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"Evaluating and developing a market-driven value chain that provides high quality fresh fish products for the local Market in Antigua and Barbuda."

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ABSTRACT

The domestic seafood supply chain in Antigua and Barbuda has being a vital source of viable protein intake for decades and has rewarded its actors with satisfactory level of profitability. But in recent years this profitability has dwindle severely and adversely affect the livelihood of many fishers. Therefore, the main objective of this project is to critically evaluate the current supply chain and assess the feasibility of adopting a more market driven value chain to combat the current ills experienced. While some fishers experience relative prosperity, others are suffering from low revenue, post-harvest losses and bottleneck of their products on the market.

Questionnaires were utilized to extract primary data from the various players in the supply chain to identify the root causes of the challenge experienced by fishers. The survey highlighted failure of transmission of market signals from attractive consumer segments as a possible explanation for these challenges. It also indicated the possibility for domestic fishers and processors to secure competitive advantage and maximise profits through value adding and higher processing activities such as fillets, cutlets, slicing, smoking and salting. The also identified snapper and groupers as most ideal species to implement these value added initiatives as possess the highest level from a basket other demersal species. The financial prerequisites to establish a market driven value is also present throughout the various marketing segments. This paper also prescribe applicable recommendation from successful example of value added initiative implemented in both develop and developing countries.

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1 Introduction

The Fisheries Industry is vital source of livelihood for thousands of Antiguans and Barbadian whether directly as a fisher or indirectly in the processing industries. A value chain and market structure investigation aimed at providing feasible recommendations will provide greater description of social and economic benefits for the twin island state is needed. The fisheries sector in Antigua and Barbuda is one where much research information is needed on a whole. However, the supply chain and the marketing platform is an area that has not received sufficient attention. There is no available up-to-date research on the marketing of fisheries products and the flow of fisheries products in the local supply chain in Antigua and Barbuda. Only out-dated literature is available since the last known market research was conducted by Ann Simon and funded by Canadian International Development Agency (CIDA) in July – September 1983 under the Mission Administration Funds (MAF) project through the Caribbean Conservation Association (CCA). Current and reliable market information relating to consume needs and want, pricing, and the overall product flow through supply chain and the best way to capitalize at each step to enhance is needed.

Our main market is the European Union territories in the Caribbean. However, exports, and in turn foreign exchange earnings, have decreased significantly, when the European Union imposed harmonised regulations governing the production and trade of seafood throughout the communities. In 1990, domestic export of seafood was 183 metric tons and valued at US$11.1 Million but in 2007, domestic export was 126 metric tons valued at US$777 thousands .The stringent technical standards of the HACCP system are weighing heavily on a developing country such as mine. As result greater urgency is needed for value addition and creation of value for fresh seafood products.

Moreover, adopting a more market-driven value chain has not only the potential to generate significant revenue but the potential to generate more employment opportunities in the upstream and downstream activities such as fish processing, selling, net-making, pot-making and boat building. Advocating a market-driven practices where consume demand are the focal point would provide to be a vital source of stable employment for Barbuda where one in every four person livelihood is already dependent on the success or failure of the fisheries.

It can contribute greatly to food security as direct consumption of protein becomes more accessible. Smaller-sized demersal species such as snapper, grouper and grunt are rich in proteins, essential fatty acids and micronutrients which are often available to low income rural population because of their low cost and availability.

1.1 Problem Statement

1.1.1 Current supply chain

The domestic trading of fisheries products is still traditionally harvest driven at its core as shown in figure 1. As a result, the revenue earned by fishers is low couple with minimal processing and overall low quality of fisheries products as little emphasis is invested into value creation or adding activities. Decline in average fish size and catch in addition to algal overgrowth on some reefs suggest that the shallow reef fishery is over-exploited around Antigua and Barbuda (FAO, 2016). It is this evident over-exploitation of marine resource that

leads to the implementation of new regulations such close season on selected demersal species such as Nassau group, Snapper, Parrot fish etc. This harvest-driven approach if not curtailed will continue to fuel over-fishing and place added strain on the already heavily exploited demersal species as resource management efforts are doing little to control fishing effort. Poor enforcement remain a constant hindrance to optimise the efficiency of regulations due to limited human and technological capacity. Many capture fisheries are in crisis, not least because of the on-going failure of fisheries resource management systems to correct or control excessive levels of fishing effort (Anderson 1986; Hannesson 1993). The framework for managing the marine resources are somewhat out-dated and the enforcement of measures that are in place to manage the resources ineffective.

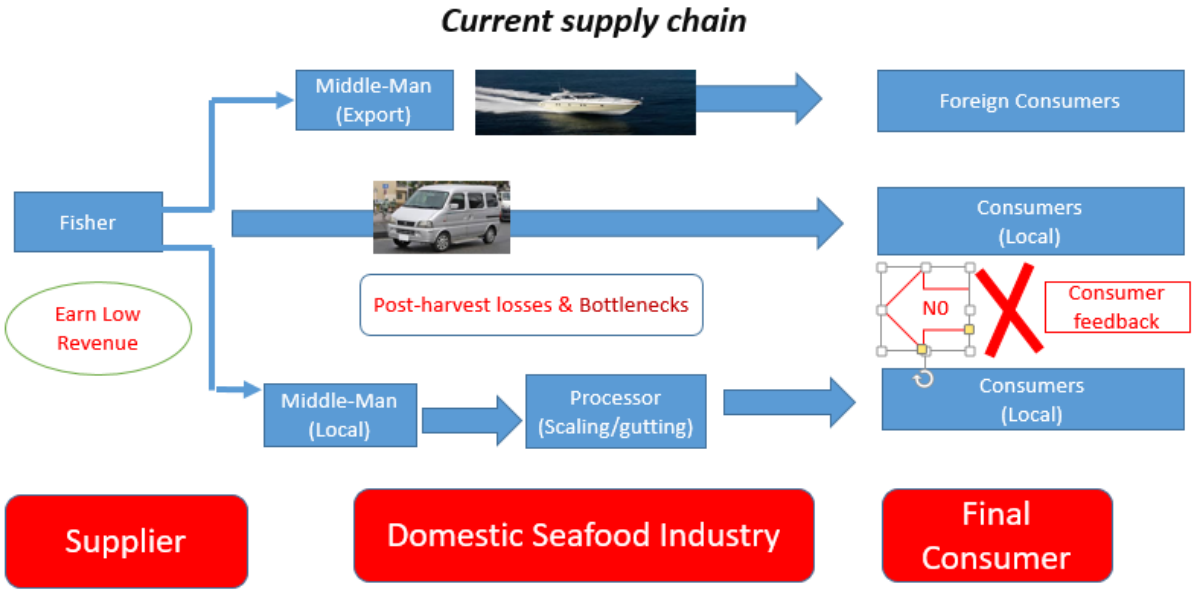


Figure 1.Current Value chain in Antigua and Barbuda

As represented by figure 1 this ignorance of consumer demand leads to alarming high levels of post-harvest losses and bottlenecks of poor quality products being available on the market. Post-harvest losses and bottlenecks are all too common on the tongues of fisher when they raise their complaints of not having anyone or market to purchase their products. But the reality of the situation is that consumers' characteristics and unique product preferences are being ignored consumer feedback are not taken into consideration. The market has changed from what it was twenty years ago. Today's consumers prefer to make one stop to acquire their product in their desired presentation or format while fishermen are still focusing on aggregating the highest volume or landing the highest catch with little regard for value adding incentives.

The dominating position held by middlemen hinders information sharing and transparency in the marketplace as they set the grounds for prices solely for their interest. It is unfortunate that the negotiating power held by middlemen is being used to promote self-interest and maximise their profit margins. The objective here is to acquire the product at least possible cost from the fishers and reselling it to on the export market with the French Caribbean territories or conducting minimal processing for the local market.

Ultimately, this stifles any opportunity for fishers to adopt product differentiate practices and gain competitive advantage within the market.

1.1.2 Expected Value Chain

The adaptation of a market-driven approach towards economically important demersal species such as snapper, grouper and grunt can greatly alleviate the challenges faced by the existing harvested-driven supply chain. These three species are the primary focused for this research and contribute a combine value of 5,112,802.58 million US Dollar to the total captured fisheries production of 12,783,370.74 US Dollars. This is roughly 40% of the captured fisheries output in 2014. The utilization of a market-driven approach brings forth the added benefit of vertical coordination as illustrated in figure 2. This would guarantee that each successive stage in the production, processing, and marketing of a product is appropriately managed and ultimately in the interrelated to the next. Therefore decisions about what to produce, with the right specifications in sufficient quantities and at the right times are communicated as efficiently as possible from the consumer to the producer. Benito et al (1993) observe that information from customers, partners and sales subsidiaries by far outweighs information from other sources. This put fishers in an ideal position to procure larger sums of disposable revenue as they will maximise unit value through the exploitation of value creation activities since consumer specifications are communicated and delivered in a timely manner. In the long-run this place less pressure on the over-fish demersal resources as consumer demand guide fishing habits and not a blindly driven harvest approach.

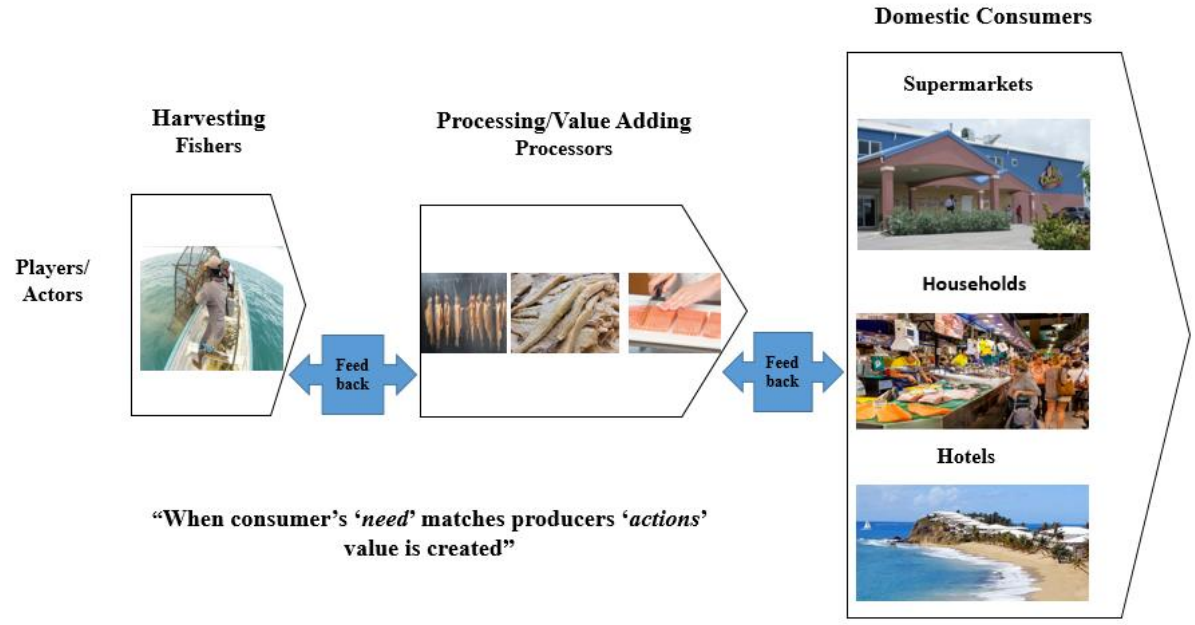


Figure 2.Expected value chain

In addition, high levels of post-harvest losses and bottlenecks would be reduced substantially with a more market oriented value adding supply chain. The primary cause of post-harvest and bottlenecks is where supply exceed demand. As seen in figure 2, under a market-driven value chain quantities and qualities of the fisheries product supply match market demand, as the closer the supply match demand the higher the value added at each part of the value chain. More importantly, this system would utilize the market signals coming from the downstream activities to produce heighten communication, transparency and overall greater level of information sharing from fishers to final consumers as showed in figure 2. It shows that all the

various elements of the value chain are in constant communication and receiving market signals that relate to offering the right quantity, the right species, in the right quality and qualitative attributes at the right time. This will prevent any actor in the value chain from functioning as a monopolistic entity with respect to price setting. In other words, the unfavourable negotiating power held be middleman will be severely reduced. This will ultimately open the door for fostering product differentiation and enabling domestic fishers and processors to exploit niches markets to gain competitive advantage.

1.2 Purpose of study

This research seeks to explore and evaluate the current supply chain of fresh fish products in Antigua and Barbuda to present applicable value added or value creation recommendations through the adaptation of a more flexible market-driven value chain which will earn higher unit value for the domestic market in trading select species such as snapper, grouper and grunt. Snapper, grouper and grunts were chosen because of their economically significance as the primary species for this research. These species account for two fifths of the total revenue earned in 2014 (Fisheries Division, 2015) and display consistent financial stability as staple revenue earners.

As market-orientated principles are not given priority within the domestic seafood market place; this is believed to be an unexploited avenue where the various stakeholders in the domestic seafood industry can maximise their profit margins.

1.3 Overall Objective

The sole driving force governing this investigation is to analyse and evaluate the seemingly unstructured, uncontrolled and unregulated supply chain and providing adoptable recommendations that will tend towards developing a more market-driven value chain which seeks to offer satisfactory returns for the various stakeholders

1.4 Specific Objective

- To identify the current challenges faced by the existing supply chain
- To establish a feasible financial path to develop a market-driven value chain
- To estimate local demand for value added products and higher processing that could help reduce the unfavourable import- export deficit
- To prescribe recommendations that will enhance communication and traceability along the value chain among the various actors.

2 METHODOLOGY

Primary information will be taken from questionnaires. The questionnaires were distributed among four different classes of respondent. These respondents include fishers, household, hotels and supermarkets. This information will be analysed using excel spread sheet format to identify patterns with respect to differences and similarities from the various respondents to uncover the factors that motivate each player in the current supply chain. Clear theories or hypothesis can extracted from the data that is amass from the sample population and the relationship among the key stakeholders will be clearer. This quantitative approach offers the possibility to be more flexible and generalizations can be made to extra conclusions. These conclusions will be compared to the literature review to assess their relevance to produce sound recommendations that can efficiently cater to the needs of the target stakeholders. These will be visually presented in graphs and charts to foster understanding the unique situation face by the value chain.

Relevant secondary information will be taken from existing lectures, articles and research done in related fields to supplement the primary objective of this research project

In addition, Porter's Five Force Model will be utilized to assess the profitability of the fisheries sector on a whole. This model seek to determine which stakeholder possess the bargaining power, the role played by substitutes and how much priority should be given to threat of new entrants. This is specifically chosen to illuminate the balance of power in the domestic seafood industry as well as to highlight weather or not new value added products and service has the potential to be profitable.

3 BACKGROUND OF ANTIGUA AND BARBUDA

Antigua and Barbuda is an archipelagic state made up of three main islands, with a combined land area of 442 km^2. It has an Exclusive Economic Zone of 107914 km^2. Antigua and Barbuda continental shelf area spans 3 710 km^2 with a combine coastline of approximately 153 km. It lies in the eastern arc of the Leeward Islands of the Lesser Antilles separating the Atlantic Ocean from the Caribbean Sea. Antigua and Barbuda has a population of approximately 91,000 while Redonda remains uninhabited. The highest point above sea level is Boggy Peak at approximately 400 m (1,330 ft). Average rainfall is 1,067 mm (42 inches) per annum.

Figure 3.Showing Antigua and Barbuda Location

The economy is service-based, with tourism, financial, and government services representing the key sources of employment and income; tourism is the leading foreign exchange earner. Tourism is the main economic activity and it accounts for 60% of the country's GDP. In addition, GDP per person is estimated to be USD 12,479.55. The capital city is St. John's lies on the northwest coast of the island.

3.1 Fishery Sector

The fisheries sector of Antigua and Barbuda is small scale/artisanal in nature with minimal restrictions to new entrants entering the fisheries. The fisheries is divided into main compartments, Inland freshwater sub-sector and Marine fisheries.

3.1.1 Inland Freshwater Sub-sector

The Inland fisheries is main executed in small salt ponds and inland dams or ponds. Presently there is absolutely no commercial exploitation of Inland fisheries resources which is common in other territories in the region such as Guyana and Suriname. However, there is traditional harvest of some freshwater and estuarine species at the subsistence level or for recreational activity. The catch profile of the inland fisheries resources mainly consist of mullets, tarpons and tilapia. According to the CRFM Statistics and Information Report in 2010 Eleven Member States indicated that the fisheries of the inland waters and fresh water systems (even

in cases where the fishery did not produce large economic gains) were of importance to the cultural life of the country and/or played an important role at the subsistence level by providing protein to the local population.

3.1.2 Marine Fisheries

The marine sub-sector is almost exclusively artisanal or small-scale commercial fishing in nature. The marine subsector has undergone significant modernisation over the past thirty year with the traditional vessels (locally constructed wooden sloops and dories) been gradually replaced by modernize imported Fibreglass (GRP) pirogues and launches vessels equipped with the latest fishing equipment (global positioning system, depth sounder, trap hauler, etc) (FAO, 2007). Base on the 2014 Vessel Census statistics release by the Fisheries Division a total sum of 1222 vessels are registered with the fisheries division but only 338 vessels are actively conducting fishing operations. In essence less than 30 percent of the registered fishing fleet is actively engaging in productive fishing operations. On board these vessels fishers primarily utilize passive gear such as hand-line, fish-traps and gill-net within the EEZ of Antigua and Barbuda. Trap fishing is the most common method of fishing, followed by hand lining and gill netting.

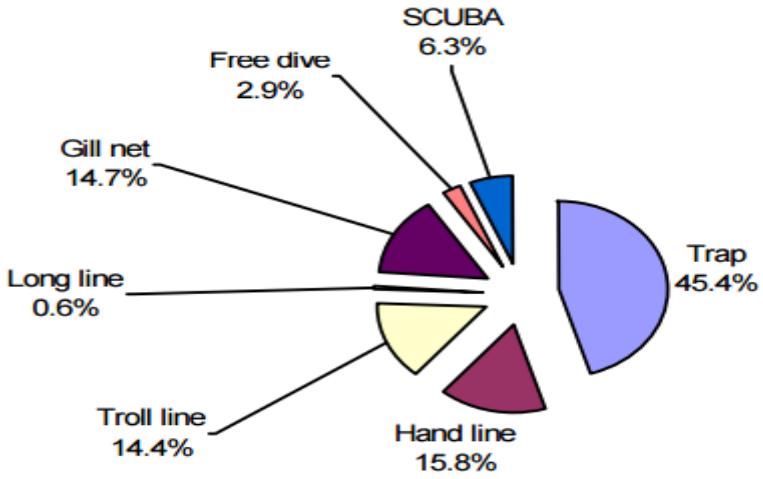


Figure 4.Primary gear composition in Antigua and Barbuda (Fisheries Division,2010)

There are thirty-two fish know active landing sites in Antigua and Barbuda. These sites range from rural beaches (with limited or no infrastructure) to fisheries complexes (with potable water, ice-making and chill storage facilities) (FAO, 2007).

3.1.3 Recreational subsector

The Fisheries Division is responsible to controlling and regulating actions of recreational marine fishers. They are subject to the same regulations, penalties and conditions as commercial fishers. However, the total quantity that these recreational fishers can extract from the marine resource is limited as they do not fish for a livelihood. These recreational fishers primarily operate from sport fishing vessels, which are equipped with trolling lines. These vessels generally operate on weekends and holidays and are rarely captured in the department's statistics except when the vessel is registered for commercial fishing as well. This recreational fisheries subsector also span various aspects of tourism, including domestic and international sports fishing tournaments, yachting and fishing events.

3.2 Economical Importance of Local Fisheries sector

Based on the recent statistics release by the fisheries division the Fisheries Sector contributes 2% of the national GDP. This represents 52% of the overall agricultural GDP and the sector is

a key component in the national food security. In situations where there is a downturn in the economy, the Fisheries sector acts as a "safety net" for the rest of the economy and provides employment for persons who would have otherwise been unemployed due to the reduced demand for workers in construction and hospitality sector. Barbuda has an even greater dependence on the fishing industry with approximately 26% of its population directly or in directly involved in some aspects of the industry. In other words; one in every 4 person is dependent on fishing. Based on 2014 statistic presented by the fisheries division, there are currently 939 active fishing both as full-time and part-time depending on the season or economical situation, who contributed a total 12.7 million US dollar to annual Production. It should also be taken into consideration that the fisheries employ at 50 individuals engaging in secondary activities such as processing, net and gear making, marketing and distribution or selling fish or fish products. More importantly, the fisheries sector serve as a vital source of livelihood for countless individuals throughout various communities in Antigua and Barbuda. As indicated by table 1.1 the level of dependency range from as low as 7 5 in the Point-Villa Community to as high as 26 % percent in Barbuda.

Table 1. Level of dependency on Fisheries sector in selected communities.

Community	Population	Fishers in the Communit y	Average number of dependant per fishers	Est.no. of dependents residing in the community	Est. % of the pop. Dependent on fishing
Codrington (Barbuda)	1200	71	3.3	235	26%
Round South (Antigua)	2021	58	3.9	113	9%
Gray-Green (Antigua)	4597	116	3.0	348	10%
Point-Villa	3768	60	3.4	204	7%

3.3 Regional Importance of Fisheries

The Fisheries Sector in the CARICOM region is an important source of livelihoods and sustenance to the inhabitants of the region. The Marine resource of the Caribbean contributes significantly to food security, poverty alleviation, employment, foreign exchange earnings, development and stability of rural and coastal communities, culture, recreation and tourism. Over the period 2007 - 2010 the fisheries sector contributed to the GDP of Member States ranging from as low as 0.07% (Trinidad and Tobago) to as high as 2.1% and 2.2% in Guyana and Belize respectively(CRFM,2010). During the period 2008 - 2009 the value of the marine capture fishery production for the region was approximately US$543.2 million annually and the value of the aquaculture fishery was US$39.3 Million, giving a total value of approximately US$ 582.5 Million annually over the period (FAO, 2010). The total number of people employed in the fisheries sector of the CRFM region was estimated at approximately 371,476 in 2008 which is approximately 5% of the workforce of the region (FAO, 2010). It should also be noted that these persons are among the socio-economically disadvantaged in the region including the least educated, rural poor and women. Within the region Jamaica (15%), Suriname (13%), Anguilla (7%) and St. Vincent and the Grenadines, Dominica and

Guyana (6% respectively) were the countries with the highest percentage of the labour force employed in the fishing industry (FAO, 2010).

4 TARGETED SPECIES

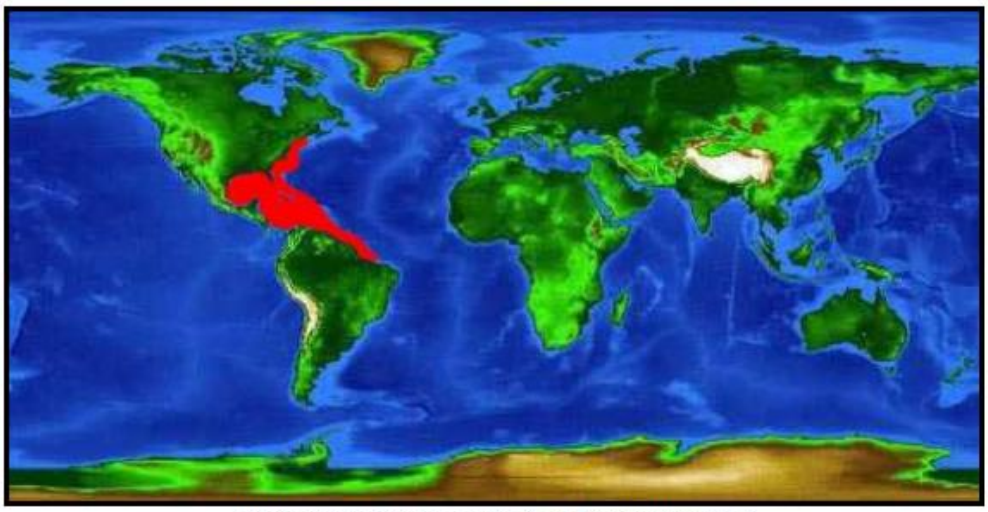
4.1 Importance of Targeted Species

Antigua and Barbuda Capture fisheries production primarily consist of small fishing vessels targeting demersal or reef-based resources. Demersal or reef species are estimated to account for at least 85% of capture production (FAO, 2007). The most commercially important species is the Caribbean Spiny lobster followed by the queen conch. Other common species include snappers (Lutjanidae), grunts (Haemulidae) and grouper (Epinephelus) which are the primary focus of this research.

4.1.1 Yellowtail snapper

Distribution and Habitat

The yellowtail snapper (*Lutjanus chrysurus*) is the most commercially Viable Snapper species found in Antigua and Barbuda. The yellowtail snapper is found in the western Atlantic Ocean from Massachusetts to Bermuda and southward to south eastern Brazil, including the Gulf of Mexico and Caribbean Sea. It is most common in the Domestic Shelf area of the Bahamas, off south Florida and throughout the Caribbean Sea.



World distribution map for the yellowtail snapper

Figure 5.The red section indicates the world distribution map for the yellowtail snapper (Cathleen Bester, n.d.)

Domestic fishers usually target this species with hand-line and fish traps. It is a common believe among fishers that the ideal time to maximise total catch of this species is at night. Along with fisher gear that utilise a technique call fish chumming to attract this species to the target area. This method is design to lure the species to the trap as it utilize bait materials such as fish sand crustaceans that are keen to the yellowtail snapper sense of smell.

4.1.2 Grunts (Haemulidae)

Distribution and Habitat

Although the Grunt Family species harvested in Antigua and Barbuda are not as commercially important as the snapper variety they considered as a vital source of subsistence and viable protein intake. These species include the White Grunt (*Haemulon plumieri)*, French Grunt *(Haemulon flavolineatum)* and Blue-striped Grunt *(Haemulon sciurus).*

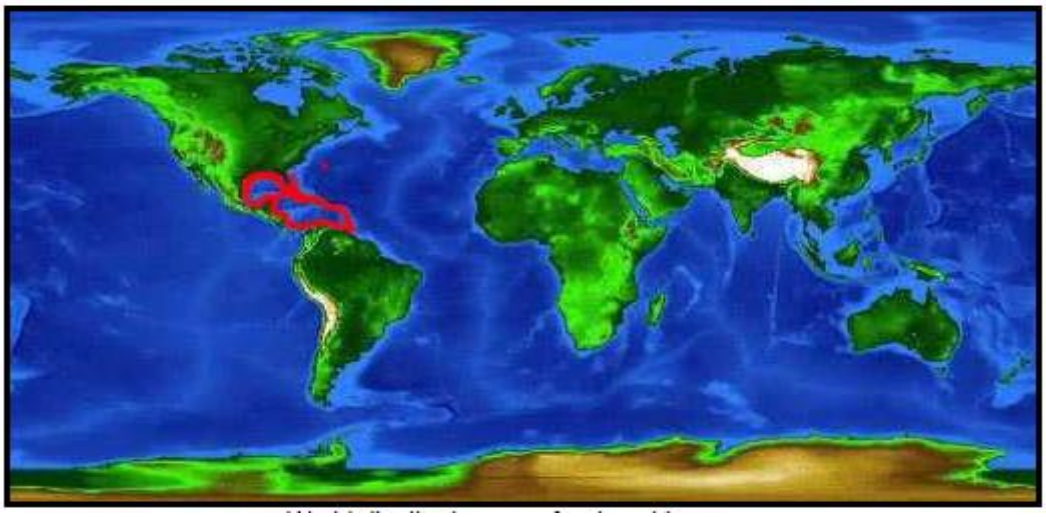


Figure 6.Red section illustrating the habitat on Grunt (Cathleen Bester, n.d)

The distribution of the different Grunt species can be found in the western Atlantic Ocean off Bermuda, South Carolina, and the northern Gulf of Mexico to Brazil including the coasts of Central America and throughout the West Indies (Figure, 6). It should be noted that despite the fact that these grunt are all part of the *Haemulon* family their habitual marine environment vary (Cathleen Bester, n.d).

These are most commonly caught by domestic fishers using fish traps ranging from nearshore operation to the outer boundaries of coral reefs. Sellers usually market these species fresh and whole to households as it is not as commercially important to supermarket, hotels and restaurants. This species is highly favoured among rural communities as low cost an easily accessible source of protein.

Groupers (*Epinephelus*)

Distribution and Habitat

The most frequently caught grouper species within the 200 Exclusive Economic Zone of Antigua and Barbuda are the Nassua Grouper (*Epinephelus striatus*), Red Hind (*Epinephelus guttatus*) and Rock hind (*Epinephelus adscensionis*).

As indicated by figure 7 these grouper species are found throughout the tropical western Atlantic Ocean, including Bermuda, Florida, Bahamas, and throughout the Caribbean Sea, south to Brazil.

Figure 7.Red section showing the known settling ground for Grouper species (Cathleen Bester, n.d)

They are well known inhabiting for offshore rocky bottoms and coral reefs throughout the Caribbean region. They can be seen from the shoreline to a depth range extending to at least 295 feet (90 m). These solitary creatures prefer to rest near or close to the bottom shallow rock reefs and inside caves.

These species are considered as an important food fish throughout the Caribbean region. Domestic fishers utilize hook and line as well as traps to capture these species frequently especially since their level of economical importance exceed that of the grunt family. This family of fish is more readily demanded by the restaurant, hotels and middleman. More importantly the Nassau Grouper is the most important commercial grouper in the West Indies. It's typically marketed whole and fresh, mostly between 2 to 10 kg.

4.2 The Catch and Revenue

Base on the most recent capture fisheries production statistics published by the Fisheries Division of Antigua and Barbuda demersal reef species remain the primarily targeted resource by the national fishing fleet within the Exclusive Economic Zone (Horsford, 2014). Demersal or reef species account for at least 80% of capture production. Figure 8 illustrates the total annual individual quantities landed by the domestic artisanal fishing fleet with respect to each species group over the past fourteen years.

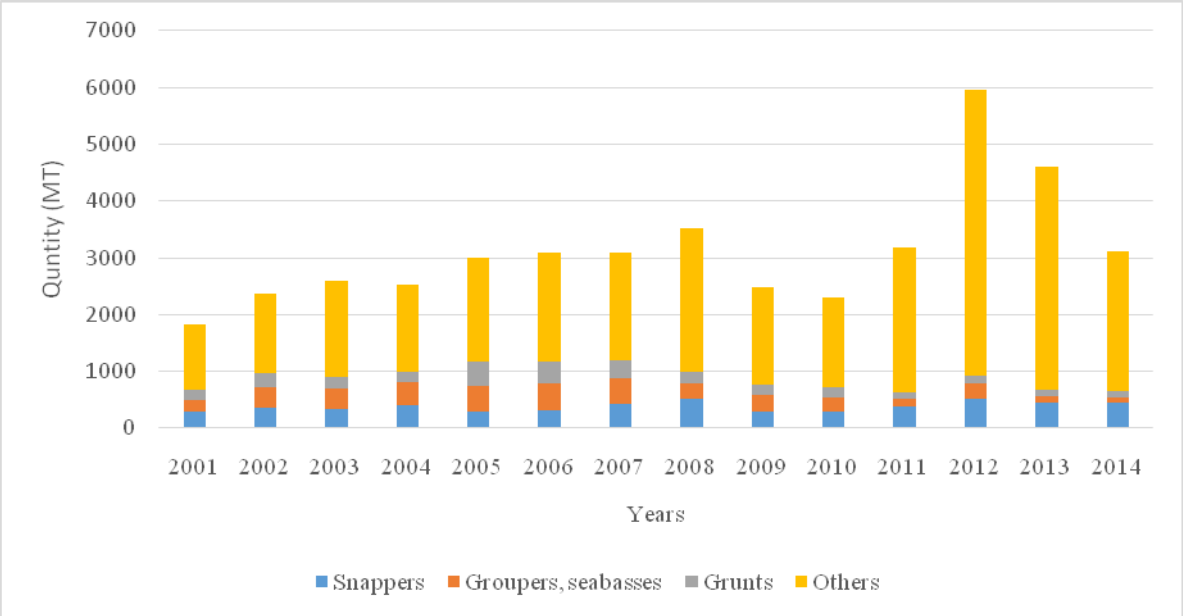


Figure 8.Capture Fisheries Production (MT) for the period 2001 to 2015 (Fisheries Division, 2014).

The total documented landed yearly quantity range from as low as 1824 MT in 2001 to as high as 5951 MT in 2012. The total landed catch increased steadily up 2012, except for a hard decline between 2009 and 2010 attributed to tropical storm. Harvested quantities decline again after peaking in 2012 due to the implementation of the new close season regulations on various demersal species. It should be noted that despite the fact that the population of Antigua and Barbuda is relative small when compared to other territories in the Caribbean region we import over 40 forty percent of our fish protein. Among the economically important species harvested within the EEZ of Antigua and Barbuda Queen conch remains the most heavily harvested; followed by Snapper with less than half of the quantity; then Grouper, grunt and Caribbean Spiny lobster with roughly 19 percent of the quantity of the harvested for Queen Conch. Figure 8 indicated that snapper has experience positive growth rate until it fell in 2009 but recovered very quickly in 2011 and continued to grow positive. Groupers experience similar positive upward growth as snapper until 2008 then began to spiral downward as result of the impact of tropical storms in the initial years, followed by the restrictions imposed by the close season regulations in 2012. Grunt on the other hand although it harvested higher quantities when compared to the other species, it shows high levels of fluctuation except within the last six years where it showed clear signs of decline in production. Bad weather condition, Gear Restrictions with respect to mess size, banning and most recent close season implementation are possible explanation for this instability. This caused fishing effort and quantity harvested to reduce as well as motivated fishers to target another species. More specifically landing and gear restrictions have also contribute to the decline in the quantities of Parrot Fish and grouper harvested. These measures are expected to enhance fisheries production in the long-run by protecting spawning stocks which will ultimately increase the number of young fish entering a population in a given year (Horsford, 2015). This explains the sharp increase in Caribbean spiny lobster harvested in 2014 as more fishers tend towards the lobster fisheries due to the new close season regulations couple with special permit requirements. It should also be note that in recent years there have being growth in the quantities of untraditionally harvested species such as Dolphinfish and Tuna-like fish. This growth is said to be attributed to the increase in the use of Moored fish aggregating device (FADs) in Antigua and Barbuda (Horsford, 2013). These species are

heavily targeted by domestic fishers because of their high demand in the domestic market coupled with their ability to earn higher returns per unit. As a result of these species economical importance at the subsistence and national level special precautionary measures were taken such as the implementation of the close season. The resources are vital economically, culturally and serve as crucial source of viable protein intake for the population so allowing these resources to be over-fished or over-exploited is not an option.

4.3 Revenue Earned

The fisheries sector of Antigua and Barbuda was generally considered to be of minor significance to the country's overall economy. However, in recent years, there has been increasing recognition of this sector's potential to procure tremendous revenue. It revenue contribution varies from as low as $24,354,216.00 in 2001 to as high as $54,785,245.00 EC in 2012 (Figure 9) (Horsford, 2015).

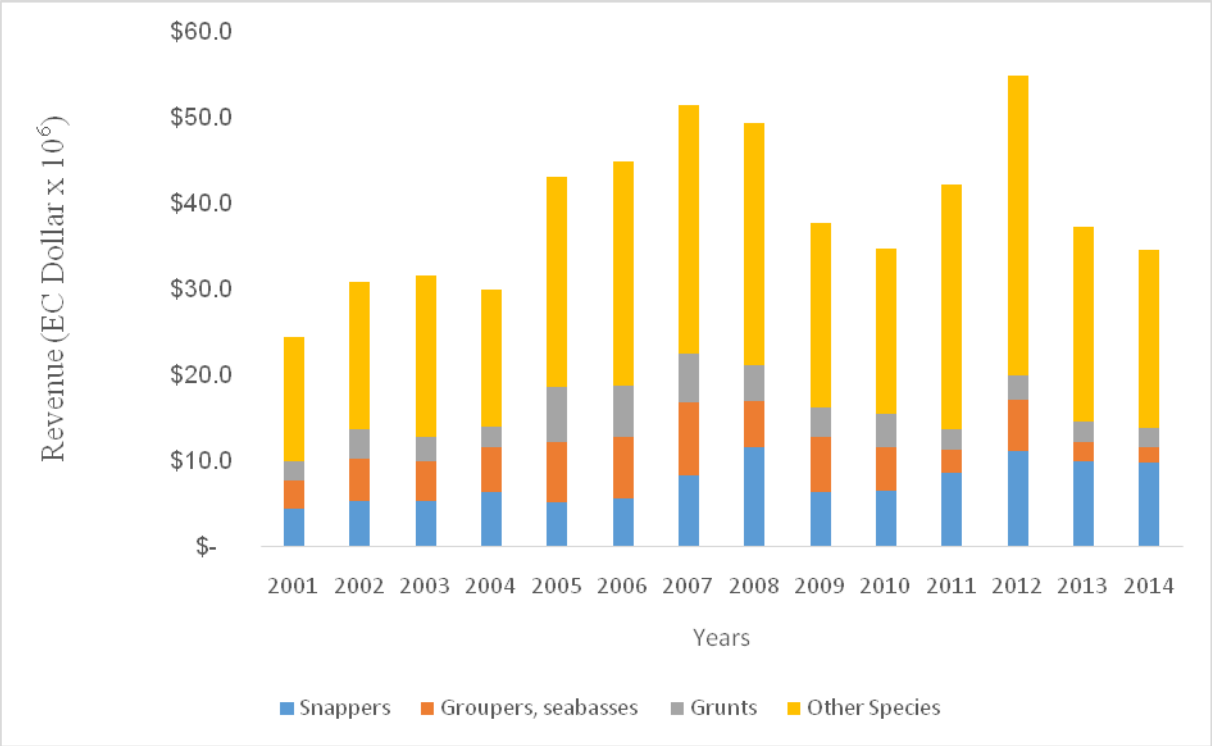


Figure 9.Revenue earned from 2001 to 2015 (Fisheries Division, 2015)

These values consistently represent 2 percent of the nation GDP earned each year and roughly 52 percent of Ministry of Agriculture output. As illustrate by Figure 9 Snapper is currently the most valuable economical species harvested and sold in Antigua and Barbuda grossing EC$ 9,787,168. This position was also held in 2004, and 2008 to 2011. Over the past fourteen years the top revenue earner position was traded between conch, lobster and snapper. But it is usually dominated by queen conch and the Caribbean spiny lobster which is exported to the French Caribbean territories of Guadeloupe, Martinique and St. Barthelme live. Grouper revenue earning capacity is not to underestimated as it fluctuates between being the second and third highest revenue earner from 2003 to 2007 and again in 2009. At current prices and processing Snapper, Grunt and Grouper has amass a combine revenue of EC$ 13,804,567 which is roughly equivalent to 40 percent of the total revenue earned by the fisheries sector. These resources have shown signs of being consistent economic revenue earners with ample room for growth as they rank in the top five demanded species in Antigua and Barbuda with respect to revenue earned. Figure 9 showed that Snapper, Grouper and Grunt has consistently

contributed a bare minimum of 40 percent to the total revenue accrued by the fisheries sector except for the period 2011 to 2013 where their contribution fell to at least 32 percent. It should also be note that the demand for queen conch and Caribbean spiny lobster has fallen significantly. The vast difference in the value of total annual revenue earned by snappers when compared to Groupers and Grunt is not solely attributed to higher quantity landed but also to the fact that higher prices are offered for snapper on the market. The decline in revenue earned by queen conch is believe to be attributed to the implementation of new regulations such as close season. One possible explanation for this change was provided by Horsfold et al, 2012 who claims that effort in the dive fishery has shifted from the Caribbean spiny lobster to the queen conch due to reduce demand for lobster from the main driver of the national economy tourism. He believes that Stay-over visitor arrivals have not fully recovered to the levels prior to the global economic downturn in 2008. The implementation of the new close season regulation along with gear and landing restrictions have caused a drastic decline in the revenue typically produced by the grouper species as more fisher shift fishing efforts to alternatives such as Snapper. Moreover, since the utilization of the moored fish aggregating device (FAD) in 2012 the revenue procure from Barracudas, Tuna-Like fish and Dolphin fish has to more than five times its previous 2011 value. It is the optimistic held conception that these pelagic species can aid in alleviating the pressure place on demersal resource to fulfil the fish dietary requirement of the nation as these resources are under-exploited.

4.4 Level of Processing/ Value Adding Activities

All domestic fisheries commodities exploited from within the 3568 km^2 shelf area of Antigua and Barbuda and landed along its 260 km coastline are marketed fresh for direct human consumption. Despite the fact that the fishing fleet of Antigua and Barbuda has undergone significant modernisation over the pass thirty year the same cannot be said for the level of processing of fisheries products. A pictorial perspective of the fisheries sector and its processing activities will classified both aspects as small scale or artisanal as the traditional methods of preparing fisheries product for the market are still the only methods be utilized. The central Market wharf and Point Wharf Fisheries Complex are the two only official entities that facilities the processing of fisheries products for the retail market and their efforts are primarily at a preliminary basis. The level of processing conducted at these facilities is minimal and consist of scaling, gutting, slicing and fillet portions. This additional service tend to increase the average price of the commodity by 1 or 2 dollar per pound. The hotels, supermarket and restaurants segment of the market are more likely to request this additional processing from suppliers. Nevertheless this limit value added effort is an important source of value to the domestic population and provide employment especially for women and unskilled members of the labour force who would otherwise unemployed. On a small scale traditional salting and drying (‘corning’) of some species is still being executed on a fairly subsistence level mainly by the rural population.

4.5 Future of Resources

Within the growing phenomenon to adopt more sustainable fishing practice to combat the effects of overfishing to guarantee a vital source of protein for future generations; more value added initiatives to secure higher unit value is needed. Earning higher unit value is said to directly correlate with less fishing effort as fisherman fish to earn higher revenue (Trondsen, 2001).

Figure 8 indicated that capture fisheries production exploitation of the domestic demersal resources increase steady until 2009 where it fell by 30 percent and regain momentum in 2012 with the highest recorded harvested quantity within that period. After such prosperity it immediately fell by 20 percent in 2013 and 48 percent in 2014. Decline in average fish size and catch in addition to algal overgrowth on some reefs suggest that the shallow reef fishery

is over-exploited around Antigua and Barbuda (FAO, 2007). Within the Caribbean region most of the traditional commercially important species and species groups are reported to be either fully developed or over-exploited. These include queen conch, spiny lobster, shrimp, shallow shelf reef-fishes, snappers and groupers and some of the large pelagic species which are managed by the International Commission for the Conservation of Atlantic Tunas (ICCAT) (Hugh A. Saul, 2010).

This commonly high perspective is on that carries much weight as the average fisher operating within the 200 mile EEZ seldom venture beyond the 50 miles. As a result greater pressure is applier to the nearshore reef fin-fish and the recent modernisation of the fishing feet with hydraulic pot haulers, depth sounder, Global Positioning System and more powerful engine does little to curtain fishing effort and pressure. Recent capture production statistics indicated that fisheries production fell by 23 percent in 2013 and 48 percent in 2014 when compared to the 5,696 Metric Tons produced in 2012. This decline in production could also be explained by the implementation of the new close season regulations coupled with gear restrictions, special permit requirements and landing restrictions. These mechanism were specifically adopted to reduce fishing effort and preserve spawn stock at particular period in the so as to guarantee higher levels of recruitment stock. In addition the growing utilization of Fish Aggregating Device (FAD) serve as portal to the exploitation of pelagic species previously under-exploited by traditional domestic fishers. This growing trend was reflected in the recent captured production statistics provided by the fisheries division. While traditional exploited demersal reef resources such as snapper, grouper, grunt surgeon fish, parrot fish and conch declined; others like Dolphin fish, Barracuda and Tuna-like fish continue to rise steadily and earning high economical returns from hotels and restaurants after the implementation of the JICA FDA Programme in 2012 (Figure 8).

Within the Caribbean there are some species that are under-utilised such as some regionally distributed pelagic fishes, namely, wahoo (Acanthocybium solandri), dolphinfish, and blackfin tuna; squids such as the diamondback squid; deep slope snappers and groupers, and some small coastal pelagic species including members of the carangidae, clupeidae, and engraulidae families (Haughton, 2004).

Moreover, ghost fishing and IUU fishing are still issues that plague domestic resources. Foreign illegal fishing, especially by the French, continues unabated. It is estimated that as minimal some EC$2.5 Million worth of fish is taken from our waters each year. Very few persons are caught due to our lack of enforcement capability (Horsfold, 2012). In CARICOM, IUU fishing is estimated at between 17 and 20% of annual catch, accounting for between 33,150 and 39,000 tonnes per annum, valued at between US$105 million and US$124 million (at 2000 prices) (Hugh A. Saul, 2010). This endemic calls for greater investment in local coastal enforcement and an even greater level of interregional cooperation among CARICOM States to remedy this issue.

5 THE THEORY BEHIND VALUE CHAIN

5.1 Main Aspects of Value Chain?

Value chains are networks of labour and production processes where the result is a finished commodity (Hopkins and Wallerstein, 1986). More specifically a fishery value chain can be defined as interlinked value-adding activities that convert inputs into outputs which, in turn, add to the bottom line and help to create competitive advantage. A value chain typically consists of inbound distribution or logistics, manufacturing operations, outbound distribution or logistics, marketing and selling, and after-sales service (De Silva, 2011). Dr. Richard Boateng in his (2011), Value Chain Analysis of Procter and Gamble case study classified these activities as Primary and Secondary activities. Primary Activities are directly concerned with creating, producing and delivering a product (e.g. component assembly). Second Activities are not directly involved in production, may increase effectiveness or efficiency (e.g. human resource management). Primary activities are supported by secondary activities such as purchasing or procurement, research and development, human resource development and corporate infrastructure.

More importantly, to facility a sound understanding of value chain approach it best to distinguish it from supply chain as the two terms are frequently used interchangeably. Supply chains typically consist of network of product-related business entities through which Commodities travel from the point of production to consumption, including pre-production and post-consumption activities. In supply chains, production is focused on efficient logistics using upstream and downstream businesses aimed mostly at pushing products to market. Supply chains are primarily focus on costs and reducing the time it takes to present the product at the point for sale. The overall goal of supply chain management is to optimize revenue by reducing the number of nodes in the chain and keeping problems such as bottlenecks in supply, costs incurred, and time to market to a minimum (FAO, 2014). A supply chain has three key parts: supplying raw materials to manufacturing units; manufacturing raw materials into semi-finished or finished products; and distribution to ensure products reach consumers (De Silva, 2011).

In contrast, a Value Chain activities are seen as a strategic evolution in the process of meeting consumer demand as they sort to achieve product differentiation and gain competitive advantage in the marketplace through the utilization of value add or value creation initiatives at each node in the product supply chain. Just like the supply chain the value chain seek to maximise net revenue but its approach is different as it will be gear towards enhancing the incremental value of each particular link in the chain. Within the fisheries this incremental value added is usually realized in the form of higher prices owned for each unit of fish landed, establishing niche market or overall expansion of existing markets (FAO, 2014).

Within the fisheries sector, the concept of value addition generally entails adding value to products through some type of processing method – basically transforming raw fish input from capture fisheries or aquaculture into finished or semi-finished product that has greater value in the market. In addition, value creation is used to characterize fish and fishery products that have incremental value in the marketplace by differentiating them from similar products based on product attributes such as: geographical location (Mediterranean tuna, Norwegian salmon, Thailand black tiger shrimp, etc.); environmental stewardship (Marine Stewardship Council label, ecolabeling, fair trade); organic products; and food safety (the Hazard Analysis and Critical Control Points [HACCP] system, free from antibiotics and heavy metals, etc.) (De Silva, 2011). It's essential to note that despite the fact that a value chain has the potential to procure significantly greater net revenue that a supply

chain it cannot exist without a supply chain because it is impossible to add valve without a supply of products (FAO, 2014).

5.2 What is Market-Driven Value Chain?

Market driven is that aspect of a marketed oriented value chain which is commonly defined as the extent to which an actor in the marketplace uses knowledge about the market, especially about customers, as a basis for decision-making on what to produce, how to produce it, and how to market it (Jaworski & Kohli, 1993, 1996; Kohli & Jaworski, 1990). Market orientation is regarded as a major prerequisite for being able to create superior customer value, which in turn is regarded as a major determinant of competitive advantage. The Market Driven approach is seen as being customer reactive in nature and not necessarily strictly innovative nor product driven as it aims to satisfy current customer needs. According to Kohli (2000) Market driven refers to a business orientation that is based on understanding and reacting to the preferences and behaviours of players within a given market structure. With the growing competition on the international food market today being successful dictates that starting with careful market research, investigating the customers' needs, and developing differentiated products or services for a well-defined Market segment is a crucial ingredient and one that is at the forefront of a market driven value chain.

Grunert, Hartvig Larsen, Madsen & Baadsgaard, 1996 advocated that more market orientation is needed in agriculture and fisheries sector as well as the subsequent processing links in the food value chain. Small-scale fishers and fish farmers have discovered that adopting new technologies is often not enough to increase their productivity unless the fish value chain for their products is enhanced at the same time (World Fish Centre, 2015). Improved value chains lead to increased production and consumption of fish, especially by poor consumers, and increased income for producers, processors and traders. Whilst fishers' behaviour may sometimes suggest otherwise, generally they fish for income rather than just to catch a specified, or maximum, quantity of fish (Arnarson and Trondsen 1998; Holland and Giant 2001; Trondsen, 2001). If higher unit values can be realised for the fish landed, fishers should be able to retain current income levels with reduced catches (and conceivably may achieve even higher incomes) but importantly, not necessarily at the cost of increased, and often excessive, catch levels.

Typically, auctions display products to be sold each day so that buyers can inspect and make procurement decisions about the quality and quantity available at the market, and also have some regard to availability and thus market price elsewhere. Unfortunately, there is not much evidence of successful fish auction system among developing nations and it would be best to benchmark these practices from developed countries. Today's auctions in Iceland, Faeroe Islands and Norway are all compute and Internet based which enables remote buyers to exchange information and trade through auctions with changes in the customer's perception and values being the driving force. This is what Trondsen (2001) calls MOVA (Market orientated value adding behaviour) as market signals coming from the most attractive consumer markets. The auction system is in this sense fundamentally different from other forms of frequently used transaction systems (like in Norway); to mention direct contract sales or the former system of bilateral contract system with officially decided minimum prices (Arnarson and Trondsen, 1998; Trondsen, 2001). In competitive advantage of nations Michael E. Porter argues that while natural endowment is important in increasing welfare through trade, it is the way in which such endowments are used that is critical (Porter 1990). Endowments are used efficiently when they result in product attributes that consumer's desire.

5.3 Market-Driven VS Production/Harvest-Driven

The philosophy of Market-driven industry in essence entails consistently cultivating knowledge about market developments, disseminating this information with appropriate personnel, and adjusting offers to suit a changing market. Knutsson (2014) defines market driven as being a market-responsive business model (land based), driven by consumer wants and problems to produce high-value branded products. Put differently, it embodies accepting the market structure and /or behaviour of market players as a constraint and working to enhance customer value within these constraints. As often interpreted, the market-driven business model would not step outside the immediate voice of the customer and attempt to reshape customer's preference or modify the value chain to suit its production requirements or cost-margin (Kohli, 2000). In short, it often means 'hear the voice of customer' and adapt offerings, as compared to the harvest driven model where the voice of the customers plays a minimal role and production initiative are ranked with higher priority. The reactive nature of the market driven approach lends its efforts to be primarily externally focused as looks outward to identify opportunities and niches among consumer's preference to capitalize on them resulting in higher quality value end product. According to market orientation theory, this is only possible when value chain agents have an understanding of market requirements and are able to take advantage of these (Kohli and Jaworski 1990; Grunert et al. 2010; Reid and Brady 2012). The successful application of the market oriented approach is dependent on the extent to which chain members generate intelligence about current and potential end users served by the chain, the extent to which they disseminate this intelligence across the chain, and the extent to which the chain responds to it (Grunert et al; Jeppesen et al; Jespersen and Anne-Mette Sonne, 2004). Goal of market driven value chain model is to offer the customer a level of value that exceeds the cost of the activities, thereby resulting profit margin.

On the other hand, the Harvest or Production driven concept is characterise as being a cost-driven business model, producing bulk standardised commodity products (Knutsson 2014). A more detailed interpretation was presented by Beamon, (1998) where he describe the model as "an integrated process wherein a number of various business entities (i.e., suppliers, manufacturers, distributors, and retailers) work together in an effort to: acquire raw materials/components, convert these raw materials/components into specified final products, and deliver these final products to retailers". Agriculture and fisheries have a long tradition for being production led, with an emphasis principally placed on efficiency, high volume, constant quality and economies of scale. Unlike the outward looking perspective held by the market driven approach to identify value and satisfy customers demand; the philosophy of the product approach advocate internal focused initiatives to identify opportunities and to achieve appropriate inventory levels, lower overall costs and, ultimately, enhance customer satisfaction and services. Whereas a market-driven value chain utilizes Pull System (i.e. work release is based on actual demand or the actual status of the downstream customers) to make the right product, for the right customer, in the right amount, at the right time; the harvest driven approach tend to adopt a Push System approach where work release is based on downstream demand forecasts (Knutsson 2014).

6 FACTORS AFFECTING THE PROFITABILITY OF VALUE CHAIN

This model thrive to assess the profitable of the domestic seafood industry in Antigua and Barbuda to highlight its competitive intensity and the bargaining power that exist between buyer and seller relationship.

6.1 Rivalry among competing producers and sellers

The level of competition in the domestic seafood market place varies from middleman to middleman; fisher to fisher and from middleman to fisher. Middlemen usually acquire products from producers at an affordable price and resell these products with minimal processing on the domestic markets as well as foreign market. The level of competitiveness that exist among middleman is low as there are only few middleman competing for available market share in foreign markets, hotels and supermarkets. However, competition intensify when fishers and middleman are competing for household consumer segment of the market as most fishers would harvest their product sell directly to the households and communities. Moreover, little innovative effort is invested into processing as a result there is minimal product differentiation which is accompanied by slow market growth resulting in high level of competition. Competition among fisher is lower as most fisher restrict their product offering to local communities and established loyal customer base.

Competition at community level is very common as it the total land area is 442 $km^{2.}$ The cost of entering the industry as a simply is relative cheap. However entering as a Captain or Vessel Owner is more expensive as minimal investment in fishing operations (e.g., vessel, gear and equipment) range from EC$45,000 to EC$210,000 (Horsford, 2011). Given the constant possibility of losing one's investment during the hurricane season some fishers never see return on their investments. Given that the processing sector is artisanal and very little effort goes into value adding initiatives fishers are confronted with additional pressure to market their homogeneous product in fix-growth market environment.

6.2 Competition from substitute products on the market

With Antigua and Barbuda's population of roughly 90,000 domestic seafood face high level of competition from more inexpensive and promotionally driven substitute items such as chicken, pork, beef and imported seafood. These products are all sold processed, packaged and ready to consume. The importers of such commodities buy in bulk and can therefore offer their competitive products at a lower price. This is visible among the hotels and supermarkets despite higher level of freshness offered by domestic fish product. The reality remains that domestically harvested commodities are unable to satisfy the demand by these markets and have to compete with imports from Guyana and Trinidad (FAO, 2007), not just in the fresh seafood market but also in the 'niche 'traditionally salted, dried (corned) and smoked market. In essence the threat substitutes into the industry is consider as high since the technology utilized is easily available along with the homogenous nature of the product which enable customers to switch with ease.

6.3 Buyer Power

Buyer Power refers to any situation where customers has a strong position to bring considerable pressure on the market to demand improved quality or lower prices (FME, 2013). Within the current supply chain the export market, hotels, supermarkets and households hold are the buyers. Buyers possess high power in the seafood industry as there is

little product differentiation with a large group of homogeneous sellers. This situation grants the buyer with a low switching cost. The most powerful of the buyers is the export market as they are few and possess greater flexibility to switch between suppliers as they are many suppliers providing the same product. They have the power to drive prices downward because unlike the hotels and supermarket chains they offer immediate payment for bulk purchases rather than consignee agreement with partial payments.

Hotels do possess some degree of bargaining power but this power varies with the tourism season peaks and lows. Hotels and supermarket true bargain power lies in their ability to switch to the external market and import the same or similar commodity at a lower price in bulk quantities when domestic prices and quantities are unsatisfactory. This puts the Hotels and supermarket in very comfortable bargaining position. Households who buys directly from fishers can engage in verbal contractual agreement and negotiate a favourable price. The history and level of loyalty that exist between the seller and buyer would determine whether or not negotiation can result in a reduction in prices. It should be noted that although the different buyer groups may possess varying degrees of power in relation to impacting prices, they can do very little to impact quality as they are not united.

6.4 Threat of new entry

Threat of new entrants refer to situation where a new seller/producer or organisation break into an industry and challenge the existing producers resulting in a decline in their profit levels (FME, 2013).Within the domestic market place new players can enter as Fishers/producer or middle-man. Therefore the threat varies according to the role pursue by the individual.

Those interesting in entering the industry as a crew member face very little barriers to entry thus resulting high levels of threats of entry for crew members. On the other hand, the industry experience low threat of entry for those entering as captain or vessel owners as it much more difficult. Such role require experiences, large sum of investment, proof of citizenship and contribution to the national schemes. Being a Captain or Vessel Owner require a minimal investment in fishing operations (e.g., vessel, gear and equipment) range from EC$45,000 to EC$210,000 (Horsford, 2011). Given the constant possibility of losing one's investment during the hurricane season some fishers never see return on their investments.

Another crucial player is the medium-man. This game change role is very difficult to acquire as it requires very large sums of capital and strong network connection to facilitate the movement of the right quantity of product to the right end users. There are only three known documented middle-man currently in successfully operation with the external market. The exit and entry barriers for middle-man is probably the highest in the industry and as result they experience high returns and quick turnover rates.

6.5 Suppliers power

This assess the strength of the supplier to effect change in the marketplace to dictate prices or availability (FME, 2013). Fisher's function in the capacity of suppliers since they provide the industry with raw materials. The individualistic nature of fishers hinder their ability to work together and produce favourable prices for their product. This is reflected in their reluctance

to form business partnership among themselves. There is one fisher's cooperative in Antigua and Barbuda and it does little to unify the efforts of fisherman to manufacture beneficial circumstances. Fishers possess little or no power to penalize customers by imposing switching cost because there are numerous suppliers providing a homogeneous product. There are many substitutes' products available on the market so fishers cannot reduce quantity to propel prices upwards. Fish is an essential component in the diets of the more health conscious customer but it is not the only source of lean protein available on the domestic market and it can be imported and sold at a lower price to the end user.

6.6 Porter's Five Force Conclusion

In essence, moderate to high competition exist on the domestic market whereas the bulk of the competition is facilitated through the external markets. Buyers possess higher bargaining power than suppliers resulting in the industry being more attractive for buyers and a small percentage of fishers. More specifically suppliers have relatively little power. There are many suppliers selling the same homogeneous product so buyers possess the flexibility to switch easily between suppliers with little to no cost. These parameters essentially makes a buyers markets. There are moderately high threats of new entrant entering the industry. The threat to entry is role dependent. The industry is attractive for middleman and vessel owners as these role require substantial financial investment they function as a deterrent for potential entrants in the domestic seafood industry. Those exercising the role solely as fishers face less restrictions. However many young people tend to shy away from this profession as it is considered labour intensive and view as 'dirty work'. The model suggest low profitability for fishers and higher profitability for buyers. The current forces at work in the domestic seafood market segment makes it attractive for buyers. It holds the potential to be attractive to suppliers through product differentiation and taking advantage of existing traditional niche markets. The exploitation and introduction of value added products can create significant value for the various stakeholders throughout the industry as well as delivering a finish product that fits consumer's needs and expectations.

6.7 Factors influencing demand

Fish is a vital source of animal protein and minerals in the diet of Caribbean people, particularly the poor and vulnerable members of society. Per capita consumption of fish in the Caribbean region is on average between 23 kg and 25 kg per year (CARD Review, 2010).

There are many factors that impact the demand function curve for fish and fisheries product harvested and sold in Antigua and Barbuda. This upward or downward shift is dependent on factors such as prices, Income, weather condition, Demography, Availability, substitutes and imports.

6.7.1 Prices

It is a common trait among all classes of consumer to secure the best product at the most affordable price within the constraints of their budgets. According to Garrette and Brown (2009) the price of fish, guides consumers purchasing decisions and they would buy easily or switch to a product or bargain that is considered cheaper. The average fish consumer in Antigua and Barbuda is no different when making purchasing decision. The prices vary according to species and size; and changes from each individual seller and buyer relationship. The only constant is a undefined set price range. Negotiated between seller and buyer usually result in the selection of a price within this range. Most fisher tend to establish a personal relationship with their loyal customer base after a period of time, as result prices usually become fixed.

Economic theory teaches us that those consumers with a higher proportion of disposable income tend to purchase more luxury item. This is the case in Antigua and Barbuda where the upper class members of suit demand and consume high qualities of fresh fish product, as it is viewed as a luxury item. It is common for higher income earners to frequently consume and establish a regular monthly consumption pattern for seafood, whether prepared in their homes or consumed at a dining establishment. This bracket of consumer tend to be more health conscious and highly educated so paying an addition premium from available income resources is considered money well spent.

6.7.2 Weather condition

The geographic location and low-lying nature of small islands in the Eastern Caribbean make them highly vulnerable to natural disasters such as hurricanes and tropical storms. The artisanal fisheries of Antigua and Barbuda have suffered major setbacks when boats, fishing gear, landing sites and marine ecosystems are physically damaged by the storm surge, high winds and heavy rains that are associated with tropical cyclones. Naturally this results in a downward shift in the demand curve for fisheries products unable to harvest the fisheries resources to cater to consumer demand. According to the CARD Review (2010), between 1950-2010 Antigua & Barbuda were impacted directly and indirectly by no less than a dozen hurricanes. As a result there would upward spikes in the consumption of other source of animal protein are such as chicken.

6.7.3 Religion

The composition of Antigua and the wider Caribbean is one of diverse mixture of people heterogeneous traits that impact their consumption patterns. Religious belief is considered very sacred among the various religious disciplines and holding true to the practices and customs are done with the most pride. For example advocates of the Adventist and Muslim teachings shy away from consuming pork, as it doesn't align with their beliefs. Fish and fish fisheries food tend to be the preferred among these groups. The same can be said for Rastafarians as they would prefer to consume fish rather than chicken, beef or pork. There is clear evidence of upward trend in the demand curve among these members of society.

6.7.4 Age range

The dietary choices of the senior members of society are vastly different from the younger generation. Whilst the younger generation quickly gravity towards fast and quickly prepare dished such as chicken and chips; the mature segment of the population are more keen towards homemade fish dished that maximise their health value and enhance their life expectancy rate. High blood pressure as it commonly known is rampant among the elder population. The nutritional properties found in fish such as being rich in vitamin B12, A and E, iodine and selenium helps to produce a low sodium diet which is important for persons with high blood pressure. It also provides them with added protection against cardiovascular diseases and seems to offer some protection from against diabetes. Pregnant woman also propel the demand for fish and fisheries products upwards as it facility foetal development as well as brain and nervous system development.

6.7.5 Availability

There are many occasions where the general unavailability of fish and fisheries product cause inward shift in the demand curve. In recent years this is seen around the newly implemented closed season period implement on the different demersal species. This restriction automatically makes other substitutes become more attractive in the eyes of the final consumer as it forbidden by law to harvest these resources. Moreover, fresh seafood tend to more accessible in rural areas as fishers and landing sites are based in these areas. This is not the case in urban areas as the only permanent suppliers of fish is the central fish markets,

small scale fish-shops and supermarkets. Once these limited sources are depleted seafood become branded as a scarce commodity in urban areas.

6.7.6 Substitutes

The availability of affordable and easily accessible substitutes such as chicken, pork and other types of protein meat products tend to reduce the demand for seafood. Most consumer relish eating their fish meals as fresh as possible because quality and the taste is much better. But this reality is not often the case with their lifestyle demands so they easily settle for other forms of processed protein sources. The price of seafood tend to remain fixed throughout the year while the prices of substitutes fluctuate and in most case fall because of product promotion initiative launch to boast sales. Now, although the consumer may remove fish his or her they will certain consumer less fish and more of the substitutes good.

6.7.7 Imports

Despite the fact that many domestic hotels and supermarket would prefer to satisfy their consumers demand for fresh seafood the quantities aren't available. As a result this unfulfilled demand is meet through the imports from the international and regional market. These imports increase the level on competition on the domestic markets especial for fisher would sell their products to the hotel value chain. Imported products are sold at lower price and in much larger quantities which tend to flood the market. There are also cases in the tourism industry where tourist may have a strong affinity for a taste of home and so the option is to import these product to keep the customer happy as these resources are not harvest exploited domestically.

6.8 Pricing System

In the early 70s in Antigua and Barbuda, there was an established system where every basket of fish that entered the local market was charge a 25 cent tax and officers were employed to ensure that the commodity was sold at the recommended price (Anne Simon, 1983). But those days are long gone as the Government of Antigua and Barbuda no longer set the market price of fishers and traders which was sole based on the weight of fish and not the type. This was a problem for fishers as the revenue acquire was insufficient to cover basic operational cost.

Today there is no constitutional set list of prices for seafood product sold in Antigua and Barbuda. Prices are decided between sellers and buyer at the point of sale as both parties deem acceptable. The prices vary from species to species and could fluctuation at any time depending on the marketing condition and the level of scarce or seasonality of the commodity. Commodities sold to the tourism sector tend to fetch a higher but the average statement made by fishers is one holding great reluctant. Most fishers are reluctant to trade with hotels and restaurants as payment are not often distributed immediately exchange with the delivery of good. As a result many fishers would opt to sell their catch to the middleman at a lower price as he would present full payment upon delivery.

6.9 Import and Export

FAO country Fisheries profile classify Antigua and Barbuda as a net importer of fish and fisheries product which aligns perfectly with Brownell (1978) declaration of a generally shortage of fresh fish in Antigua. History has shown from the period 1960 to 1968, roughly 430 MT of Fish and Fisheries products were imported into Antigua & Barbuda each year (Vidaeus 1970). These imports consisted of salted and cured fish products to satisfy traditional local tastes, as well as frozen fish and seafood products for the tourism sector. Today that position still holds true despite the best efforts of export sector to remedy the

current import-export deficit situation through the exporting of live Caribbean spiny lobster to narrow the gap. This position is further reinforced by the 2014 statistic publish by the National Statistic Division which stated that Antigua and Barbuda imported approximately 220 tons of frozen and fresh/chilled season food products. It is a commonly share notion that import levels remain high mainly because local agents are unable to satisfy or shift the traditional tastes for cured products such as salted cod, smoked herring and pickled mackerel. The seafood demand of the tourism sector does little to abate this issue as it only consume approximately 10 percent of the catch from local fisher (FAO,2013) and import the remainder. This is common through the Caribbean region as in 2009 CRFM Member States were estimated to have imported roughly 70,037 MT of fish. This was equivalent to 48% of the production from marine capture fisheries plus aquaculture production of the region for that year. Import of chilled/fresh or frozen fish and the import of canned fish each accounted for approximately 38% of total fish imports, while the import of dried, salted, smoked, pickled (cured) fish accounted for approximately 24% of the total imports (CRFM,2012).

Despite modernisation in fisheries sector exports are still restricted to the French overseas territories in the region such as Guadeloupe and St. Martinique. This export is primarily consist of Caribbean Spiny Lobster. Luckhurst and Marshalleck (1995) estimated that approximately 50-60% percent of the lobsters landed in Antigua and as much as 80% of that landed in Barbuda is exported to Martinique and Guadeloupe. In addition, records indicated that conch was exported to the French territories in the 1970s until mid- 1990s (Horsford 2004), but currently all conch landed are consumed locally (Luckhurst and Marshalleck 1995). In 1997, conch exports to European Union was banned due to the stringent harmonization of food safety regulations for EU Member States under Article 5 Directive 91/493, which include marine gastropods such as the queen conch. Before implementation of this system coupled with the challenging safety standards outline by EU approximately 23.5% of the conch landings were exported to the French territories in the region (Jeanel Georges; Robin Ramdeen; Kyrstn Zylich and Dirk Zeller, 2015). The recent statistic taken from the National Statistic Division suggested that in 2014 Antigua and Barbuda domestic fish export and re-export of fish trade is roughly 43,414 kg. This is approximately 19.7 percent of the quantity imported for that year which rightly justifies branding Antigua and Barbuda as net importer nation.

6.10 Consumer Preference

A daily observation of the average consumer tells us that consumers differ widely in their food preferences and consumption patterns: some prefers fish, others avoid it and prefer meat; some prefer fresh fish, other prefer processed fisheries products such as canned and smoked. An economical definition of consumer preference derived from the Theory of consumer states that it is the subjective (individual) tastes, as measured by utility (i.e., the level the satisfaction that a consumer derives from the consumption of a good), of various bundles of goods. Consumer value is measured in terms of the relative utilities between goods. Consumer's utility determinants are decided by a host of noneconomic factors such as quality, convenience, availability, Variety, Health and nutrition Concerns, safety and hygiene (Debreu, 1959).

6.10.1 Quality

Within the seafood industry the level of quality of the product is deciding factor between being marketed as a first grade high valued commodity fetching equivalently high market price as with the Yellow tail tuna sold on the Japanese market or otherwise. According to the International Organization for Standardisation, quality is define as "the totality of features

and characteristics of a product or service that bear on its ability to satisfy stated or implied needs". This entails all processes from harvesting of fish to reaching the plate of the final consumer in a satisfactory manner with respect to level of freshness, smell, meat texture and absence of fish-borne illness such as Ciguatera. Immediate and proper icing or refrigeration is the common advice given to fishers of developing nations to enhance quality and add value to their products thus resulting in earning higher revenue.

6.10.2 Convenience

It's becoming common for both parents to be active participants in the global labour force annually in both developed and developing countries. As a result convenience and ease of food preparation become a dominant factor in consumer's purchase choices. Modern labour-force driven parents find it troublesome to purchase fish and fisheries product due to it time-consuming preparatory nature. As a result consume are gravitating towards paying an addition premium to acquire products that are scaled, gutted, fillet or even precooked and cooked (De Silva, 2011).

Consumer demand cannot be met without the availability of the product or service desired by the consumer. Luckily within the Caribbean region the fisheries sector provide a wide host fisheries resources that are desired culturally and on a subsistence basis throughout the year. One of the core element in establishing a life time customer's base is the consistent availability of the right product; in the right place; at the right time in the right quantity. However, within Antigua and Barbuda and among the other Caribbean territories natural disasters such as Hurricane; seasonality of certain pelagic species as well as the implementation of relative new regulations such as close season, and gear restrictions on certain overfish demersal species have hamper the availability of fisheries product on the market. As a result domestically consumers have resorted to other alternative species or seek other protein substitutes.

6.10.3 Safety and Hygiene

Safety and Hygiene is a rapidly growing concern among the consumers of fresh fisheries products within Antigua and Barbuda and the Caribbean at large. As many islands in the region are seek to gain access to international market such as the EU they are expected to comply and satisfy the Food and safety prerequisites outline by the HACCP system. Antigua and Barbuda has found it difficult to appease these harmonise standard as it lack the facilities and resources need to execute the safety requirements; coupled with having some of the highest number of reported cases of 'fish poisoning' (i.e. caused by the ciguatera toxins) in the sub-region (295 cases in 2001 and 276 cases in 2002) (Horsford, 2004.). With such alarming and frequent occurrences it's only natural that local, regional and international consumers become more cautious.

6.10.4 Health and Nutrition

The adequate consumption of the right food with the appropriate nutritional content plays a vital role in the lives of today's health conscious consumer. Therefore fish and fisheries products are considered to be one of the healthiest and vital source of protein filled with a wide variety of fatty acids coupled with micronutrients such as zinc, vitamin A and iron (FAO, 2014). The added benefit of fish resource is that they tend to be abundant a wide variety ranging from big to small; from thick to flat width and from long to short in length. Smaller-size fish tend to be a much richer source of micronutrients which are more ready available for consumption by the low-income of under the poverty line members of society as these fish tend to be price very low. This is the case in Antigua and Barbuda as fisher's would sell the smaller-size fish at lower price or simply add them to the purchase of customers to enhance value.

7 SURVEY

7.1 Primary Data

The central mechanism used to extract the relevant primary data was questionnaires with the aid of structured and semi-structure interviews with fishermen (captain/owners), Supermarkets, Hotels and random consumers (Households). These quantitative methods allows for a broader study, involving a greater number of subjects, and enhancing the generalisation of the results.

The questionnaire geared at the fishers seek to strategically extract how the market mixed factors that impact the fishermen operation and to what extent does the fisher lend a listening ear to these factors. It also shed light on the logistic effort that goes into delivering the product to the plate of the final consumer as well as the effort invested into product quality, safety and overall healthy. The fisher's consumer markets as well as the factors that trigger demand in these markets were explored along with inputs from the fishers on how best to improve their unique situation were explored.

Moreover, the questions aimed at hotels, supermarkets and random consumers generally focused on the factors that influence the purchasing behaviour. To a large extent these questions are forward thinking as they in-cooperate the level of processing customer would like to receive as well as how they would like to access their fish product. The role played by quality, reliable, quantity, location and delivery time were examined.

The staff at the Antigua and Barbuda Fisheries Division implemented the survey by collecting questionnaires as well as conducting the interviews. The list of current legal fishers was taken from the fisheries division after the decease or retired fishers were taken from the list. Preliminary visits were made to the different landing sites around the island to discuss with fishers their unique situation and to have more effect grasp of how to structure the questions to acquire seek after information regarding the supply chain and their marketing activities. Questionnaires were distributed to various fishermen at the different landing sites starting 16th July. Approximately over one hundred questionnaires have been distributed so far. Fishers were interviewed at the Fisheries Division office when they came to renew their license and registration vessels. This could compromise the integrity and reliability of the information as fishers may answer questions in a bias manner. Fifty-one captain/owners were survey from the total captain/vessel owner population within the fisheries sector to provide useful and quantified feedback that could help achieve objectives of the project.

Another aspect of the research entails a consume preference research where 500 questionnaires were distributed at random nationwide, particular in the capital city and at the branches of the most popular supermarkets. This was done to sculpt the fish species typically demanded by the local population and their ideal method preparation or processing. It also painted a picture of what is considered as an acceptable price range for customers and which age range are seen as health conscious. These interviews were conducted face to face as well as randomly selecting numbers from the directory and calling households.

In addition, questionnaires were distributed to supermarkets and hotels. The top five largest supermarket outlets will be chosen to acquire a portrait of the variety and quantity of fish product they sell to their customers on an average basis. Who and where they import their products from will be explored as well as the motivation behind importing rather than

purchasing fresh fish locally. The same framework would be apply to the top hotels on the island to ascertain a completely image of factors that drive their demand for fisheries products.

7.2 Analysis

The primary purpose of this chapter is to quantify and present the trends and patterns revealed by survey in a more concise and understandable format. This section will paint a lucid picture using graphs, charts and tables of the different forces and conditions at work in the domestic seafood industry that motivate the actions of the key stakeholders.

Table 2. Showing household demand for fresh local fish (Appendix 3).

Respondent Position	Percentage	Total
Yes	94.6	500
No	5	

Table 3 indicated that over 90 % of the consumer sample population demand fresh local fish as part of their diet irrespective of their age range or residential community.

Figure 10.Level of Processing required

The majority of the sample population desire some degree of processing to be done their seafood. Scaling and gutting is the highest form of valued added method available and it demand is reinforced by over 80 % of the sample. It's should also be noted that respondent who choose "other" demand mainly canned, salted and smoked products.

Table 3. Species demanded in preferential Order

Species	1st Preference	2nd Preference	3rd Preference	4th Preference	5th Preference	Total
Angelfish	10%	23%	8%	34%	24%	147
Barracuda	47%	26%	0%	21%	5%	19
Doctorfish	38%	15%	11%	25%	11%	307
Grouper	7%	20%	29%	29%	15%	490
Grunt	8%	13%	23%	27%	30%	240
Lionfish	15%	27%	23%	35%	0%	26
MahiMahi	63%	38%	0%	0%	0%	8
OldWife	30%	23%	12%	12%	23%	83
Parrotfish	12%	16%	23%	13%	37%	293
Salmon	30%	21%	8%	32%	9%	53
Silver	61%	0%	17%	6%	17%	18
Snapper	34%	29%	25%	10%	2%	487
Tilapia	13%	28%	11%	19%	30%	47
Triggerfish	10%	27%	27%	12%	24%	51
Tuna	60%	10%	10%	0%	20%	20
Marlin	0%	44%	0%	0%	56%	9
BangaMary	19%	49%	26%	0%	6%	47
Goatfish	50%	0%	0%	25%	25%	4
Butterfish	50%	0%	50%	0%	0%	4
saltfish	0%	0%	0%	100%	0%	4
Mackerel	0%	0%	0%	0%	100%	14

When consumers were asked to list their top five species in preferential order Snapper dominated 1st and 2nd order preference with respect to quantity and percentage. Groupers dominated the 3rd and 4th order preference while grunt ranked as 3rd place under the 5th order Preference.

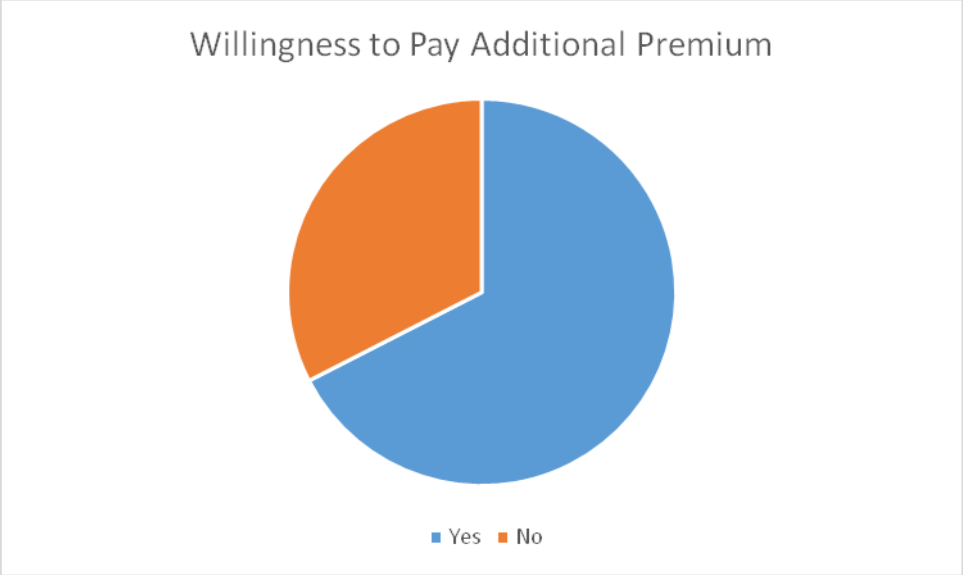


Figure 11.Consumer willingness to additional premium

Figure 11 Indicate that over sixty-five % of the sample is willing to pay an additional premium more processing.

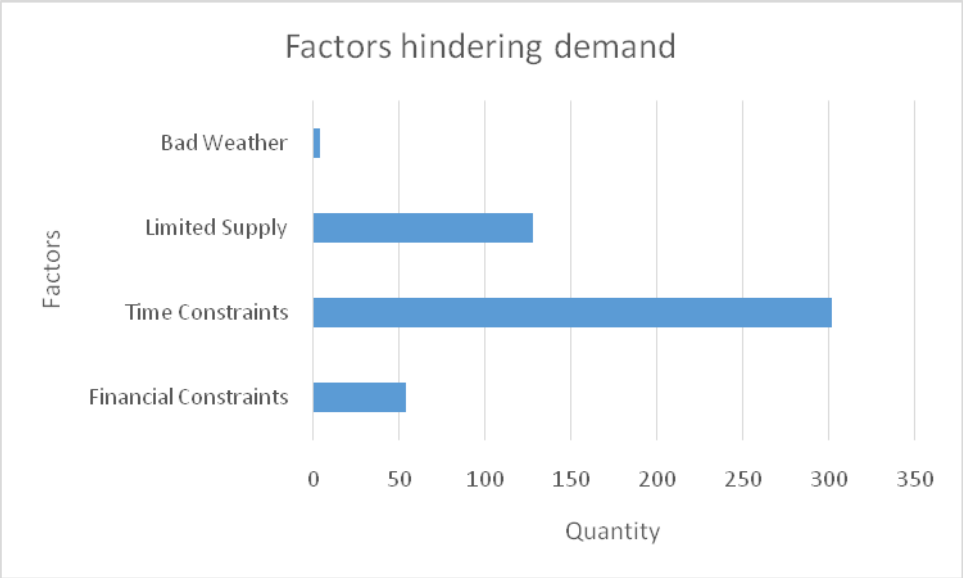


Figure 12.Factors preventing consumers from acquiring seafood

Survey revealed that time constraints is the most dominant factor preventing consumers from acquiring seafood accounting for sixty percent of the sample, followed by limited supply with twenty-five percent. Financial constraints are a hindrance for roughly 10 % of the sample population while bad weather accounts for less than 1 %. But it should taken into consideration that contribute to limited supply.

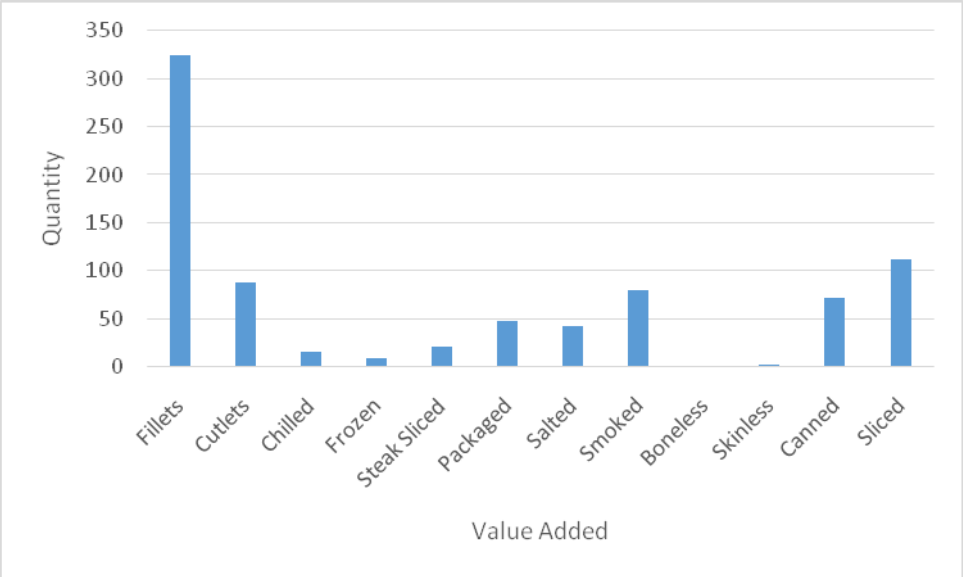


Figure 13. How consumers would like seafood to be sold

At the point of sale over 40 % of the respondent prefer to have seafood presented in a fillets format while another roughly 14 % desire slicing. Smoking and cutlets both accounts for approximately 10 %; while Canning and accounts for 8 %. Salted and Package products both represent rough 5 % of the sampled responses.

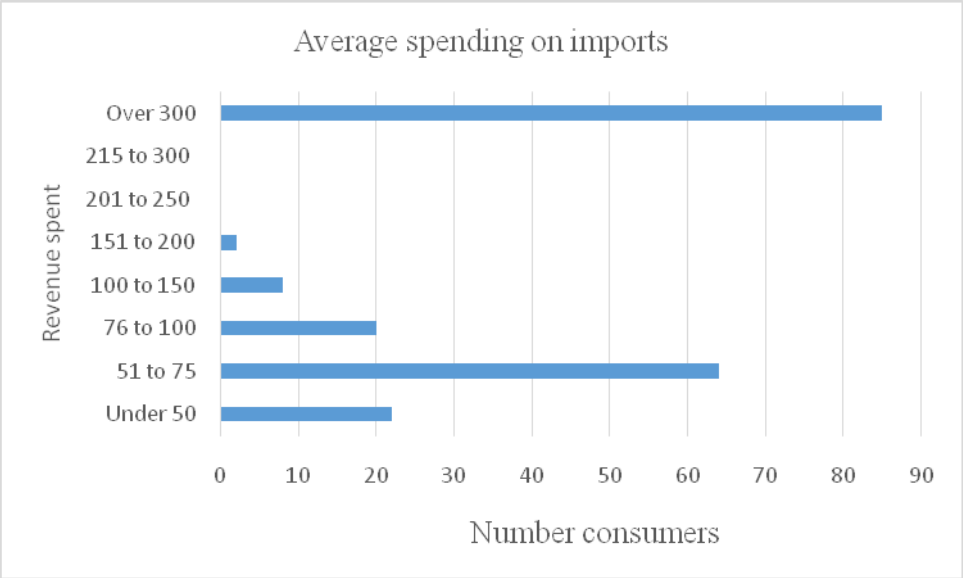


Figure 14.Average spending on import seafood

The survey revealed that 42 percent of the sample populate who consumer imported fish product allocate roughly over 300 EC dollar to these products monthly. Another 32 percent invest between 51 to 75 EC dollar while 9 to 11 percent is allocated among 76 to 100 and under 50 EC dollar respectively. In addition 4 percent of the sample invest between 100 to 150 EC dollar of their disposable income towards domestic imports while 1 percent invest allocate 151 to 200 EC dollar.

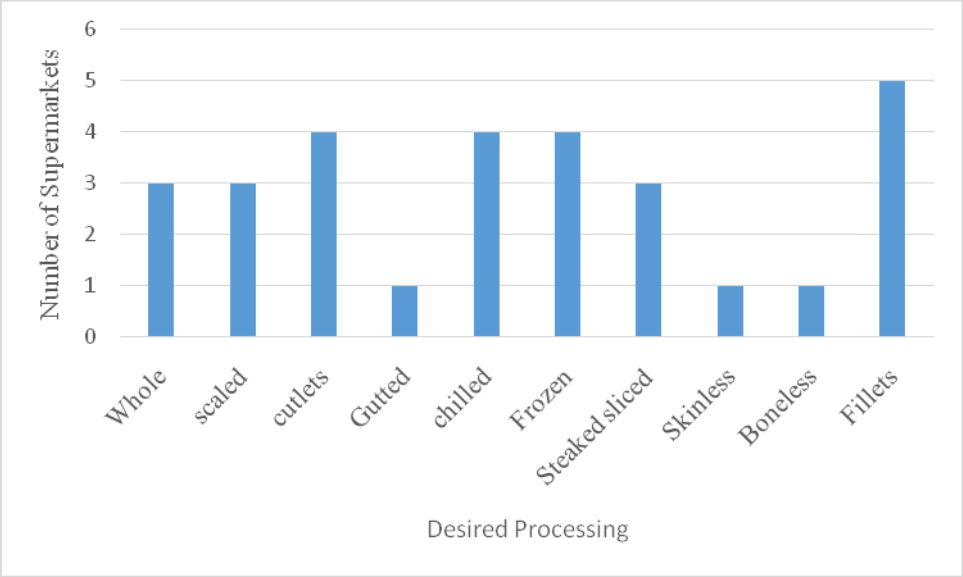


Figure 15.Level of processing demanded by supermarket

Fillets are the most desired form of processing demanded by the top five supermarkets branches in Antigua and Barbuda. Cutlets, chilled and frozen seafood products are demand among four of the major supermarkets. Whole, scaled and steaked-sliced are popular among three branches while skinless and boneless are only demand by one entity each.

Table 4. Supermarket willingness to pay additional premium for processing

Response	Number of Supermarkets willing to pay Additional Premium
Yes	4
No	1

Table 5 highlighted that majority of the surveyed supermarkets are willing to pay an additional cost acquire the level of processing they desire.

Table 5. Supermarkets average spending on imported seafood

Amount spent on Imported Fish	Supermarkets
10,500-15,000	2
7,500-10,000	2
4,500-7,000	1

Table 6 revealed that two of the top five supermarket invest 10,500 to 15,000 EC dollars every month to acquire processed seafood products from their external supplier; while two others invest between 7,500 to 10,000 EC Dollar to acquire valued added seafood products. The fifth entity invests between 4,500 to 7,000 EC Dollar at least each week to acquire its fisheries products.

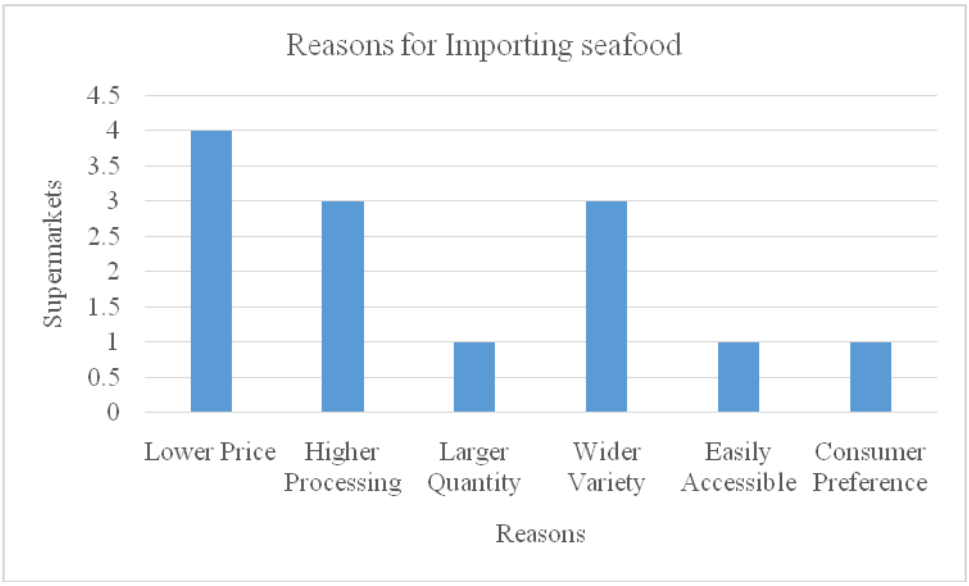


Figure 16.Supermarkets reason for import seafood

The prevailing reason among supermarkets for importing seafood is lower prices as its cheaper in the long run when purchased in bulk. The availability of higher processing is the second most important reason for importing seafood. Consumer preference, larger quantity and accessibility were only listed by one supermarket each.

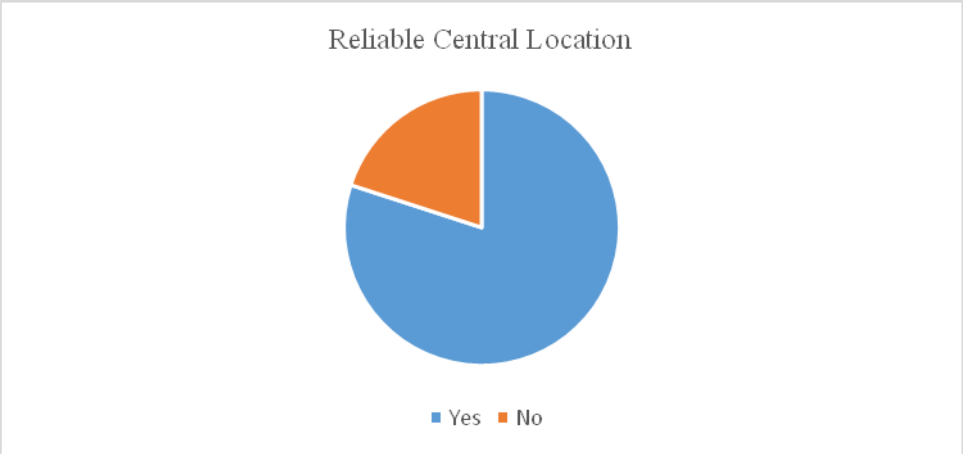


Figure 17.Central location to acquire seafood

The majority of the supermarkets found the concept of having a reliable local central location to assess all landed domestic appealing. Only one supermarket was not in agreement with this being done locally and traceability was listed as the primary concern.

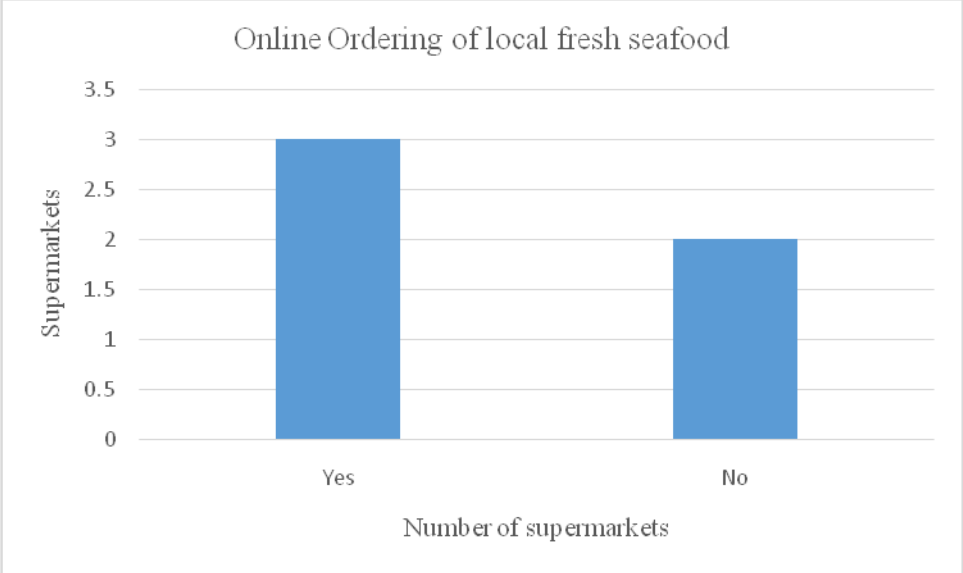


Figure 18.Ordering seafood Online

Over 50 percent of the sample are receptive towards the concept of ordering seafood online while the other two are reluctant due to traceability and the poor internet connection.

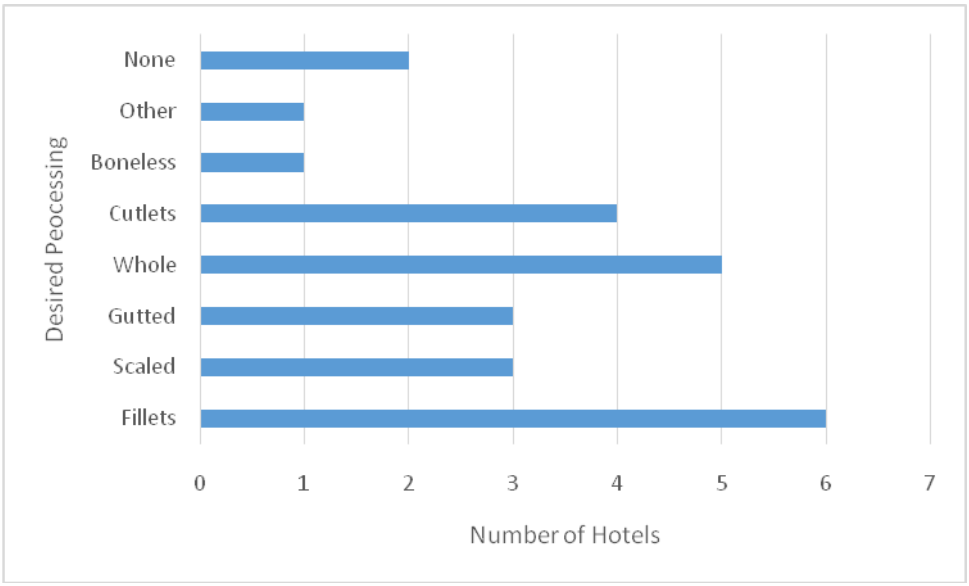


Figure 19.Level of Processing demanded by hotels

Similar is observation was detected among hotels where fillets is the most demanded form of processing among 6 of the 10 hotels sampled. Whole fish was demanded by 6 while scaled and gutted was demanded by 3 equally. Boneless and other have 1 each with other being smoked fish. Two of the establishments are content with their current level of processing.

Table 6. Hotel Willingness to pay additional Premium for added processing

Respondent Position	Number of Hotels willing to pay for Additional Premium
Yes	6
No	4

Table 6 indicate that 60 % of the sample is willing to pay for their desired additional processing. The remaining 40 % are content with their current level of processing.

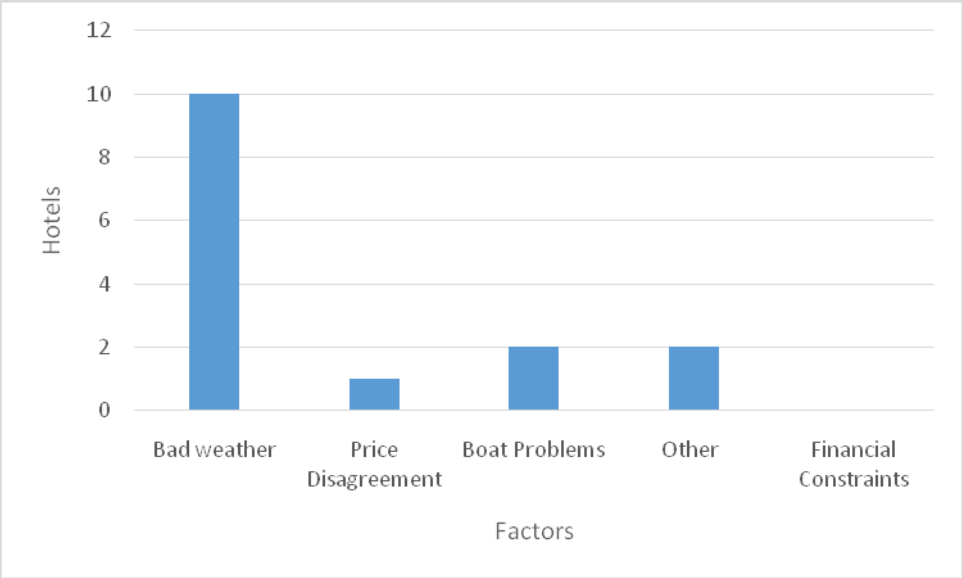


Figure 20.Factors preventing hotels from acquiring seafood

The most powerful factor preventing hotel suppliers from meeting demand is bad weather as it was listed unanimously by entity. Boat problems and other were listed twice each with others consisting of limited supply. One respondent list price disagreement while financial constraint was not limiting factor on the part of the hotels.

Table 7. Hotels average spending on imported seafood

Amount Spent imported seafood Monthly	Number Hotels
500-1000	1
1,500- 2,000	2
2,500- 4,000	1
4,500- 7,000	2
10,500- 15,000	1
26,000 and Over	1

As shown by Table 8 two sample members invest 4,500 to 7,000 EC dollar monthly into imported seafood while two more invest 1,500 to 2,000 EC dollars monthly. The highest monthly allocation towards imported seafood was 26,000 EC dollar and the lowest is 500 to 1000 EC dollar.

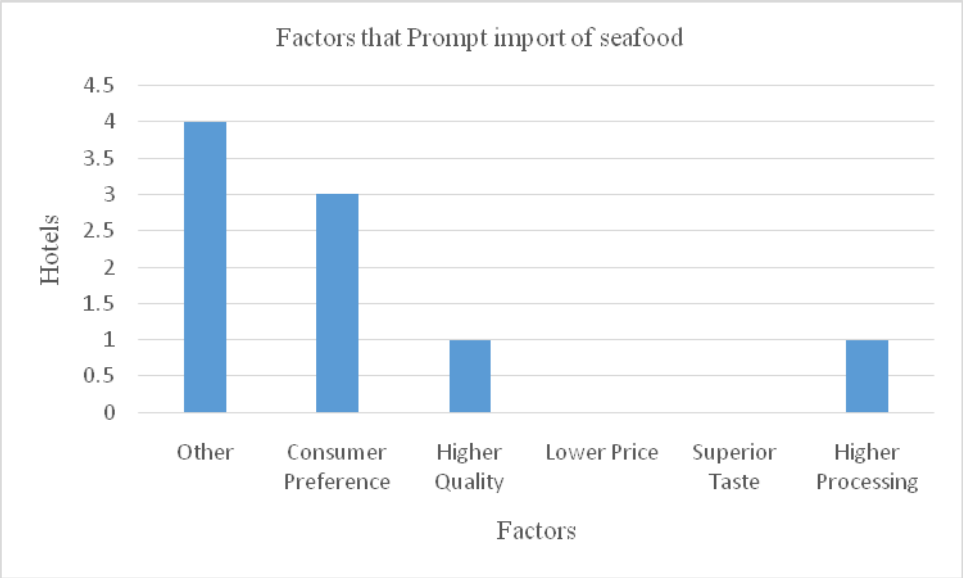


Figure 21.Factors that prompt importation of seafood

The dominant factor prompting importation of seafood among the sample population was "other" with 50 %. Other basically consist of limited supply and using imports as substitutes. Consumer preference has roughly 38 % of the sample while higher quality and higher processing share one each. Lower price and taste has no effect on the importing of seafood.

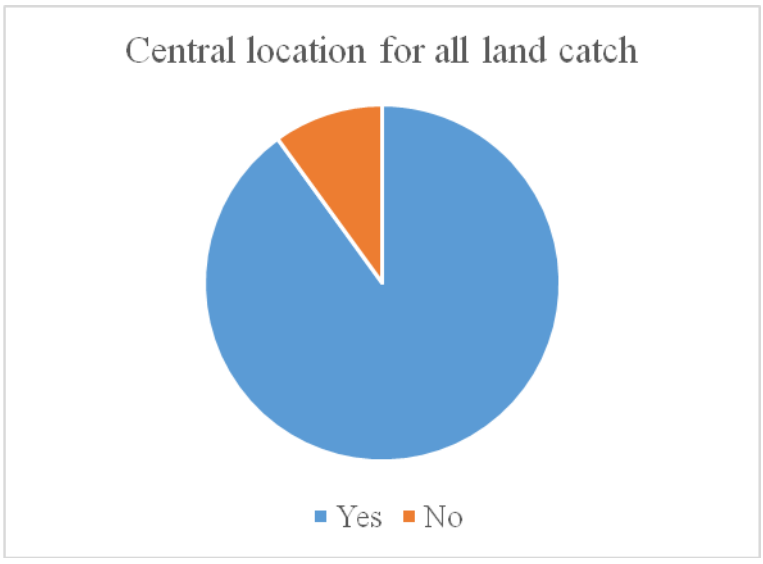


Figure 22.Hotels purchasing seafood from a local central location

The idea of having a central location documented all landed fresh is appeal 90 % of the sample.

Figure 23.Hotels purchasing seafood online

Results indicated that purchasing local fresh fish online is an option 80 % of the sampled population is will pursue. The other 20 % would prefer to evaluate the product closely with their senses before purchasing.

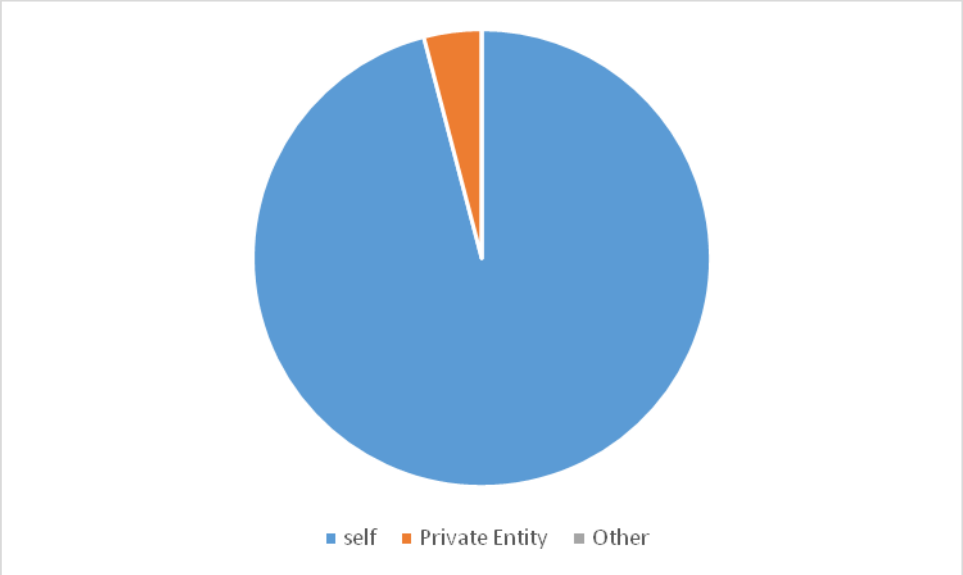


Figure 24. Who is responsible for marketing fishers catch

Survey conveyed that 98 % of fishers are responsible harvesting and marketing their own products.

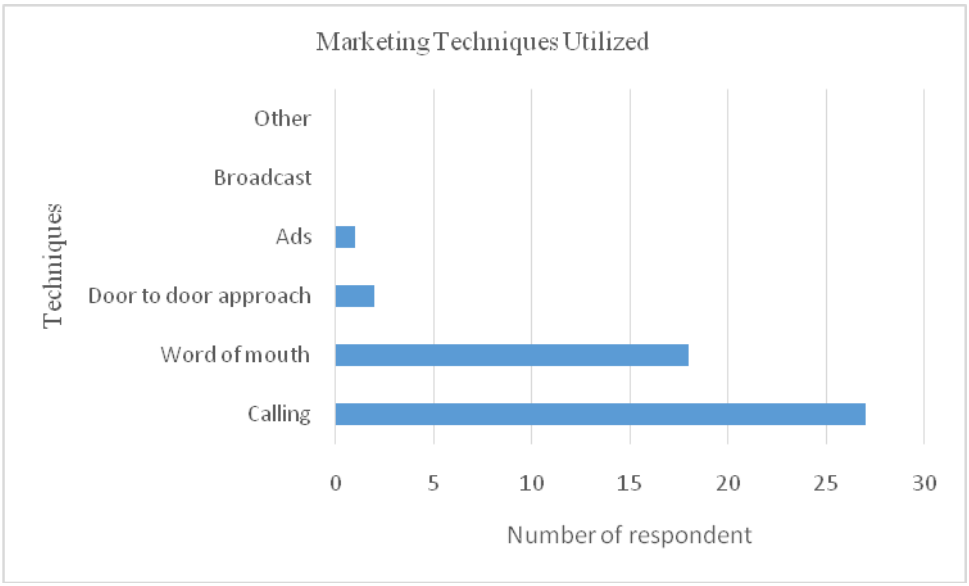


Figure 25.Marketing techniques Utilized

The most dominant marketing technique utilized by domestic fisher's is calling with 56 % of the sampled population; followed by word of mouth with roughly 38 %. Four percent of the sample population used the door to door approach while 2 % use Ads.

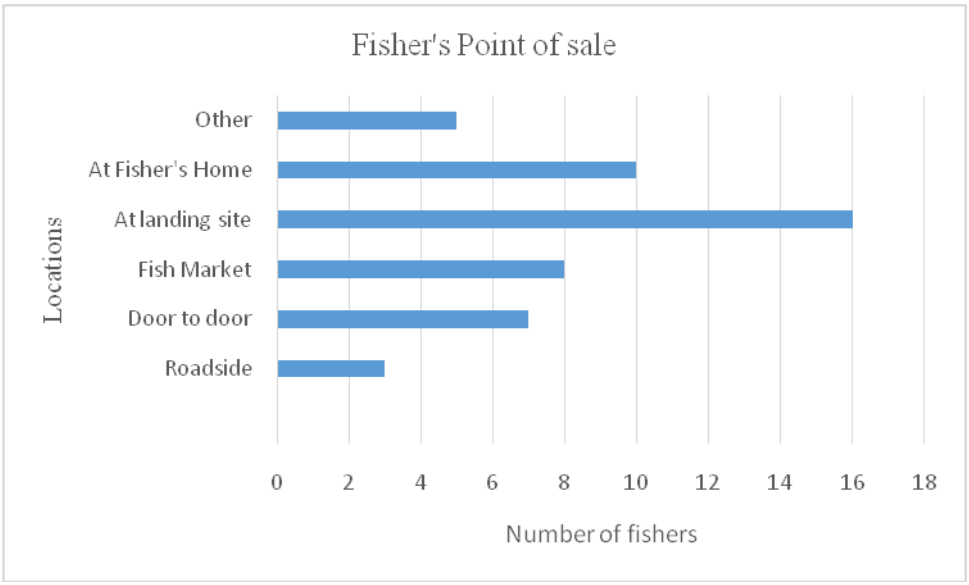


Figure 26. Location of point of sale

The result indicated that roughly 32 % of the sample sells their catch at landing sites, while 20 % would sell from their homes. Sixteen percent of the catch are sold at the market while 14 % are delivered to the customers. Six per are sold at roadside and 10 % are sold through other means.

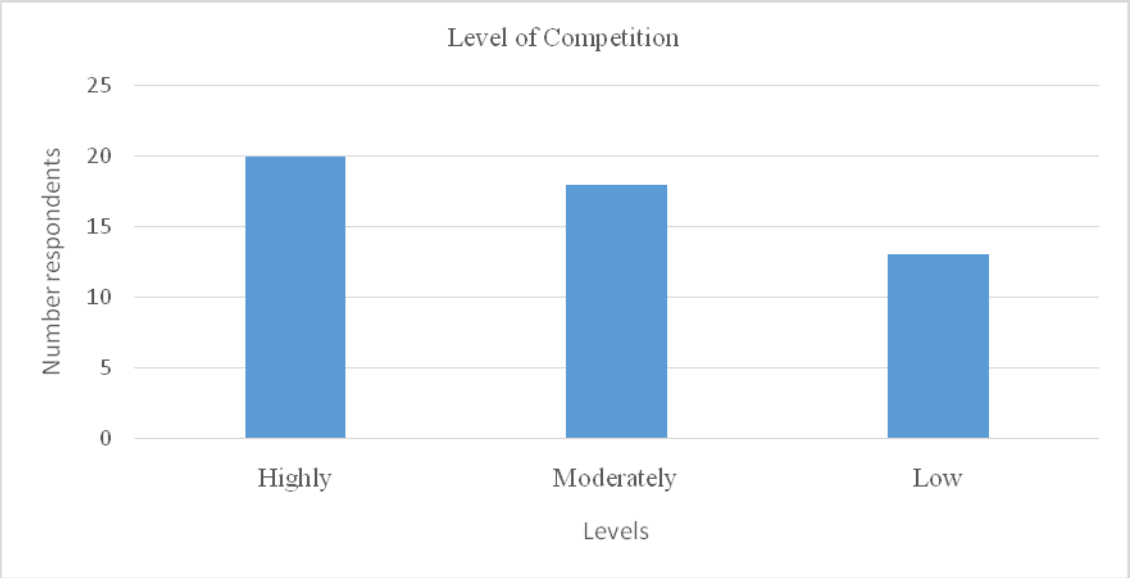


Figure 27.Level of competition

Roughly 40 percent of the sample define the market as highly competitive while 35 percent view it as moderately competitive. Twenty-Five percent view the existing level of market competition as low.

8 Results and Discussion

8.1 Establishing the demand for higher processing or value added products services

The survey advocate a firm support position Grunert, Hartvig Larsen, Madsen & Baadsgaard, (1996) perception that more market orientation is needed in fisheries sector as well as the subsequent processing links in the food value chain. The demand for higher processing was reinforce among all three segments of the consumer markets researched. The highest domestically available form of processing "scaling and gutting" was requested by 80 percent of the sampled consumers while at the point of sale the majority of the sample desired seafood to be sold as fillets, sliced, smoked, cutlets, salted and packaged. The opportunity for producers and processors to cooperate together and capitalize on this unsatisfied demand is available. They can acquire higher unit value per fish landed (Tronden, 2001) as well as to develop or introduce higher revenue earning value added products as Vietnam and Cambodia stakeholder.

Moreover, the survey revealed snapper, grouper and grunt were ranked among the most preferred demanded domestically harvested species as they dominated 1st, 2nd, 3rd and 4th order preference. As there is already great demand for these species sustainable value added and value creation initiative should be strategically design within the parameter of these species. This already acquired taste will quickly foster processors and produce likelihood of securing competitive advantage in the market. Therefore, the transformation within the framework of Porter's five force model from a position of low supplier power to high bargaining power becomes a much more possible reality.

In addition, research findings indicated that the demand for higher processing is great among the supermarkets and the hotels as they cater for multiple consumer preference but the most popular processing format desired by both is fillets. Within the hotel industry this followed by whole, scaled and gutted level of processing as the head chef would be directly responsible for catering to the consumer's immediate needs. On the other hand, along the supermarket value chain fillet are followed by cutlets, chilled and frozen seafood products. These products are sold with consumer's convenient and ease of preparation in mind. It should be mote that despite the clear demand for higher level of processing extreme level of processing practiced in developed country such as skinning and boneless products are strongly demanded. Therefore, in keeping with the theories put forward by advocates of value chain philosophy producer and processor who seek to gain a competitive advantage in the domestic markets should deliver the right product, in the right quantity with moderate format of processing. This will position producers and processors to realize higher unit value for catch landed and fishers should be able to retain current or higher income levels with reduced catches in the long run with less fishing effort (Arnarson and Trondsen, 1998)

8.2 Establishing Financial Feasibility for value added products

Holland and Giant (2001), advocate that fishers displayed income generating behaviour rather than fish for a specified or maximum quantity. But for fishers to satisfy his financial need the different consumer segment of the market must be willing to pay the required premium. The survey outline that the different fragments of the consumer market are not only willing to pay the minimum requirement for minimal processing but are also willing to pay for higher premium for valued added products. This willingness to pay for value added products is reflected ambitiously by 80 percent (Table 5) of supermarkets, follower 65 percent

(Figure 11) of households and 60 (Table 7) percent among hotels. This consumer trait is favourable for both fishers and processors as it aligns to their income generating behaviour.

More Over, figure 14 suggest that consumers allocate a relatively large portions of their disposable income towards acquiring imported seafood products. Over 40 percent of the households invest roughly 300 EC dollars towards acquiring imported seafood food while another 32 percent invest 50 to 75 EC dollar. According to table 5, 80 percent of the supermarkets invest at least 10,000 EC dollar monthly to acquire imported seafood and the driving forces behind this is high processing, lower price and wider variety. Among the hotels surveyed 60 percent of the sample also allocate at 10,000 EC dollar at minimum to acquire imported products. These expenditure directly correlate with the exorbitant proportion of revenue allocate towards imported fisheries product and the existing import-export seafood deficit. This expenditure establishes the availability of sufficient financial resources that could be allocated towards more domestic value added product, as imported seafood such as salmon and tuna tend to be expensive. With the adoptions of a more market-driven value chain receiving feedback and signals from the consumers the right product or variety of products can be developed or introduce to capture a larger fraction of consumer income. This could combat the low revenue earning position currently held by most fishers as administering the right product, in the right format at the right time will earner unit revenue and tackle the problem of post-harvest losses and bottleneck on the market.

More importantly, it was interesting to note that the most crucial factor that prevent household from acquiring seafood is not financial constraint but time constraints. This speak volumes to the level of financial security the average individual possess. Financial constraints accounts for roughly 10 percent (Figure 12) of the sample which suggest that the average consumer is comfortable with current domestic seafood prices and enjoy comfortable standard of living that can accommodate price increases brought on by value added initiative. Among the Hotels the major factor preventing the acquisition of fresh seafood is bad weather while financial constraints was not mention as a hindrance (Figure 20).

8.3 Current challenges experienced by existing supply chain

As illustrated by Figure 1 the existing supply chain is one where low revenue, high post-harvest losses and bottlenecks is quite common when executing primary activities (Dr. Richard Boateng, 2011). This situation should not exist since most producers communicated that icing is done throughout the cold chain and at the point of sale but observation at the public market would share a contrary opinion. Additionally, the functioning reality of the existing supply chain is one that ignores secondary activities such as consumer feedback that is usually facilitated through market research, which will enhance consumer endowment in the long run (Porter, 1990). The research reveals that market signals concerning what product to produce, in what quantity, what format and what time are not being taken into consideration. In other words, ‘hearing the voice of customer’ and adapt offerings (Kohli, 2000) to their needs is not a priority. This is reinforce with 92 (Figure 12) percent of the fishers with absolutely no prior marketing training or marketing experience being responsible for marketing their owner products and 98 percent (Figure 25) of the marketing technique utilize revolve around word of mouth, calling and door to door approach. Fisheries Division records indicate that over 80 percent of the fisher did not acquire a secondary school education. Therefore possessing necessary expertise or marketing foundation needed to strategically and success market seafood seems beyond their scope or qualifications. As a result fisher’s production is focused on efficient logistics using upstream and downstream businesses aimed mostly at pushing products to the market, with no market feedback from

final consumer. This situation is further compounded with the point of sale being scattered among various locations such as roadside, fisher's home, landing sites and fish market (Figure 26). This becomes a difficult task for consumers with time constraints and shopping for convenience (De Silva, 2011). Poor marketing techniques and neglect of marketing signal being transferred from the end user is not common under auction systems. An auction system display products to be sold every day and equip buyers with the capacity to inspect and make procurement decisions pertaining to the level of quality and what available on the at the market; and auction are usually fixed in one central location and more modernise auctions are done online so buyers and seller still meet in a single central location. The market-oriented nature of the auction system is crucial prerequisite towards creating superior customer value, which in turn is regarded as a major determinant of fostering competitive advantage. The concept of acquiring seafood from one central location was well received by 90 percent (Figure 23) of the hotels sample and 80 percent (Figure17) of the supermarket entities gravitate towards having a central seafood location. Having this system be done online was also accompanied by a positive feedback reflect through 80 percent (Figure 23) of the sample hotels and 60 (Figure 18) percent of the supermarkets. Having this system be done online would be a more fitting compliment as the sample revealed that most fishers do not owner means of transportation.
Another major contributing factor to the current ill-favoured condition of the current supply chain is the fact that the level of competition range from moderate to highly competitive (Figure 27). This aligns with the Five Force analysis done on the domestic seafood industry as there is an absence of product differentiation among sellers. With no value added or value creation consumers basically purchase a homogeneous product from all producers, which has chance of secure competitive advantage in an already very competitive market environment. When faced with intense competition the hand-line bass fishers in Brittany add value to their product by developing a traceability "fish Tag ID" system, which enables customers to identify the origin of the fish, how it was caught and the fishermen who caught it. Value creation is a simpler and more attractive alternative when there is high level of competition combine with high level of product similarity and the means for higher processing is lacking.

8.4 Summary of benchmark discussion on appendix case studies

Several case studies from both developed and developing countries with similar characteristics and objectives were reviewed and assessed to benchmark the best practice to cultivate an appropriate Market-driven value chain the fits to the needs of the domestic seafood industry in Antigua and Barbuda.

Under the Regional Fisheries livelihood Programme for south and Southeast Asia (RFLP) the chosen countries were enhance their livelihood and practice sustainable harvesting of the natural resources through a series of value added initiatives. They first facilitate the dissemination of information promoting hygiene and food safety through posters, billboards, leaflets and other informational materials. This was reinforced with the provision of ice boxes, gloves and other hygienic supplies to guarantee safe seafood that can be marketed at a higher price. The programme also provided training in food safety as well as business management and marketing. It also focused on developing recipes as well as introduces new valued added process to generate additional revenue for local fishers in the different communities. Moreover, a series of infrastructural development took place fish ports, market area and action halls. Ultimately, fisher saw the matriculation in their available disposable income with these value added approaches and consumers experience a more delicious and healthier product equivalent to the additional premium spent.

9 Conclusion

In essence the overall goal of this research is to identify the feasibility of establishing a more flexible market driven value chain that will eliminate the current challenges experience by the existing supply chain and generate competitive advantage for fishers. The survey revealed the following:

There is a great demand for higher processing and value added initiative among the different market segments. It should also be noted that more research needs to done in the restaurant segment of the market as this crucial revenue generation area was not explored throughout this research due time constraints.

Snapper, grouper and grunts are among the most preferred species domestically. This provides suppliers and processor with the opportunity to enhance their strength in the domestic seafood market and upgrade to a position of high bargaining power through the adaptation of value adding initiatives to foster product differentiation. This in turn will provide suppliers with competitive advantage and negotiate favourable prices which earn them high revenue per unit sold.

There is supportive evidence of financial feasibility towards establishing a market driven value chain that seek to gain competitive advantage through the application of value added mechanisms. Further research is also needed to assess the financial the potential financial gains from the adaptation value added products and higher processing.

Consumers display strong willingness to pay addition premium to acquire added products. Domestic producers and processors have the opportunity to exploit the relative large portion of consumer disposable income allocated towards purchasing imported fish.

The root causes of the current challenges are little to no marketing coupled with no market research to transform landed inputs to a final products that resemble final consumer feedback. As fishers lack the marketing expertise needed, they could accomplish this through training or the establishment of a central marketing location or system that maximise efficiency and enhance the livelihood of domestic fisher through earning high revenue per unit sold. Such a system will alleviate the strain placed on fishers to locate and operate in competitive market marketing environment.

10 Recommendations

Drawing from the experience of successful value added and value creation approach done in both developed and developing countries with identified characteristics as Antigua and Barbuda it would be best to administer a two phase recommendation scheme to establish an efficient market driven value chain. The first phase would consist of information gathering and sharing while the second phase would be more proactive.

- **Information Phase**

This initial stage is consist of two separate but equally important components. The first step entails the gathering and acquisition of pertaining information relating to stock size; general fisheries data as well as market and consumer data. This information would be ideal for sound long term decision making with respect to identifying the best mode to meeting consumer needs in a sustainable manner while generating acceptable returns for each affect stakeholder.

The second aspect is information sharing. This embody the dissemination of information concerning food safety and health to all affected stakeholder. This phase is strategically designed to educate the sellers and buyers the benefit of consuming healthy seafood. There is also a component that will inform fishers and processors of the potential revenue gaining opportunity behind adopting value added initiatives. Appropriate medium such as leaflets, television and radio broadcast, posters, ads and Internet can be utilized to disseminate the message to the right stakeholder. This phase should range from six month to two years, as it would take a long time to change the mentality of fisher's and producers.

- **Proactive Phase**

This stage is more technical and involves bringing the various players together under neutral terms and conditions. The provision of training in a variety of area is an avenue that needs to explore if establishing a market driven value is to be brought to reality.

Training on marketing principles and business management are necessary components for fishers and processor to be in a position to make education decision under particular market condition. Training in business is needed as it would help to cultivate a foundation for healthy and long-term decision making framework that listens to the voice of the final consumer. This training can be done in conjunction between the fisheries division and the fisherman cooperative as both entities possess the required human resource and expertise.

The provision of training in the preparation of value added products demanded by domestic consumers. Such products include those of the smoked and salted variety. These products are traditionally appealing and have the capacity to establish niche markets. This can be accompanied with a recipe manual detailing the preparation as well as introduce other value added products that are conducive to domestic taste. The Fisheries Division can assist with the training and preparation of manual as it has experience effective activities. The fisheries complex is also equipped with processing unit plant and ovens for smoking fisheries products.

Establish an auction mechanism that fits to domestic needs. This auction system could be in established in the physical capacity through the utilization of the public fish market area where fish are already bring their products to be sold. This would be more within the comfort zone of producers, as it resembles their current activities. The successful adoption of this can strive from benchmarking practices from developed countries. With a series of renovations unutilized areas of the public fish market can be fitted to execute a successful auction system.

Another variation to the auction approach is have it done online as in the case of developed countries. This centralize online manner of conducting business transactions was supported by the survey. It would have to be modern and simplified greatly to cater to the needs of Antigua

and Barbuda. As fishers are more comfortable with communication through texting and calling it would best to in cooperate this element into the auction system when communicating consumer needs to fishers. Maybe the system can be designed to send text messages to fishers outlining the exact specifications of each particular consumer demand. This would be well received among hotel and supermarket as are comfortable with purchasing seafood online. The governance and maintenance of this online system can be executed by the Fisheries Division or the Fisherman Cooperation.

Moreover, the implementation of an e-market website could be an option pursue to establish greater market orientation. It would be designed for fishers to take a picture of their catch post it on the website for all customers to view and make real time purchasing decision to maximise on product quality. The supervision of this website can be done by the Fisheries Division as it is strictly monitoring and maintenance.

In addition, a more simple approach to making the value chain more market friend is the adaptation and utilization of cost effective Apps to execute marketing and purchasing transactions. Fishers could compile a directory of customers under friendly apps such as ‘whatapps’ and inform his customer basis when he is going to fish by sending a broadcast to the entity group. It even grants the fisher’s the flexibility of sharing real time photo of his catch with customers. Customers will be able to communicate their interests to produces as well. This system is not complex and no computer literacy is required.

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APPENDIX 1: CASE STUDIES

Value added approach from developing country case studies

The Regional Fisheries Livelihoods Programme for South and Southeast Asia (RFLP) set out to enhance capacity among participating small-scale fishing communities and their supporting institutions in Cambodia, Indonesia, the Philippines, Sri Lanka, Timor-Leste and Viet Nam. The RFLP aspire to provoke positive change and enhance the livelihoods of fishers and their families while advocating and stimulating the importance of more sustainable fisheries resources management practices. The four-year (2009 – 2013), US$ 16.35 million programme was funded by the Kingdom of Spain and implemented by the Food and Agriculture Organization of the United Nations (FAO) working in close collaboration with the national authorities for fisheries in the six participating countries.

Moreover, the RFLP programme strive to remedy the loss of income from fish and fishery Products attributed to inferior handling, poor preservation and processing practices, and inequitable returns from or because of the existing marketing mix. Activities were specifically geared towards strengthening public awareness revolving around food safety issues; provision of adequate training for processors and traders in fish handling, processing and business management; enhancing the management of landing sites; constructing and piloting operations for adding value to products and marketing; and improved the transparency and accessibility of available market information.

Viet Nam Case: Measure for improve quality of fisheries product and marketing chain

The Hygiene and safety of seafood products is a serious issue along the central Vietnamese coast. The Regional Fisheries Livelihood utilized a wide variety of activities to broaden public awareness of food safety issues. Billboards were placed in public areas as well as distribution of posters and leaflets on food safety in local fish selling areas, community markets, fishing vessels, fish collection points and at pre-processing and processing units. Radio station were utilized to broadcast basic messages on food poisoning and preventative measures while documentaries concerning food safety were developed and aired on Thua Thien Hue television (TRT) and by the provincial TV channel of Quang Nam. In addition, communal public address systems were also used to transmit basic aquatic product hygiene and food safety messages.

The RFLP Provide training on food safety hazards and preventative methods for fishers, traders, processors and commune and district level fishery management staff. More than 500 cool boxes and 50 oxygen aerators were handed over to beneficiaries in the three provinces to enhance the quality of their aquatic products.

Renovation was done at the Thuan fishing port and fish market in Thua Thien Hue province. The key elements of the renovation included the expansion of the trading hall; improvement of the water supply, drainage system and toilets; installation of lighting and garbage bins; and, the establishment of a fish auction area. In the immediate term, this assistance has improved hygiene conditions for trading by local fishers as well as traders, most of which are women. Sia market, a district-level market of Quang Dien district, was also upgraded, providing a better environment for both fish traders and customers.

Fish sauce is traditionally an important source of income source for Vietnamese fishing communities along coastal areas. Training was conducted on fish sauce making and food safety in Quang Tri province introducing improved filtering methods in order to boost fish sauce quality. Subsequently, a pilot for the production of fish sauce in three communes of Quang Tri province was launched. Training on drying techniques was also provided and a pilot scad drying model was implemented in one commune in Phong Hai commune in Thua Thien Hue province.

Additionally, support was towards building the capacity of Binh Minh Fisheries Association in Quang Nam province to effect direct marketing practices. The Fisheries Association members were trained how to introduce their products, how to set up business contacts and relationships as well as how to identify customers' needs and fish prices.

Value add initiative impact

The improved fish sauce production launched in three Quang Tri communes (six groups) improve filtering method which resulted in higher quality "maggot free" fish sauce. Ultimately this new method generates higher income and required both much less time and labour costs when compared to the old approach. Under the improved filtration system 2 kg of fish produced 1.5 litres of fish sauce, including 1 litre of class- 1 and 0.5 litre of class-2 fish sauce, while using the old method 2 kg of fish only yielded one litre of class-1 sauce, with 10-15% of the protein content remaining in the fish sauce not being extracted.

Fishers Phong Hai and Phu Thuan communities were able to set higher selling prices for capture fisheries product as the provision of aerators, batteries, plastic cool boxes, ice, and salt greatly enhance the quality of the product for the end user. The use of aerators increased the survival rate of crabs which not only resulted in significantly higher prices but also propelled the fishers to operate in another market segment such as live crabs (VND 25,000-30,000/kg for dead crabs compared with VND 100,000-200,000/kg for live crabs.) The aerators cost only about US$ 20 and so can quickly pay for itself.

Cambodia Case: Measure for improve quality of fisheries product and marketing chain

An awareness campaign was launch among 569 participants through posters and other informational material, on fisheries product safety at landing sites, processing sites and for consumers. This was compliment with Training and a manual on Good Hygiene Practice (GHP) in the community based fishery products supply chain was developed and approved by Fisheries Associations for national use. Training was supplemented through the provision of basic tools such as ice boxes, plastic baskets, boots and gloves. Training on business management for fish sauce production and fermented fish groups was carried out. Subsequently pilots for the improved production of fish sauce with CFi Koh Kchang and fermented fish with CFi Banteay Prey were launched.

Value add initiative impact

Upon receiving the equipment and Training from the Regional Fisheries Livelihood Programme many Cambodian fishers have reported immediately be able to negotiate better price for their commodity as ice box can keep fish chilled for a longer period when used properly. Now that the rate of spoilage has reduced and the overall quality of the product has enhance fishers are able sell selected species such as short-body mackerel between 2000-3000 Riels per kilo whereas before they would of only fetched between 500 to 800 Riels per

kilo. Another fisher reported prior to receiving training when he caught 300kg of fish at least 75kg would spoil but after applying the knowledge he acquired as well as utilizing the ice box he would only loose approximately 10kg.

The techniques introduced to improved fermented production was found to be very success among a group in Banteay Prey. It was estimated that 2,500 kg of fermented fish were sold in May 2013. These were packaged in plastic containers bearing Community Fisheries labelling. The price of the fermented fish sold increased from 5,500-6,000 Riels to 6,500-7,000 Riels after using the improved packaging.

APPENDIX 2: VALUE ADDED APPROACH IN DEVELOPED COUNTRIES CASE STUDIES

Case: The association of hand-line Fishermen from the tip of Brittany by European Union Commission 2011

Background

Before the early nineties the bass fisherman of Brittany enjoyed favourable fishing harvesting as well as satisfactory post-harvest sales and returns on their fisheries product. But at the dawn of the early nineties all this changed. They found themselves experience a rapid decline their returns as the market has changed. This was due to the new entrants of farmed bass. This sudden blow attributed to the value of their catch plummeting to approximately 30 percent in what seemed to be over night. This was an especially rough period for the hand-line bass fisherman as the farmed bass commodity was competing for the same market share of customers at a much lower price.

Value added Measure adopted

Ultimately a conclusion was reached to develop a collective process, involving local fishermen, where strategy developed to tailor the local catch to the evolving market situation, and to communicate the value and quality of the catch to consumers. This materialised into a traceability scheme to facilitate the marketing of line caught bass. In 1993, approximately 120 vessel-owners from four local fisheries committees join forces to boast and launch a collective brand, based around the tagging of line caught bass with a "fish ID tag". This unique ID tag enabled customers to identify the origin of the fish, how it was caught and, through a system of searchable database, even the fishermen who caught it.

Impact of Value added Measure

The success of this brilliant approach was nothing short of instant as within a matter of months, the product differentiation boasted the market value of line caught bass. It doubled sale price and repositioned line caught bass as a "high end" product. This vast increase in the sale price equipped fishermen with the capacity to regain recover revenue levels equivalent to the pre-crisis situation and to boast their profit margin by an additional 20% when compared to previously successful years. In 2006, out of 500 000 line caught bass, 400 000 fish were tagged, which testified to the popularity of the initiative. In terms of price points, whereas the market value for net or trawler caught bass was €8.50/kg, line caught fish could reach €15/kg at auction.

This initiative is still very much alive today and is still providing fisherman with satisfactory returns on sale of their commodity. The key to the long term success of this approach is that it developed an innovative communication strategy to bring fishermen together as well as to "identify" the product with the community who produce it. The product itself now has a personal relationship with the customer as they would be familiar with its origin. In addition, by promoting hand-line harvesting of natural resources it indirectly support sustainable fishing practices while at the same time, through an innovative and diversified communication strategy (i.e. website, press campaign, photograph book…) contributes to the modernisation of the local SMEs involved.

Case: Aquascot and Mainstream Scotland, United Kingdom; FAO Studies on Seafood value addition

Background

Aquascot is part of the Cermaq of fish farming companies. As of May 2003, the Group's farming units in Scotland operate under the name Mainstream Scotland, while the value-added processing unit is called Aquascot VAP. Together these two units represent vertical integration with a number of marine and freshwater farming operations around the coast of Scotland, ranging from South Argyll to the Orkney and Shetland Islands. The group farms Atlantic salmon, sea-grown trout, cod and turbot. The processing facilities are centred in Alness in the east Highlands, where the fish is processed in to fillets, steak and fillet portions, together with lightly smoked and further value-added products such as fish in sauce, ready meals and salmon en croute. The main markets of Aquascot are UK and European retailers.

Value Added Initiative

Products are sold primarily under the *private labels* of supermarket chains. Aquoscot products are often positioned as lower-cost alternatives to regional, national or international brands which results in immediate attention from the average local consumer as well as providing profitable returns since these commodities are seen as home-grown. It should also be taken into consideration that within the last decade private label products that was once seen as second-class alternatives are now bridging this gap by delivering quality comparable with national brands.

It strategically positioned itself as an organic Salmon producer. Aquascot is one of the few companies in the United Kingdom that possess a licensed to farm and process organic salmon. The Orkney sites that farm and process organic salmon are inspected by the soil Association, one of the certified bodies approved by the UK Government to monitor producers in order to ensure compliance. These salmon are also fed fishmeal produced from sustainable sources .This is very appealing to that fraction of the UK consumers who place great emphasis on health and safety when making a purchasing decision.

The range of value-added products offered by Aquascot are vast and cater to wide assortment of consumer preference. Its products baseline starts from fresh whole fish and full fillets (skin on, bone in) to complete ready meals incorporating a multitude of other ingredients and processes. The products include: Whole, gutted fish in modified atmosphere packaging (MAP) for the chilled retail cabinet.

Moreover, boneless fillets, with or without skin, packaged in bulk for the counter or in MAP or vacuum retail formats. Fillet portions and steaks, mainly in MAP lidded-tray formats. Choice of catch weight or fixed-weight systems. Portions are also combine with marinades, and produced in MAP lidded-tray formats.

In addition, fish in sauce for microwaving or oven cooking along with fish flavoured toppings for microwaving. These dishes are especial convenient for the overly active ambitious labour-driven person or busy housewife.

Salmon burgers were launch in both fresh and frozen format and received a returns and still growing. Other products include spanning loch Etive trout, lightly smoked salmon and trout portions, salmon and vegetable parcel, fish en croute, fish 'n ' sauce and a growing range of ready meals.

John Cooper, Group Commercial Manager for Aquascot claimed that the main recipe ingredient for the success of new salmon products is sounded market research, including an understanding of the target consumer, and strong customer partnership. He exclaimed ' Generally speaking, when a new product fail, it is because companies do not pay enough attention to real consumer and customer needs, be it regarding quality, convenience, ease of use, packaging format, price point, or consumer marketing support'.

Case: Iceland Cod Value chain; FAO Revenue distribution through the seafood value chain

Background

The Icelandic cod fishery is a highly capitalized fishery with multiple fleet segments and a wide variety of seafood products. The cod fishery is also the single most important fishery in Iceland in terms of export value. Catch is harvested year round by vessels of three main categories: the in-shore fleet using hook and line, the long lining and gillnet fleet, and the trawler fleet. The catch is sold fresh, frozen, salted and dried. The utilization of the catch depends on factors like the size and texture of the fish. Large cod is preferred as an input in the processing of salted cod while medium sized cod is preferred for processing frozen cod fillets.

Value added Initiative

The production and distribution Icelandic cod to the final end users are governed by several underlying vale chains. More specifically there are high levels of market segmentation and product differentiations as the value chains have different levels or stages from the very short ones with whole fish sold at foreign fish markets to the longer value added products with two or more processing stages selling their products to catering and restaurants. Cod products are mainly sold to three markets; Europe, US and Asia, with the bulk of the catch going to Europe and the US. These products include Fresh fillets, Consumer packs, Sea frozen, fillet blocks Salted, split Sea frozen fillets, Salted fillet, fresh unprocessed, Land frozen fillets, Land frozen fillet block and Klipfish.

Value is added to the cod product through efficiency and maximisation of infrastructure and services such as sea and air transportation. Over the past years efficient airfreight systems have developed allowing fresh fish from Icelandic waters to be in retail stores within 48 hours in Europe and 72 hours in the United States. This further strengthens the avenue to marketing Icelandic cod fresh and as a high value fisheries commodity earning high foreign revenue. Efficiency in factories and on board fishing vessel equipped with processing technologies provide by supporting industries as Marel, Slipway and DMG greatly advocate the need to reduce time spent processing harvested catch.

More importantly, the Icelandic auction has done its part to enhance the value of fisheries products harvested within Iceland EEZ. It was launched in 1988 as a joint traditional floor

auction initiative among fishers and buyer to generate more fish supplies in communities. Today it has developed into a computerize online auction system linking suppliers and sellers from all over Iceland and the international market. The auction system has graduated to a level of sophistication and modernization that is not restricted to auctioning fish after sorting on onshore, instead some fish are auction while the boat is still at sea. Roughly 20 percent of Icelandic white cod are sold through the auction. The auction system seek to maximise value functioning as a clearing mechanism for fish from contract agreement which do not meet product specification. The auction system generate higher prices per unit landed for fishers since it function as a buyer and seller haven where heterogeneous products found in fishing grounds are processed into homogeneous products that match demand in homogeneous market segments (Tronden,2006).

Another major value added approach is the complete utilization of the cod product. It is said that roughly 70 percent of the cod is utilized through various industries and each unit is worth roughly 50 to 60 USD. Aside from being consume as a source of protein the different parts of the cod are harvested to produce a variety of products such as cosmetics and medical products are produce from enzymes found in the organs and intestines; heads and bones are marketed dried exported and also sold as natural fish stock for food processing. Moreover, the liver is used to produce canned products such as smoke liver and liver pate and Omega 3 capsules. In addition the fish skin is transformed into collagen and leather to make clothing and accessories.

APPENDIX 3: FISHER'S QUESTIONNAIRE

Fisher's Distribution Chain and Marketing Questionnaire

Respondent name: _____ Respondent Position:_____

Date:_____ Vessel Name: _____

1. What species of fish do typically target?

Mixed Reef-fish [ ] Pelagic [ ] Conch [ ] Lobster [ ] Snapper [ ] Other_____

2. Which method do you utilized to catch fish?

Trapping [ ] Hand-lining [ ] Gill Netting [ ] Scuba [ ] Free diving [ ] Rod and Reel [ ] FAD [ ]

Trolling [ ] Spare Gun [ ] Other _____

3. What's your average selling price per pound?

5 to 8 [ ] 9 to 12 [ ] 13 to 16 [ ] 17 to 20 [ ] 21 to 25 [ ] Other [ ] _____

4. How flexible are your prices?

Very Flexible [ ] No Flexibility [ ] Average Flexibility [ ]

5. Explain your answer:

_____

_____

6. What quantity do you typically catch on an average basis?

Species	**Quantity**

7. On average what percent is:

Actually sold [ ] Give away [ ] Kept for personal consumption [ ]

Other _____

8. Do you store your catch?

Yes [ ] No [ ] Sometimes [ ]

9. If yes or sometimes, please explain where and how.

Ice Box [ ] Refrigerator [ ] Fish hole/Ice hole [ ] Other [ ]
_____

10.How long you typically keep your catch before it is sold?

under 1 hour [ ] 2 to 5 hours [ ] 6 to 12 [ ] under 1 day [ ] 2 to 3 days [ ] 3 to 6 days [ ] under

1 week [ ] 2 to 3 weeks [ ] Other [ ] _____

11. Do you gut and scale your fish before its sold to customers?

Yes [ ] No [ ] Sometimes [ ]

12. If yes or sometimes, how much per pound for gutted and scale fish?

5 to 8 [ ] 9 to 12 [ ] 13 to 16 [ ] 17 to 20 [ ] 21 to 25 [ ] Other [ ] _____

13. Who typically purchase gutted and scaled fish?

Hotels [ ] Housewives [ ] Supermarkets [ ] Restaurant [ ] Middle [ ]

_____
_____

14. How much ice do you typically take on a normal fishing trip?

1 to 3 bags [ ] 4 to 6 bags [ ] 7 to 10 [ ] 11 to 13 bags [ ] 14 to 17 bags [ ] 18 to 21 bags [ ]

15. Are the products immediately iced after being catch on board the vessel?

Yes [ ] No [ ]

16. Is icing done at regular intervals up until the product is delivered to the customers?

Yes [ ] No [ ]

17. At the point of sale is the product normally kept iced?

Yes [ ] No [ ]

18. What percent of your catch do you typically sell to the following with respect to species?

Entities	**Species**	**Percent**
Hotels [ ]		
Housewives [ ]		
Supermarkets [ ]		
Restaurant [ ]		
Middle [ ]		

19. Do you experience any difficult with marketing you fish?

Yes [ ] No [ ]

20. Please provide an explanation for your answer

_____
_____
_____

21. Are you a Member of the Antigua and Barbuda Fisherman Cooperative?

Yes [ ] No [ ]

22. Are you interested in having the Fisherman Cooperative or any other entity assist in term of helping you market your products?

Yes [ ] No [ ]

23. What assistance would you like to see in the future?

_____
_____
_____

24. How competitive is the current market?

Highly [ ] Moderately [ ] Low [ ]

25. Please a reason(s) for you response in above.

_____
_____
_____

26. What impact does the importation of regional fresh fish had on your market?

None [ ] Loss of customers [ ] Lower average price [ ] loss of average earning [ ] Saturate the market [ ] other [ ] _____

27. On average how long is your typical fishing trip?

1 to 5 hours [ ] 6 to 10 hours [ ] 11 to 15 [ ] 16 to 20 hours [ ] 21 to 24 hours [ ] 1 to 3 days [ ] other [ ] _____

28. Do you deliver the products to your customers personally?

Yes [ ] No [ ] Sometimes [ ]

29. What mode of transportation do you typically utilize to deliver the product to the customers?

Truck [ ] Bus/Van [ ] car [ ] Jeep [ ] Boat [ ] Walk [ ] Customers come to collect [ ]

Other_____

30. Is your means of transportation personally owned by you?

Yes [ ] No [ ]

31. How long is your typical delivery time?

15 to 30 Minutes [ ] 30 to 45 Minutes [ ] 46 to 1 hours [ ] Over 1 Hour [ ]

32. Do you incorporate the storage and transportation cost in the selling price?

Both Storage & Transportation [ ] None [ ] Only storage [ ] Only Transportation [ ]

33. From where do you normally sell your products?

Fish Market [ ] roadside [ ] Door to Door [ ] At fisher's home [ ] At landing site [ ]

Other _____

34. What method do typically use to market you products?

Door to Door Approach [ ] Ads [ ] Broadcast [ ] Word of Mouth [ ] Calling [ ]

Other_____

35. who is responsible for marketing your products currently?

Self [ ] Private Entity [ ] Other [ ]_____

36. Are you interested in having someone else marketing your product for a small fee?

Yes [ ] No [ ]

37. If Yes, who?

Fisheries Division [ ] Fisherman Cooperative [ ] Private entity [ ] Other [ ]

38. Is there anything you would like to see done that would better help you market your product and delivering it the plates of the final consumer?

Reduce / subside the cost of boat equipment [ ] Reduce/ subside the cost for fishing gear [ ]

Subside fuel cost [ ] Other [ ]

_____

39. Are you aware of the close season on fish?

Yes [ ] No [ ]

40. How has the close season affected your business?

Loss of Revenue [ ] Loss of customers [ ] Force to change fishing method [ ] Force to diversify catch [ ]

Temporary halt fishing activities [ ] Other [ ]_____

41. Have you seen any impact of the close season on existing fish stock?

Yes [ ] No [ ] Some-degree [ ]

42. Please give a reason for your answer.

Slight Increase [ ] Great Increase [ ] unchanged [ ] Slight Decrease [ ] Great Decrease [ ]

APPENDIX 4: CONSUMER QUESTIONNAIRE

1. Which age range ? Name: _____
Establishment:_____

less than 25 [ ]26 - 35 [ ] 36 - 45 [ ] 46 - 55 [ ] over 56 [ ]

2. Gender:

Male [ ] Female [ ]

3. Where do you reside?

_____

4. Is local fresh fish a regular part of your diet?

Yes [ ] No [ ]

5. Is fresh imported Fresh Fish a part of your diet?

Yes [ ] No [ ]

6. Please give a reason for your answer above?

Lower Price[ ] sold in large quantity [ ] Taste better [ ] Better Package [ ]

Other [ ] _____

7. What level of processing do you desire?

Scaled [ ] Gutted [ ] Scaled & Gutted [ ] None [ ] Other [ ]_____

8. Are you willing to pay the additional cost to acquire this level of processing?

Yes [ ] No [ ]

9. How often do you purchase fresh fish locally per month?

1 to 3 Times [ ] 4 to 7 Times [ ] over 8 Times [ ]

10. How often do you purchase freshly imported Fish per month? (Excluding smoked, salted, canned etc)

1 to 3 Times [ ] 4 to 7 Times [ ] over 8 Times [ ]

11. Name the top five (5) species of Fresh Fish you typically purchased in preferential order?

1._____ 2._____
3._____

4._____ 5._____

12. How much do you typically spend per month on local fresh fish?

Under 50$ [ ] 51 to 75$ [ ] 76 to 100$ [ ] 100 to 150$ [ ] 151 to 200$ [ ] 201 to 250$ [ ]

251 to 300$ [ ] Over 300$ [ ]

13. What quantity of local fresh fish do you typically consume per month?

5lb to 10lb [ ] 11lbs to 20lbs [ ] 21lbs to 30lbs [ ] 31 lbs to 40 [ ] 41lbs to 50lbs [ ] Over 50 [ ]

14. How much do you typically spend per month on freshly imported fish?

Under 50$ [ ] 51 to 75$ [ ] 76 to 100$ [ ] 100 to 150$ [ ] 151 to 200$ [ ] 201 to 250$ [ ]

251 to 300$ [ ] Over 300$ [ ]

15. What quantity of freshly imported fish do you typically consume per month?

5lb to 10lb [ ] 11lbs to 20lbs [ ] 21lbs to 30lbs [ ] 31 lbs to 40 [ ] 41lbs to 50lbs [ ] Over 50 [ ]

16. Who is your current supplier of fish?

Fisherman [ ] Supermarket [ ] middleman [ ] Other [ ]

17. Is the fish delivered to you?

Yes [ ] No [ ]

18. On a scale 1 to 5, how would you rate the reliability of your supplier?

1 very unreliable [ ] 2 Somewhat unreliable [ ] 3 Neutral [ ] 4 Somewhat Reliable [ ] 5 Very Reliable [ ]

19. Please state the reason for your response:

_____
_____
_____
_____

20. How far is your supplier from your home?

Very far [ ] Far[ ] close Proximity [ ] Very close Proximity [ ]

21. What factors typically prevent you from acquiring fresh fish in order of importance?

Financial Constraints [ ] Time constraints [ ] Limited Supply [ ] Bad Weather [ ]
Other _____

22. Would you like local Fresh fish to be sold as:

Whole [ ] Scaled [ ] Cutlets [ ] Fillets [ ] Gutted [ ] Chilled [ ] Frozen [ ] Steaked Sliced [ ] Packaged [ ]

Skinless [ ] Boneless [ ] smoked [ ] Canned [ ] Salted [ ] Other [ ]
_____

23. Would you appreciate going online and purchasing fresh fish directly from fishers?

Yes [ ] No [ ]

24. Are you open to the idea of conveniently messaging or calling a reliable fisherman to acquire your fresh fish locally?

Yes [ ] No [ ]

25. Do you eat local Tilapia/”Kali”?

Yes [ ] No [ ]

26. If yes, what quantity of Tilapia/”Kali” do you typically purchase per month?

5lb to 10lb [ ] 11lbs to 20lbs [ ] 21lbs to 30lbs [ ] 31 lbs to 40 [ ] 41lbs to 50lbs [ ] Over 50 [ ]

27. At what price do you typically purchase Tilapia/”Kali” for?

5 to 8$ [ ] 9 to 12$ [ ] 13 to 16$ [ ] 17 to 20$ [ ] 21 to 25$ [ ] Other [ ] _____

28. How often do you purchase Tilapia/”Kali” per month?

1 to 3 Times [ ] 4 to 7 Times [ ] over 8 Times [ ]

30. If No, why don't you purchase Tilapia/”Kali”?

_____
_____
_____

APPENDIX 5: HOTEL QUESTIONNAIRE

Hotels Supply chain Questionnaire

Respondent name: _____ Respondent Position: _____

Date: _____ Establishment's Name: __ _____

1. Is local fresh fish apart of your menu?
   Yes [ ] No [ ]

2. If yes, which species?
   Snapper [ ] Grouper [ ] Grunt [ ] Parrot Fish [ ] Surgeon [ ] Hind [ ]
   Other [ ] _____

3. On average, how much pounds of local fresh fish do you purchase monthly?
   500 - 900lbs [ ] 1000 – 5000lbs [ ] 6000 -10,000 [ ] 11,000 – 15,000 [ ] 16,000 – 20,000 [ ] 21,000 – 25,000 [ ] Over 26,000 [ ]

4. How much do you typically spend per month on local fresh fish?
   500 – 1,000 [ ] 1,500 – 2,000 [ ] 2,500 – 4,000 [ ] 4500 – 7000 [ ] 7,500 – 10,000 [ ] 10,500 – 15,000 [ ] 15,500- 20,000 [ ] 21,000 – 25,000 [ ] 26,000 and over [ ]

5. What level of processing are you currently receiving from your supplier?
   Whole [ ] Scaled [ ] Cutlets [ ] Fillets [ ] Gutted [ ] Chilled [ ] Frozen [ ] Steaked Sliced [ ] Packaged [ ] Skinless [ ] Boneless [ ] Other [ ]
   _____

6. What level of processing would like to receive from your supplier?
   Whole [ ] Scaled [ ] Cutlets [ ] Fillets [ ] Gutted [ ] Chilled [ ] Frozen [ ] Steaked Sliced [ ] Packaged [ ] Skinless [ ] Boneless [ ] Other [ ]
   _____

7. Would be willing to pay an additional cost for this additional value?
   Yes [ ] No [ ]

8. How often do you purchase fresh fish from your local supplier monthly?
   1 once [ ] 2 Twice [ ] 3 Times [ ] 4 Times [ ] 5 and over [ ]

9. Who is your local Supplier?
   Fisherman [ ] Middleman [ ] Supermarket [ ]
   Other [ ] _____

10. How many Local supplier(s) do have?
    One [ ] Two [ ] Three [ ] Four [ ] Five and over [ ]

11. Does your local supplier deliver the products?
    Yes [ ] No [ ] Sometimes [ ]

12. What factors prompted you to purchase fresh local fish rather than imported fish?
    High quality [ ] Reliable Supplier [ ] Customer's Preference [ ] Easily Accessible [ ]
    Reasonable Price [ ]
    Other [ ] _____

13. How long does it typically take to acquire products from your local supplier?
    1 to 6 hours [ ] 7 to 12 hours [ ] under 1 day [ ] 2 to 4 days [ ] 5 to 7 days [ ] 1 to 2 weeks [ ] other [ ] _____

14. What factors typically prevent supplier from satisfying your demand?
    Bad weather [ ] Financial constraints [ ] Price Disagreement [ ] Boat Problems [ ]
    Other [ ] _____

15. Is imported fish apart of you menu?
    Yes [ ] No [ ]

16. If yes, which species?
    Trout [ ] Salman [ ] Tuna [ ] Banga-Mary [ ] Dolphin Fish [ ] Snapper [ ] Grouper [ ]
    Grunt [ ] Albacore [ ] Other [ ]
    _____

17. What's the average life span of imported species before showing any signs of spoilage?
    3 to 6 days [ ] 1 Week [ ] 2 Weeks [ ] 3 Weeks [ ] 1 Month [ ] 2 Months [ ]
    Other [ ] _____

18. Where is your external Supplier located?
    _____
    _____

19. On average, how often do you import fish from your supplier monthly?
    Once [ ] Twice [ ] 3 Times [ ] 4 times [ ] 5 Times and Over [ ]

20. On average, how much pounds of imported fish do you purchase monthly?
    500 - 900lbs [ ] 1000 – 5000lbs [ ] 6000 -10,000lbs [ ] 11,000 – 15,000lbs [ ]
    16,000 – 2,000lbs [ ] 21,000 – 25,000lbs [ ] Over 26,000lbs [ ]

21. What is your average monthly cost for imported fish?
    500 – 1,000 [ ] 1,500 – 2,000 [ ] 2,500 – 4,000 [ ] 4500 – 7000 [ ] 7,500 – 10,000 [ ]
    10,500 – 15,000 [ ] 15,500- 20,000 [ ] 21,000 – 25,000 [ ] 26,000 and over [ ]

22. What factors prompted you to purchase imported fish rather than local fresh fish?
    Lower price [ ] Higher Quality [ ] Larger Quantity [ ] Superior taste [ ]

Customer Preference [ ] Higher Processing [ ]
Other [ ] _____

23. What level of processing does your current external supplier provide?
Whole [ ] Scaled [ ] Cutlets [ ] Fillets [ ] Gutted [ ] Chilled [ ] Frozen [ ] Steaked Sliced [ ] Packaged [ ] Skinless [ ] Boneless [ ] Other [ ]
_____

24. How do you contact your supplier(s)?
Calling [ ] Email [ ] Text Messages [ ] Invoice [ ]
Other [ ] _____

25. The top five (5) species demanded (Highest rate of turnover) by your customers are:
1._____ 2._____
3._____ 4._____
5._____

26. On a scale of 1 to 5, how would you rate the reliability of your supplier(s)?
1-very unreliable [ ] 2-Somewhat Reliable [ ] 3- Neutral [ ] 4-Somewhat Reliable [ ] 5- Very Reliable [ ]

27. On a scale of 1 to 5, how would you rate the quality of your supplier(s) products?
Very Poor Quality [ ] Poor Quality [ ] Neutral [ ] Good Quality [ ] Very Good Quality [ ]

28. What methods do you utilize to find potential suppliers?
Word of Mouth [ ] Surfing the internet [ ] Calling (Telephone-Directory) [ ]
Market Research [ ] Other [ ]
_____

29. Would you appreciate having a reliable central location, where you can assess all landed catch from all suppliers and being able to make an inform purchasing decision?
Yes [ ] No [ ]

30. Would you purchase fish from a local online system that can guarantee fresh local fish for consumption?
Yes [ ] No [ ]

31. If no, Please provide a reason for your response.
_____
_____

11 APPENDIX 6: SUPERMARKET QUESTIONNAIRE

Supermarket Supply chain Questionnaire

Respondent name: _____ Respondent Position: _____

Date: _____ Establishment's Name: __ _____

1. Is local fresh fish sold at your establishment?
   Yes [ ] No [ ]

2. If yes, which species?
   Snapper [ ] Grouper [ ] Grunt [ ] Parrot Fish [ ] Surgeon [ ] Hind [ ]
   Other [ ] _____

3. How often do you purchase fresh fish from your local supplier monthly?
   1 once [ ] 2 Twice [ ] 3 Times [ ] 4 Times [ ] 5 and over [ ]

4. On average, how much pounds of local fresh fish do you purchase monthly?
   500 - 900lbs [ ] 1000 – 5000lbs [ ] 6000 -10,000 [ ] 11,000 – 15,000 [ ] 16,000 – 2,000 [ ] 21,000 – 25,000 [ ] Over 26,000 [ ]

5. How much do you typically spend per month on local fresh fish?
   500 – 1,000 [ ] 1,500 – 2,000 [ ] 2,500 – 4,000 [ ] 4500 – 7000 [ ] 7,500 – 10,000 [ ] 10,500 – 15,000 [ ] 15,500- 20,000 [ ] 21,000 – 25,000 [ ] 26,000 and over [ ]

6. What level of processing are you currently receiving from your supplier?
   Whole [ ] Scaled [ ] Cutlets [ ] Fillets [ ] Gutted [ ] Chilled [ ] Frozen [ ] Steaked Sliced [ ] Packaged [ ] Skinless [ ] Boneless [ ] Other [ ]
   _____

7. What level of processing would like to receive from your supplier?
   Whole [ ] Scaled [ ] Cutlets [ ] Fillets [ ] Gutted [ ] Chilled [ ] Frozen [ ] Steaked Sliced [ ] Packaged [ ] Skinless [ ] Boneless [ ] Other [ ]
   _____

8. Would be willing to pay an additional cost for this additional value?
   Yes [ ] No [ ]

9. Who is your current local supplier?
   Fisherman [ ] Middleman [ ] Other [ ] _____

10. Does your local supplier deliver the products?
    Yes [ ] No [ ] Sometimes [ ]

11. What factors prompted you to purchase fresh local fish rather than imported fish?

High quality [ ] Reliable Supplier [ ] Customer's Preference [ ] Easily Accessible [ ] Reasonable Price [ ]
Other [ ] _____

12. How long does it typically take to acquire products from your local supplier?
    1 to 6 hours [ ] 7 to 12 hours [ ] under 1 day [ ] 2 to 4 days [ ] 5 to 7 days [ ] 1 to 2 weeks [ ] other [ ] _____

13. What factors typically prevent supplier from satisfying your demand?
    Bad weather [ ] Financial constraints [ ] Price Disagreement [ ] Boat Problems [ ]
    Other [ ] _____

14. Is imported fish sold at your establishment?
    Yes [ ] No [ ]

15. If yes, which species?
    Trout [ ] Salman [ ] Tuna [ ] Banga-Mary [ ] Dolphin Fish [ ] Snapper [ ] Grouper [ ] Grunt [ ] Albacore [ ] Other [ ]
    _____

16. Where is your supplier(s) located?

---

17. What level of processing does your current external supplier provide?
    Whole [ ] Scaled [ ] Cutlets [ ] Fillets [ ] Gutted [ ] Chilled [ ] Frozen [ ] Steaked Sliced [ ] Packaged [ ] Skinless [ ] Boneless [ ] Other [ ]
    _____

18. On average, how often do you import fish from your supplier monthly?
    Once [ ] Twice [ ] 3 Times [ ] 4 times [ ] 5 Times and Over [ ]

19. On average, how much pounds of imported fish do you purchase monthly?
    500 - 900lbs [ ] 1000 – 5000lbs [ ] 6000 -10,000lbs [ ] 11,000 – 15,000lbs [ ] 16,000 – 2,000lbs [ ] 21,000 – 25,000lbs [ ] Over 26,000lbs [ ]

20. What is your average monthly cost for imported fish?
    500 – 1,000 [ ] 1,500 – 2,000 [ ] 2,500 – 4,000 [ ] 4500 – 7000 [ ] 7,500 – 10,000 [ ] 10,500 – 15,000 [ ] 15,500- 20,000 [ ] 21,000 – 25,000 [ ] 26,000 and over [ ]

21. What factors prompted you to purchase imported fish rather than local fresh fish?
    Lower price [ ] Higher Quality [ ] Larger Quantity [ ] Superior taste [ ]
    Customer Preference [ ] Higher Processing [ ]
    Other [ ] _____

22. How do you contact your supplier?
    Calling [ ] Email [ ] Text Messages [ ] Invoice [ ]

Other [ ] _____

23. Would you appreciate having a reliable central location, where you can assess all landed catch from all suppliers and being able to make an inform purchasing decision?
    Yes [ ] No [ ]

24. Would you purchase fish from a local online system that can guarantee fresh local fish for consumption?
    Yes [ ] No [ ]

25. If no, Please provide a reason for your response.
    _____
    _____
    _____

26. What type of payment system do you prefer?
    Formal Contractual arrangement [ ] Informal Arrangement [ ]
    Other [ ] _____

27. The top five (5) species demanded (Highest rate of turnover) by your customers are:
    1._____ 2._____
    3._____
    4._____ 5._____

28. On a scale of 1 to 5, how would you rate the reliability of your supplier(s)?
    1-very unreliable [ ] 2-Somewhat Reliable [ ] 3- Neutral [ ] 4-Somewhat Reliable [ ] 5- Very Reliable [ ]

29. On a scale of 1 to 5, how would you rate the quality of your supplier(s) products?
    Very Poor Quality [ ] Poor Quality [ ] Neutral [ ] Good Quality [ ] Very Good Quality [ ]

30. What methods do you utilize to find potential suppliers?
    Word of Mouth [ ] Surfing the internet [ ] Calling (Telephone-Directory) [ ]
    Market Research [ ] Other [ ]
    _____