there any link between these events/relationships and your economic wellbeing?

4.4 Do you have any family members/relatives trading in this market/ stall owners of this market? Who and where?

4.5 Does your husband help you in anyway with the trading? Does he support you directly? Does he provide you with contacts/networks for trading? Introduce you and the trade to his colleagues? Does he pitch in financially?

4.6 Who looks after your children when you are at the market? Who does the cooking while you are here? How do you manage your household responsibilities and your work here?

4.7 Who would help you:

a) If you needed help around the home if you are in bed with flu/illness
b) If you needed help with heavy household or trade related jobs that you cannot manage alone, e.g. moving stocks
c) If you needed advice about an important change in your life, e.g. changing jobs, moving to another area
d) If you were upset because of problems with your spouse or partner
e) If you were feeling a bit depressed and wanting someone to talk to
f) If you needed someone to look after your children, an elderly or a disabled adult you care
g) If you needed someone to look after your home or possessions when away

4.8 When was your last social gathering? (wedding/funeral/birthday party/New Year celebrations)

4.9 How do you think family, friends or neighbours perceive you as a trader? Do you think being a trader is a suitable occupation for a woman? Why?

4.10 Who do you think is an ideal Cambodian woman? Has this changed over the years do you feel?

4.11 Is there a 'modern version' of *chabap srei* and *sri gráp lakkhaná?* Any modern role models that women and young girls look upto?

4.12 Do you usually take all your meals together as a family?

4.13 How important do you think is family in Cambodian culture in general? Do you think this has changed over the years? Especially with many household members migrating for work outside of their village?

4.14 Do you think that the respect which you receive within your family has increased or decreased over the years? What has led to this?

4.15 Who makes financial decisions about household matters in your household? Who covers the household costs in your household? If more than one household member, what are the rough proportions?

4.16 Do you think that the respect which your family receive from your extended relatives/neighbours/work peers have decreased or increased over the year? Why? How?

4.17 Were there any important household events in the past 10 years? Any family break ups or deaths? Or perhaps weddings or illnesses? *[For each important event:]* How did this affect you?

5. <u>Friends and neighbours</u>

Now we'd like to move outside your home.

5.1 How often do you meet up with your friends and neighbours? What would you do when you meet up? (ex: have a chat, drink tea/coffee together, have a meal etc.).

5.2 What have been the most important relationships with your friends and neighbors and others in the community and beyond the community? Why? Have they helped or hindered improvement in your wellbeing? How have they made a difference, especially in your trade related activities?

6. <u>Work/trade related relationships</u>

Horizontal linkages

6.1 What have been the most important relationships with the people you work with?

6.2 Have any of these relationships been very important?

6.3 How?If you have any other family/relatives trading/working in this market, how do you interact with them? Do they support you in anyway?

6.4 How do you interact with your fellow traders here in the market? Do you share your meals/tea time with them? Do you share price information with them? Your business contacts? With how many traders here would you say that you interact closely? (i.e. on a daily basis

6.5 Would you say that the traders here are willing to help each other or do they mostly go their own way? If they do help each other, in what kids of instances do they help?

6.6 Do you trust your fellow traders in general? In what kinds of instances?

6.7 Would you participate in a family function of your fellow traders? (funeral, wedding etc.)

6.8 Have you visited the houses/families of your fellow traders?

6.9 Has there been any instances in the past where the traders in this market have got together for a community cause? (ex: religious purpose, common service/good etc.)

Vertical linkages

6.10 How many *mooi* buyers do you have at this point of time? For how long have you been trading with them? How did you first get in touch with them? How do you interact with them? (place orders, make payments, change orders etc.

6.11 What kind of person do you think is a good *mooi*?

6.12 Do you have *mooi* buyers/suppliers or their family members/next generation that have traded with your mother/grand-mother? How has this relationship changed over years?

6.13 Do you trust your *mooi* buyers and suppliers? Do you extend credit to them? Do they usually pay back? Do you trust that if you have made a miscalculation and paid them more, that they will give you the extra money back? Do you trust that they supply good quality products to you?

6.14 Would you participate in any family functions of your mooi? (ex: wedding/funeral etc.)

Overall

6.15 Are there any other relationships that have had an impact on your life?

6.16 If you think back over your life, what experiences have brought the most meaning to your life?

6.17 Do you feel confident in yourself? Has your confidence grown over the years? How and why?

6.18 Do you think of yourself as belonging to a certain community or group of people? Is belonging to this group important to you? Do you think this group helps or hinders your access to economic opportunities? How? Has the importance of this group to you changed over time?

6.19 Has the presence of conflict in the community affected any of the important relationships in your life – either in your household, among friends and relatives, at work, in the groups that you belong to, or in the wider community? If so, how and why?

6.20 Finally, do you have any political connections? [Only ask these questions if you think it is appropriate]. In the past 10 years, have you as an individual or your social group (define what the group is) ever tried to get help with a personal matter from a politician or a government official? What was their response?

7. <u>Education</u>

7.1 Upto which grade did you study? Did you have plans for continuing your studies?

7.2 What have been the most important learning and educational opportunities in your life? This might include learning on the job, training that you received or something such as an informal apprenticeship or guidance from someone. Or it could be formal schooling.

7.3 How did this impact your wellbeing?

7.4 Economic History?

7.5 Now what is the first big thing that you purchased or was perhaps given to you? How did this make a difference in your life?

7.6 What are the other important purchases or assets that you or another member of your household have bought or invested in during your life? This might be land, a business, or a house, or it could simply be setting aside savings for your children's weddings or inheritance. *[For each major asset in recent years]*

7.7 Do you recall when this was acquired? Why did you purchase it? How did it make a difference in your life?

8. **<u>What/who made this possible?</u>**

8.1 If you think back, would you say that you've been able to gradually acquire more and more wealth *[or assets]* over your life, or that there have been ups and downs? Why? What caused this to happen? Did particular individuals or events make a difference? What has been the timing of the changes?

8.2 Do you save? Why? Why not? What is the form of your savings? Would you mind discussing a little bit about your financial savings and investments in the past 10 years? *[If relevant,]* Who do you turn to for information on managing funds? Are there any services you turn to for information and advice on managing these assets? How have these assets performed over the last 10 years? What are your expectations for your savings and investments in the future?

8.3 When you think back on your working life and what you have accumulated, can you think of any government policies or programs that may have been helpful or gotten in the way?

8.4 Do you feel prepared financially if something bad should happen to the family which may require substantial funds? How will you cope? What would help you cope better?