From Poverty to Prosperity

Applying Commercial Techniques to Subsistence Fishing Communities

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Coope Isla Venado: The Development and Promotion of a Fishing Cooperative in the Nicoya Gulf

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Report Submitted to:

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Abstract

Our project analyzed the application of commercial techniques to subsistence fishing communities, focusing on the island of Venado, where 22 families have formed a cooperative to improve their socioeconomic condition. We accomplished this through interviewing and surveying field experts, members of other cooperatives, members of Coope Isla Venado, and potential consumers. We analyzed the current path of commercialization and concluded that processed products are sold at higher prices and that the use of intermediaries as processors is the main source of profit loss for fishermen. We identified successful business practices of the Costa Rican fishing industry and made recommendations to streamline production and so achieve sustainable commercialization.

Acknowledgements

We would like to give our deepest thanks to our project sponsors from INCOPESCA, for the resources they provided us with to assist our work and also for the time they dedicated to help us conduct the interviews, surveys and site observations in all the locations. For sponsor profile, see Appendix A.

We also would like to thank everyone who participated in our interviews and surveys; the project would not have been possible without their time and information

We would also like to sincerely thank our on-site project advisors, Professors Jeanine Skorinko and James Dempsey, for guiding us through the research process and for offering their professional advice and counseling.

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Executive Summary

Fishing production has been steadily increasing in Costa Rica over the past two decades to satisfy both rising domestic food needs and international market demands. Fish production has grown from an estimated 2 thousand metric tons in 1960 to 45 thousand metric tons in 2009, with the value of fish products exported from Costa Rica rising from 105 million US dollars in 2006 to over 127 million US dollars in 2008 (FAO, 2011; FAO, 2008). Despite this increase, not all fishing communities are benefiting. Chronic poverty persists among communities who rely on traditional fishing methods. The island of Venado is one such community where 22 families have formed a cooperative, Coope Isla Venado, in hopes of improving their socioeconomic condition.

We investigated four main objectives 1) evaluating the current system of the fish market and specifically how products are commercialized, 2) identifying factors of sustainable quality commercialization, 3) assessing the current status of the cooperative, determining its strengths and weaknesses, 4) comparing the initial fishermen's selling price of products to hotels and metropolitan restaurants' purchasing prices.

We set out to investigate ways of optimizing Coope Isla Venado as a business entity and lay the foundation for further expansion. To gain a more comprehensive understanding of how to commercialize fish products in Costa Rica in the current market, and what factors can contribute positively to the cooperative's efficiency, we interviewed several field experts, including the general manger of a large-scale wholesaler, and members of both previous and present cooperatives. From these interviews we found that after being caught, fish are passed through a series of intermediaries that process, package, and distribute the fish. At every step, the price of the product increases, and while the price paid by the final consumer is high, the fishermen themselves do not see the profits. From these interviews, we concluded that the success of the cooperative would depend upon 1) establishing its own processing facility, 2) buying proper fishing and transportation equipment, 3) creating an administration with distributed power, 4) adhering to the food safety standards enforced by Servicio Nacional de Sanidad Animal (SENASA).

To determine the current production capabilities and earnings of the cooperative, we surveyed 18 of the 22 cooperative members. From the data, we determined the cooperative caught approximately 200 kilograms of sea bass per week and approximately 40 kilograms of jumbo shrimp per week. Fishermen of the cooperative earn an average of 1,625 colones per kilogram of unprocessed sea bass and 5,500 colones per kilogram of unprocessed jumbo shrimp.

In order to determine the profit potential of the cooperative, we gathered information on the demand of potential consumers; we surveyed 11 coastal hotel restaurants and 22 metropolitan restaurants of San José to determine the price paid for fish products, specifically sea bass and jumbo shrimp. From these surveys, we determined that hotels and restaurants pay an average of 4,450 and 6,116 colones per kilogram of sea bass, respectively. They also purchase a substantial amount of shrimp; the hotels pay an average of 11,417 colones per kilogram of jumbo shrimp and the restaurants pay an average of 7,900 colones per kilogram of shrimp (it was no-t specified if these restaurants were buying jumbo shrimp or the smaller, less expensive pinky shrimp, which may have affected the average purchasing price). Ninety-four percent of these establishments listed quality as an important factor in purchasing fish products; 58 percent also listed price as a main contributing factor.

We compared the price at which fishermen sell their products to the price paid by hotels and restaurants. We found that hotels and restaurants bought sea bass for more than 3,000 colones per kilogram over the price charged by the fishermen; this means the final price was almost three times that of the original. Similar trends applied for jumbo shrimp. Hotels paid almost 6,000 colones more per kilogram of jumbo shrimp than the price charged by the fishermen, meaning the final price was double that of the original. (The restaurants did not specify what type of shrimp they bought and so this data was not available for comparison.)

Through our research, we provided several recommendations for Coope Isla Venado in terms of its commercialization of products, management, consumer relations, and future expansion in order to achieve sustainable quality commercialization. Our suggestions include:

1) Establish a processing facility to sell products directly to consumers
2) Buy proper fishing, processing, storage, and transportation supplies

3) Adhere to food safety standards enforced by Servicio Nacional de Sanidad Animal (SENASA), the government agency in charge of regulating sanitary standards in regards to product quality and safety
4) Form an administration with power distribution and a series of checks and balances
5) Engage members of the community in the administration
6) Educate and train all members of the cooperative regularly in their respective fields

Although these recommendations are aimed for the success of Coope Isla Venado, these practices can be applied to other regions, with the potential of helping rural fishing communities throughout Costa Rica benefit from the nation's rich aquatic resources.

Table of Contents

Table of Figures:

Table of Tables:

Chapter 1: Introduction

Fishing production has been steadily increasing in Costa Rica over the past two decades to satisfy for both rising domestic food needs and international market demands. Fish production has grown from an estimated 2 thousand metric tons in 1960 to 45 thousand metric tons in 2009, with the value of fish products exported from Costa Rica rising from 105 million US dollars in 2006 to over 127 million US dollars in 2008 (FAO, 2011; FAO, 2008). Despite this increase, not all fishing communities are benefiting. Chronic poverty remains a problem among communities who have relied on traditional fishing in order to obtain a more stable level of prosperity. The island of Venado is one such community where 22 families have formed a cooperative, Coope Isla Venado, in hopes of improving their socioeconomic condition. Fishing cooperatives have improved the economic stability of several other communities in Costa Rica (personal communication, 2011).

We analyzed the application of commercial techniques to subsistence fishing communities to improve the socioeconomic conditions of the members of Coope Isla Venado. Specifically, we investigated four main objectives 1) evaluating the current system of the fish market and specifically how products are commercialized, 2) identifying factors of sustainable quality commercialization, 3) assessing the current status of the cooperative determining its strengths and weaknesses, 4) comparing the initial fishermen's selling price of products to hotels and restaurants' purchasing prices.

Chapter 2: Literature Review

In the following chapter, we summarize the findings of our initial research regarding the factors that set the context of our work with Coope Isla Venado. We first explain the region of interest, the Gulf of Nicoya, and a background of the cooperative and its importance. We then discuss the process of commercialization in respect to selling fish products and the strategy behind marketing a new product to increase sales for the cooperative. We conclude with a discussion on the conditions that allow for optimal production and quality, and the issues that surround these conditions.

2.1 The Nicoya Gulf Region

The Nicoya Gulf is a body of water that projects northwesterly into Costa Rica about two-thirds of the way up on the Pacific coast. It is 52 miles long, has a width range spanning from 34 miles at the mouth to 5.5 miles at the Port of Puntarenas, and covers an area of 450 square nautical miles. It experiences seasonal and geographic fluctuations in temperature, freshwater contribution, salinity, and oxygen content (Peterson, 1960). It is inhabited by over 200 species of fish and 400 species of ocean-floor dwelling organisms (Vargas-Zamora, 1995) and accounts for 63.62% of the fishery landings in Costa Rica as of 2002 (FAO, 2011), making it the nation's most important fishing region. According to Instituto Costarricense de Pesca y Acuicultura (INCOPESCA), the aquamarine species that are in highest demand in the Nicoya Gulf are sea bass, mahi-mahi, porgy, shark, marlin, shrimp and tuna (INCOPESCA, 2011). The communities surrounding the Nicoya Gulf are home to a large number of rural fishermen who heavily depend on the fishing industry for a living (FAO, 2011). Several of these communities are located on the island of Venado, a small island located in this gulf (see Figure 1).

The island of Venado covers only 6.5 km^2, with an expansive rainforest accounting for 95% of the land area. It is home to approximately 1,100 Costa Ricans, the majority of whom rely on traditional fishing as their source of income. The success of the fishing industry is therefore vital to the socioeconomic wellbeing of those on the island (personal communication, 2011).

Figure 1 - Country of Costa Rica with close-up on location of the island of Venado (Left – CIA, 2011)

Our team worked with Coope Isla Venado, a cooperative of 22 artisanal fishermen who catch primarily jumbo shrimp and sea bass on the island of Venado. Being artisans in the fish industry, they catch fish in small quantities, often using traditional methods (Merriam-Webster Dictionary, 2011). The cooperative was approximately a year old at the beginning of our project and still establishing itself, with minimal commercial activity or funding to improve its operation (personal communication, 2011). We aimed to streamline the distribution of quality products from this group in order for the cooperative to ultimately increase its market scope, form direct relationships with buyers by removing intermediaries, and eventually create economic stability in the long term.

2.2 Commercialization

In order to effectively distribute its product to consumers, the cooperative needed to refine its methods of commercialization. Commercialization is the process of introducing a product to the market; this involves a number of steps that moves the product from its origin to the consumer in order to turn a profit. In general, when a new service or product is introduced into a market there are several contributing factors, including the production, distribution, marketing, sales, and consumer support, that are important to its success (NCI, n.d.; OSPESCA, 2010). There are numerous stakeholders within the process that contribute to this marketing

success. In the traditional chain of commercialization of fish in Costa Rica, three main stakeholder populations are involved: the producers, the intermediaries, and the consumers. The producers, in this case the fishermen, are responsible for catching the fish. They then sell their catch to intermediaries, individuals or businesses that have the money, equipment, personnel, and transportation necessary to process and distribute the final product. Consumers have the capacity and desire to purchase the final product. The fish product can go through one intermediary step or several, and each one impacts the final price paid by the consumers. Figure 2 explains, in general terms, the current chain of commercialization of fish in Costa Rica (OSPESCA, 2010; Schroeder et al., 2010; Otárola & Ramírez, n.d.; personal communication, 2011). From the figure, it becomes apparent just how many steps and people are involved in bringing the product to the consumer.

For many artisanal fishermen, the use of this system has been accepted because intermediaries, with their involvement in product processing and distribution, are such an integral part of commercialization. Intermediaries not only purchase and process the fish but may also provide fishing supplies, such as gasoline, hooks, and bait. The fishermen can often not afford these supplies on their own, and therefore have incentive to continue selling their products to the various processing facilities (personal communication, 2011). There are, however, issues with this arrangement. In the number of transactions that occur between the original and final sales of the product, the price of the product increases significantly. The fishermen have no control in these price jumps, and they do not benefit from the profits. It is difficult for them to change the system because they are dependent on the services of the intermediaries. The system has disadvantages for the consumer as well; it results in a higher final selling price, it increases the amount of time that passes between capture and final sale, which could negatively impact the freshness and quality of the product, and it makes it more difficult to trace the origin of the product the consumers purchase. One way to circumvent the traditional system and avoid these issues would be for the fishermen to sell their products directly to consumers, which is the goal of Coope Isla Venado (personal communication, 2011; OSPESCA, 2010). This would require the fishermen to take on the responsibilities of the

intermediaries (processing, packaging, storing, transporting, and distributing) and be able to market their product.

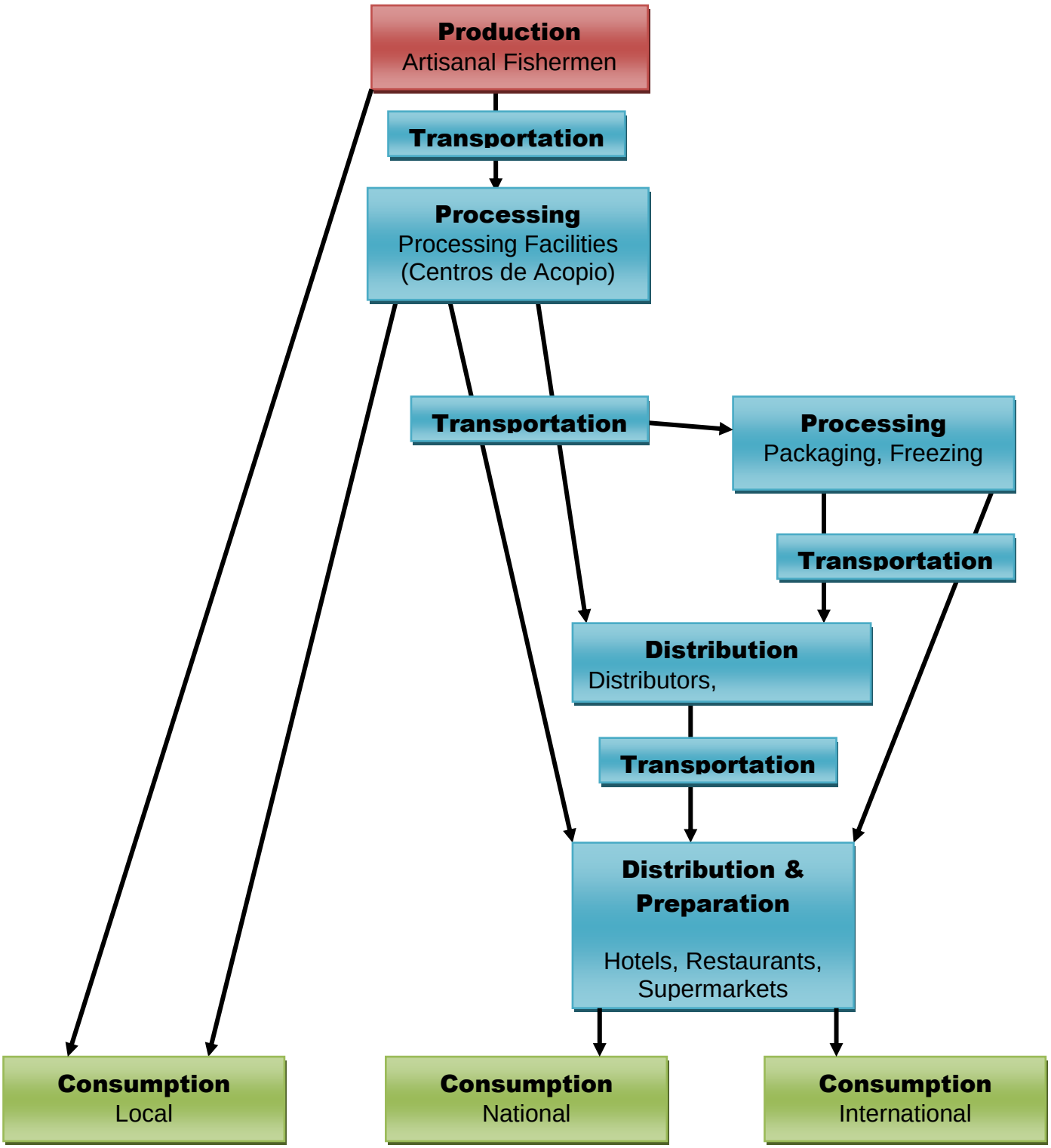

Figure 2 - Commercialization of Fish Products in Costa Rica

2.2.1 Marketing

While improving commercialization is one step in increasing product distribution and earnings, marketing is equally important in selling product. Based on research performed by Piercy (n.d) and Slater and Narver (1994), creating a successful business depends upon providing a product with superior value to the market while still turning a profit. Businesses must understand and meet the consumers' perception of value, including quality, price, and customer service. In accomplishing this, they will attain high customer satisfaction, which in turn leads to customer retention (Piercy, n.d.; Slater & Narver, 1994). This research further explains that creating these strong consumer relationships is often dependent upon the strength of the internal relationships of the business. Every step in the production chain has an impact on the value of the product and has the potential to increase that value. The skills, commitment, and performance of the employees are what determine the quality of the service and product. For this reason, it is important to maintain the skills, coordination, and attitudes of employees. This can be accomplished through routine training and internal communication to keep all employees involved and in touch with each other (Piercy, n.d.; Slater & Narver, 1994).

2.3 Preserving Product Quality

Commercialization and marketing are important in creating, processing, and distributing product, but the sales will only be made if the product is up to the quality standards expected by the customers. Artisanal fishermen work with a relatively small amount of fish in comparison to industrial companies, and their trips to catch their products are generally daily and last no more than a few hours. In the past when the market for fish was relatively small, fishermen could sell their product directly to the consumer, often right off the boat, meaning that there was little time between capture and consumption. Urbanization, increased demand, higher quality standards, and the need to introduce intermediaries to handle the market transactions all increased this amount of time. Without proper preservation, the product is more likely to be contaminated or damaged with this extended time (Huss, 1995).

Providing quality product to consumers is arguably the most important factor in creating successful business, particularly when that product is meant for human consumption and can

affect human health. Based on a study done in 2007 in which 37 restaurants from the provinces of San José, Heredia, and Alajuela were surveyed, 73% of restaurants would be willing to pay a higher price for product with a better grade of freshness and quality (Ramirez Villalobos, 2007). To determine ways to optimize sales for the cooperative, we investigated the aspects that define quality fish products and the methods by which to ensure the quality throughout the commercialization process.

2.3.1 Determining Quality

In order to supply the market with high quality product, producers must first understand what defines quality. Quality of fish products refers to several factors, including sensory appeal, bacterial contamination, and degree of spoilage. Sensory appeal pertains to the attractiveness of the fish product as determined by human senses. A panel of specialized quality testers can evaluate the quality of fish products based on a series of factors such as the appearance of the skin and meat, the smell of the fish, and the condition of the eyes and gills. They use these evaluations to determine if the fish is acceptable for consumption by individual customers. An example sensory quality assessment can be seen below in Table 1 (Huss, 1995).

There are also several scientific methods used to determine the extent of spoilage and the presence and number of bacteria in the fish. While the details of these methods are not pertinent to this project, it is important to note that all of these methods are performed by field experts and are used to determine the quality of the product being sold. Their use becomes more frequent when larger consumers and product volumes are being handled (Huss, 1995; Johnston et al. 1994).

Quality parameter	Character	Score (ice/seawater)
General appearance	Skin	0 Bright, shining 1 Bright 2 Dull
	Bloodspot on gill cover	0 None 1 Small, 10-30% 2 Big, 30-50% 3 Very big, 50-100%
	Stiffness	0 Stiff, in *rigor mortis* 1 Elastic 2 Firm 3 Soft
	Belly	0 Firm 1 Soft 2 Belly burst
	Smell	0 Fresh, seaweed/metallic 1 Neutral 2 Musty/sour 3 Stale meat/rancid
Eyes	Clarity	0 Clear 1 Cloudy
	Shape	0 Normal 1 Plain 2 Sunken
Gills	Colour	0 Characteristic, red 1 Faded, discoloured
	Smell	0 Fresh, seaweed/metallic 1 Neutral 2 Sweaty/slightly rancid 3 Sour stink/stale, rancid
Sum of scores		(min. 0 and max. 20)

Table 1 - An example sensory quality assessment format

2.3.2 Quality Control during Processing

The next step in providing quality products to market is taking measures to ensure this quality. There are numerous steps in moving the fish from capture to market. Throughout all the processing steps, the fish need to be handled properly in order to avoid physical damage. This begins with the methods used for catching the fish; all techniques used should ensure that no unnecessary mechanical damage is incurred or that the fish are not excessively stressed, which could accelerate the decomposition processes that begin after death. The catch is then

transferred from the capture gear to the boat and stowed until it can be handled, which includes sorting, bleeding, gutting, and washing. These processes should be done as efficiently as possible with the appropriate sanitary utensils and methods that reduce potential damage to the product. The catch then needs to be chilled and stored until the boat returns to land, when it is transferred to land storage, further processed (beheading, removing the scales and fins, deboning, cutting the meat into fillets), and stored until it is finally transported to its destination market (P. Bykowski & D. Dutkiewicz, 2011; Ababouch, 2005; Huss, 1995).

It is important that this sequence runs smoothly and quickly, assuring that all the fish product is properly handled and preserved at every step so as not to run the risk of contamination or damage. This is not only important for the health of the consumers, but maintaining product quality and preservation also helps to reduce wasted product. The final fillet usually comes out to be half, sometimes even less, of the original weight of the whole fish, so taking extra care will prevent unnecessary damage and further product loss. Proper and efficient fish preparation is necessary to achieving top quality, maximum yield, and highest profit (P. Bykowski & D. Dutkiewicz, 2011; Ababouch, 2005; Huss, 1995).

During processing, precautions must also be taken with the personal hygiene of the workers and the cleanliness of the work environment to avoid unnecessarily tainting the product. The guts, heads, fins, and other waste material should be kept in an area away from the fish being used for consumption to reduce the possibility of contamination. All processing areas, equipment, and containers should be designed in such a way that they are easy to clean so that they can be washed frequently with nonhazardous cleaning materials. The people in charge of handling the fish during processing should be properly educated in causes of food borne diseases and matters of hygiene and appropriate working attire (Johnston et al., 1994).

2.3.3 Quality Control during Storage and Transportation

Once the fish has been processed, it needs to be stored and transported in order to reach its final destination, and maintaining quality during this period should remain a priority. The best way to preserve the quality of fish is to keep them alive as long as possible before they are consumed. This can be accomplished with storage and transportation containers filled with water with carefully monitored temperature, oxygen, and toxin levels. When properly

controlled, the keeping of live fish can be a very effective method of delivering high quality product. However, this is difficult to accomplish with large catch volumes and limited funds because of the amount of equipment and monitoring required, and artisanal fishermen must often use refrigeration instead (Huss, 1995).

The majority of fish spoilage is caused by microbial activity. This activity and growth, however, is reduced as the temperature is lowered, with minimal activity occurring at temperatures below 10 degrees Celsius. Figure 3 is a graph depicting the effect of temperature on the growth rate of the bacterium *Shewanella Putrefaciens.* The optimum growth temperature is around 30 degrees Celsius; at half this temperature, the growth rate is already at 40% of its maximum. At zero degrees Celsius, the growth rate is less than 10% of its maximum. This demonstrates how storing fish at low temperatures plays a considerable role in the fish's preservation (Huss, 1995; Johnston et al. 1994).

Using ice to preserve fish is the one of the oldest and most commonly used methods available (Huss, 1995). Ice is easy to obtain through purchase or production and is generally obtainable at a low price. It is easily transported and manipulated for packing fish for storage or shipping, has a large cooling capacity (a small amount of ice can cool a comparatively large amount of product), and helps prevent the fish from drying out, preventing dehydration and weight loss. There are a few disadvantages to using ice, which include increasing the weight and volume that has to be handled by fishermen and creating the need for insulated storage and transportation (Ababouch, 2005; Huss, 1995; Shawyer & Pizzali, 2003).

In addition to retarding the growth rate of bacteria, ice also reduces the speed of enzymatic reactions within the fish, namely those related to the *rigor mortis* period. During this period, all of the muscles in the dead organism harden causing overall body stiffness. A delayed start and increased length of *rigor mortis* generally increases the fish's shelf life, although there is some variability based on species (Huss, 1995; Datta, n.d.)

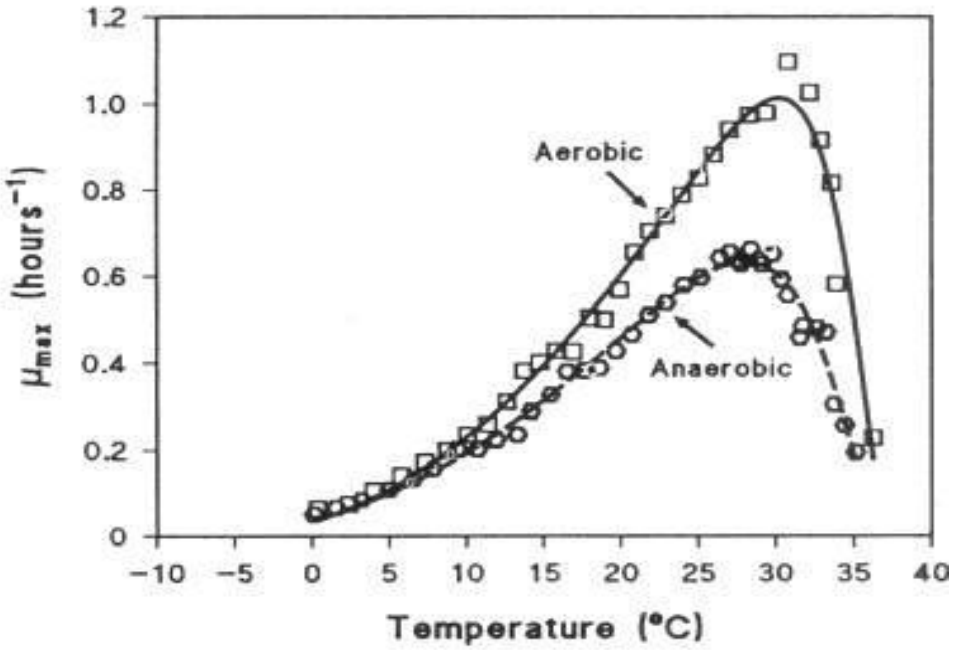

Figure 3 - Graphical depiction of the effect of temperature on the growth rate of the bacterium Shewanella Putrefaciens

There are several factors that will influence the amount of time it takes for fish to freeze. The product's temperature prior to freezing, its thickness and shape, the species of fish, and the amount of contact area with ice will all cause variation in proper cooling time (Johnston et al., 1994; Shawyer & Pizzali, 2003). It is important to ensure that there is enough ice to initially cool the fish to zero degrees Celsius and to account for both loss of ice from melting and thermal losses (Huss, 1995).

There are several different types of ice that can be used in product cooling. Flake ice is produced quickly, is easiest to distribute around the fish, causes minimal physical damage to the fish, and cools the fish the fastest. However, it also takes up more volume per the same cooling capacity, melts the fastest, and has a reduced cooling capacity when wet. Crushed ice has a greater chance of physically harming the fish, but thermal losses are compensated for by the larger pieces of ice that take longer to melt. Block ice (which is crushed to any size before being used for chilling) has a slow melting rate and takes up less space when being transported and stored; however, it takes much longer to make (Shawyer & Pizzali, 2003; Huss, 1995).

Ice production requires capital, maintenance, a potable water supply, a refrigeration and collection system, storage, and energy, all of which can be difficult for a developing area to maintain. Ice may also be expensive relative to the market price of fish in developing areas, and

using it would increase the price of the fish for consumers; sometimes it does not seem to be an economically sound decision to ice the products (Ramírez Villalobos, 2007; Harris, n.d.; Huss, 1995). However, as is mentioned above, safe, high quality products are most important to businesses purchasing fish. A lack of proper refrigeration threatens this and can in fact be detrimental to the profits of the fishermen, by allowing both product to spoil and business opportunities to be missed (personal communication, 2011). The importance of installing properly refrigerated storage and transportation technology is demonstrated by an incident faced by a cooperative in Belize. This cooperative lacked adequate cold storage facilities, processing equipment and ice-making machines; as a result, it had to dump 5,066 kilograms of spoiled spiny lobster tails. They lost the money they would have earned by selling this product and the money and time that had gone into preparing the product for sale (Gibson, n.d.).

2.4 Conclusion

It was our goal to promote the development of Coope Isla Venado, establishing new markets and increasing sales and profits. We investigated the scope of the Costa Rican fish market to tailor our suggestions to the market environment in which the cooperative was working. We determined the keys to successful marketing to know how to attract and retain customers for the cooperative's products. In learning the importance of marketing a high quality product, we examined the ways in which to provide quality fish products to consumers. This information was integrated into our suggestions for Coope Isla Venado; it provided a foundation for understanding how to optimize the cooperative as a business entity, increasing its production and profits to improve the lives of the members.

Chapter 3: Methodology

Our project's goal was to promote the development of a recently formed fishing cooperative on the island of Venado, aiming to maximize its profits and efficiency by streamlining the process of distribution. In order to achieve our goal, we completed the following objectives:

1) Evaluated the current system of the fish market and specifically how products are commercialized
2) Identified factors of sustainable quality commercialization
3) Assessed the current status of the cooperative determining its strengths, weaknesses, production, and earnings
4) Examined potential consumers' (hotels and restaurants) purchasing trends

Chapter 3 describes how these objectives were completed using a combination of interviews and surveys. The target populations were field experts, intermediaries, producers, and consumers.

3.1 Current Market Analysis – Interviews with Field Experts

To gain an understanding of commercialization in Costa Rica, we interviewed two experts in the field of fishing and aquaculture, with a particular focus on the marketing of fish products. Our questions focused on production and demand trends of different species of fish, marketing in the Gulf of Nicoya, and issues currently facing the market. We specifically addressed the species of fish living in the Gulf of Nicoya, the problems faced by rural, independent fishermen, and the factors that are important to a successful fishing cooperative.

To understand the movement of product from producer to consumer, we visited a main center for the distribution of fresh food products and spoke to several representatives. Based on our research of the fish market and the processes we witnessed at the distribution facilities, we developed questions to better understand the role of intermediaries. Using their responses to our questions, we determined how intermediaries are involved in processing and distributing the product from seller to buyer, why they are being used, and the effect they have on the target market and profit potential. By gaining insight into the current methods of product

distribution, we could adapt the current procedures in place and apply them to a small cooperative.

In order to gain a different perspective on the fish market, commercialization, and intermediaries, we interviewed a general manager of fish products of a large wholesaler in Costa Rica. During the interview, we evaluated the buying strategies of larger-scale distributors to aid in developing selling strategies for the cooperative. We asked questions pertaining to the product demands of the wholesaler and the thought process behind the purchases in terms of suppliers, price, and quality. We discussed the differences between captured and cultured fish products, the influence of the international market, the cultural aspect of fish in Costa Rica, and the health and safety policies involved in supplying quality products.

3.2 Current Market Analysis – Surveys with Producers

Participants. We surveyed 18 of 22 members of Coope Isla Venado (8 males; 10 females). All were native to Costa Rica and Spanish was their first language. Those present to take the survey were representatives of their entire families, so age data was not collected.

Procedure. The focus of our project was the 22 member Coope Isla Venado on the island of Venado; to obtain input from these members, we distributed a survey during a general body meeting. The survey assessed the current organization of the cooperative, the economy of the community, the members' motivations for joining the cooperative, and the members' expectations of the future of the cooperative. More specifically, we examined 1) the types of marine products sold by the fishermen in the cooperative, 2) the volumes produced and the earnings made by the fishermen, 3) the current commercialization techniques utilized by the fishermen to market their products. The survey can be viewed in Appendix B.

3.3 Current Market Analysis – Surveys with Processors

Participants. We surveyed four male owners of Centros de Acopio, the initial processing plants and direct purchasers of the cooperative's products. All were native to Costa Rica and Spanish was their first language.

Procedure. The cooperative members rely heavily on intermediaries to provide fishing supplies and process their products; eliminating these intermediaries would increase profits for

the fishermen. We surveyed owners of Centros de Acopio on the island to better understand the role these facilities play in product processing and marketing. We specifically evaluated 1) the supplies provided to the fishermen by the processors, 2) the average product volume handled on a monthly basis, 3) the breakdown of the species processed, including the volumes and prices paid, 4) the destination of the processed products, 5) any issues that arose when obtaining product from the fishermen. The survey can be viewed in Appendix C.

3.4 Current Market Analysis- Surveys of Potential Consumers

Participants. We conducted phone surveys with a total of 54 hotels and resorts that included restaurants located throughout the provinces of Guanacaste, Alajuela, San José, and Puntarenas. We received responses from eleven hotel representatives (nine males; two females); five of these hotels were located in Guanacaste, five in Puntarenas, and one in Alajuela. We surveyed 26 restaurants in San José in person and received data from representatives from 22 of them (16 males; 6 females).

Procedure. In order to determine how the production and sales prices of the cooperative compares to the demands of the market, we gauged the current buying habits of potential consumers. We targeted the hospitality market, specifically hotels and restaurants. We created a list of hotels and resorts by searching travel websites, removing any lodgings that did not have a restaurant. Because of the 54 hotels' distribution throughout Costa Rica, we conducted phone surveys with them. The restaurants we surveyed were chosen randomly for their convenience; they were all located within San José so we could distribute the surveys in person. Both the hotels and restaurants received the same survey. This survey evaluated the current purchasing patterns of these consumers and their willingness to consider a new supplier. They specifically addressed 1) the current source of their marine products, 2) the volumes obtained and prices paid for different species of fish, 3) their opinions of the products they are currently buying, 4) the factors that affect their decision to buy, 5) their thoughts on doing business with the cooperative. With this information, we were able to determine the demands of the market and the feasibility of the cooperative's selling to these consumers. The survey can be viewed in Appendix D.

3.5 Comparative Analysis – Interviews with Members of Other Cooperatives

As a basis for comparison, we interviewed representatives of two other Costa Rican fishing cooperatives, one that existed for about two years (two male producers) and one that has been in existence for over two decades (one male processor; one female administrator). The purpose of the interviews was to gain insight into the experiences of the two cooperatives, especially given their histories, in order to help us make recommendations for the operation of Coope Isla Venado. We assessed their structure and operation, areas they felt needed improvement, their production in terms of species, volumes, and prices, and their beliefs about what is required to run a successful cooperative.

Chapter 4: Findings and Data

In this chapter, we present our findings on sustaining quality commercialization, the production, earnings, and occupational distribution of Coope Isla Venado, as well as the demands of the hospitality market. These findings were later used to make recommendations to meet our project's goal of promoting the economic development of Coope Isla Venado.

4.1 Sustaining Quality Commercialization

Establishing a commercialization process is important, but equally as significant is ensuring that the commercialization is sustainable. In order to determine what is necessary for sustaining quality commercialization, we interviewed a general manger of fish products of a large wholesaler, representatives of a main distribution center, and members of two cooperatives in the Nicoya Gulf.

General Recommendations. From our interviews with market representatives and general manager of a large scale wholesaler, we were able to identify several key factors that could pertain to the efficiency of Coope Isla Venado. Based on these interviews, five out of the five people that we interviewed stated the following items would be necessary to improve the success of the cooperative 1) buying proper equipment, 2) building a processing facility, 3) having several members of the cooperative educated in business administration and marketing. One of the interviewees suggested designating members to perform specific tasks (e.g. fishing, processing, selling) in order streamline commercialization.

While the infrastructure and business knowledge are important components to a successful cooperative, our interviews also made it clear that food safety and quality assurance are also significant factors. The cooperative will need to meet the standards enforced by Servicio Nacional de Sanidad Animal (SENASA), the government agency in charge of regulating sanitary standards in regards to health. These health and safety regulations include wearing gloves, hairnets, and aprons when handling the food products (see Figure 4) and frequent hand washing. Products also need to be refrigerated and stored in clean containers.

Figure 4- Two Processing Employees Demonstrating Proper Working Attire

In addition to the recommendations that would aid the immediate success of the cooperative, our interviews also provided suggestions that pertained to long-term success. The general manger of a large-scale wholesaler suggested the cooperative consider the depleting fish population and plan for the future. This population depletion will affect the fishermen's production capabilities and ultimately their income. One way to account for this problem would be to transition into aquaculture, or fish farming. Aquaculture has the potential to provide a constant supply of fish and also give the ocean a chance to replenish its fish population.

Lessons from Other Cooperatives. Because we aimed to better understand different factors that could lead to the success or failure of Coope Isla Venado, we interviewed members of both a previous and an existing cooperative. From interviews with members of a previous cooperative, we were given suggestions for the administration of Coope Isla Venado. By

conducting an interview of an existing cooperative and receiving a tour of its facility, we were able to identify factors that have contributed to the achievements of that cooperative.

We interviewed two fishermen who had belonged to a fishing cooperative that was in existence for two years. Based on their experiences with cooperatives, both fishermen emphasized that the administration can directly contribute to the success of a cooperative. In particular, they believed that engaging members of the island in the administration would benefit Coope Isla Venado because those in charge would be familiar with the dynamics of the community, the individual members, and have a firsthand experience with any problems the cooperative may face. In addition, both fishermen, because of a lack of financial oversight in their previous cooperative, recommended that the cooperative establish a documentation system that maintains records of sales and develop mechanisms to ensure that the funds are being distributed equally throughout the members.

Our group interviewed representatives of an existing fishing cooperative and gained specific insight into how this cooperative has sustained itself for over two and a half decades. We identified three factors that have contributed to this success 1) owning a processing facility, 2) having an administration with distributed power, 3) having members of the community partake in the administration, 4) running annual management and marketing clinic for its members in partnership with Instituto Nacional de Aprendizaje (INA), the National Institute of Learning.

Our group received a tour of the cooperative's processing facility and was provided a detailed description of how this cooperative maintains quality assurance. After the fishermen brought their freshly gutted fish to the processing facility, it was immediately placed on ice and sorted by quality. If the product was undamaged, it was then processed. The processed products were stored in insulated containers on ice. In order to ensure that fish material did not contaminate the ice, the ice machine was separated by a physical barrier from the actual processing room. The refrigerated fish was then either transported to an export distribution center or sold in a store located on site. The maximum turnover time (from capture to sale) was two days. The steps the cooperative took in order to ensure quality met the standards of SENASA.

4.2 Current State of Coope Isla Venado

We surveyed 18 out of the 22 members of Coope Isla Venado to understand the state of the cooperative including its occupational distribution, members' reasons for joining, production of fish, and earnings.

Occupational Distribution. Out of 22 members, 32% reported they are solely involved in fishing and 18% stated they were involved in tourism. Nine percent of members said that they are involved in either: both fishing and agriculture, both fishing and tourism, or exclusively agriculture. The remaining 23% of members did not provide information on their occupation. Figure 5 illustrates this occupational distribution.

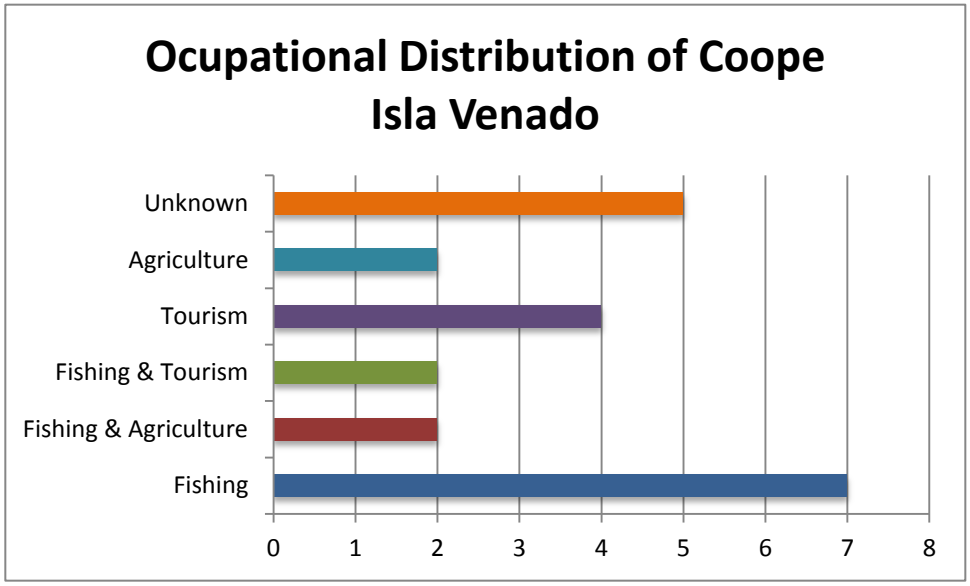

Figure 5- Occupational Distribution of Coope Isla Venado

Reason for Joining. These surveys also addressed the reason why each member chose to join the cooperative to determine each member's expectations. Out of the 16 members who answered this question, all 16 expressed a desire to improve their socioeconomic condition, with 50% of the respondents directly stating they hoped to "better their quality of life". Thirteen percent joined to maintain employment, and 6% also sought to develop the community as well as improve their own lives.

Production and Earnings. In order to form an overview of the current production capabilities of the cooperative, we asked the members about the species and the volumes of fish they caught. We used this information to determine how the cooperative's production aligned with

the market demands. Nine of the members responded to this question (not all of the cooperative members actively participated in fishing) and from the responses we determined that there were two popular species being caught by more than half of the fishermen: sea bass and jumbo shrimp. Eleven percent of fishermen also reported catching less popular species such as mackerel, catfish, and snapper. The individual fishermen sold anywhere from 20 to 65 kilograms (44 to 143 pounds) of total product of all species per week, the majority being sea bass and jumbo shrimp.

We also inquired about the average prices the cooperative members received for the different species of fish so that we could compare the price difference between the initial sale and the final sale. We gathered the prices received for a specific species from the different members and took the average of those prices (as of November 2011, 500 colones equaled approximately 1 US dollar). Sea bass (caught by 86% of fishermen) sold at an average of 1,625 colones per kilogram. Jumbo shrimp (caught by 56% of fishermen) sold at an average price of 5,500 colones per kilogram. There was one exception to these price averages, and those numbers came from the cooperative member who processed the fish products before selling them, consequently gaining more profits. He earned over 3,000 colones (about 200%) more per kilogram of sea bass and approximately 4,500 colones (about 80%) more per kilogram of jumbo shrimp. He was the only member who did not sell his products to a processing facility on the island of Venado but directed his products straight to marketing centers like Palmares, San José, and Jicaral. The summary of this data can be seen below in Table 2.

Fish Product	Average Price (colones)	Volume per Week
Sea Bass	1625	203 Kg
Jumbo Shrimp	5500	37 Kg
Sea Bass Filets	5000	50 Kg
Processed Jumbo Shrimp	9000	50 Kg

Table 2- Average Prices Received and Volumes of Fish Produced by Cooperative

4.3 Hospitality Market Demands

Hotel Restaurants. In order to determine the hospitality market demand, we surveyed 54 hotels from the provinces of Guanacaste, Puntarenas, and Alajuela, asking them about the species and the prices of the products they purchased. Eleven of the hotels responded to the survey--a 20% response rate. Because the cooperative mainly caught sea bass and jumbo shrimp, we were most interested in the amounts the hotels bought of these species. Fifty-five percent of the surveyed hotels bought sea bass at an average of 4,450 colones per kilogram, and 55% of the hotels bought jumbo shrimp at an average price of 11,417 colones per kilogram. However, the survey responses indicated that there are other species in high demand. Seventy-three percent of hotels bought mahi-mahi, 64% bought snapper, and 36% bought pinky shrimp. There were also some species purchased by less than 20% of surveyed hotels, such as tuna and salmon. The summary of this data can be seen below in Table 3.

Fish Product	Percent of Establishments
Jumbo shrimp	55
Sea bass	55
Mahi-mahi	73
Snapper	64
Pinky shrimp	36

Table 3- Hotel Demands for Fish Products

The hotel representatives were also asked their opinion of their current fish supply; 55% of the representatives described the current fish prices as expensive while the remaining 45% described the prices as average. Seventy-three percent of the hotel representatives described the quality of their fish product as excellent, eighteen percent described it as good, and nine percent described it as average. When asked about the factors that are most important in purchasing fish products, all eleven hotel representatives stated that quality played a large role in their purchases, six listed price, three listed sanitary handling and operation, and two listed a constant supply. Eight of the hotel representatives would be interested in buying the products of a cooperative of artisanal fishermen that wants to commercialize its fishing products directly to consumers. An analysis of variance (ANOVA) was performed on the data to determine if the

size of the hotel influenced any of the following variables 1) where the hotel purchased its fish, 2) the hotel's perception on price, 3) the hotel's perception of quality, 4) the most important factors to the hotel (price, constant supply, quality, sanitary handling and operation). From these analyses we concluded that there is no significant effect of size of hotels on the variables listed above.

Metropolitan Restaurants. To supplement the hotel restaurant data, we surveyed 26 restaurants in San José to determine which species is in highest demand and how much they pay for their fish. Twenty-one restaurants responded to the surveys -- an 85% response rate. Because the cooperative mainly catches sea bass and jumbo shrimp, we were most interested in the amounts the restaurants bought of these species. Sixty-eight percent of the surveyed restaurants bought sea bass at an average of 6,116 colones per kilogram. Seventy-three percent of restaurants that were surveyed bought shrimp at an average price of 7,900 colones per kilogram. However, the restaurants did not specify if the shrimp were jumbo or the smaller, less expensive pinky shrimp altering the average purchasing price; thus, we could not compare this data to the data collected from the fishermen and hotels. Other species were purchased less frequently among metropolitan restaurants. Thirty-six percent of the surveyed restaurants stated they bought tilapia, 23% stated they purchased marlin, and 18% stated they bought porgy. Less than 10% of the surveyed restaurants reported buying catfish, shark, mahi-mahi, and trout. Table 4 represents these demands.

Fish Product	Percent of Establishments
Jumbo shrimp	n/a
Sea bass	68
Tilapia	36
Marlin	23
Snapper	18

Table 4- Restaurant Demands for Fish Products

The restaurant representatives were also asked their opinion of their current fish supply; 21 of the participants answered these questions. Fifty-seven percent of participants who answered this question thought that the price was average, thirty-eight percent thought

the price of fish was expensive, and only five percent thought fish products were inexpensive. From the data collected, it was concluded that 57% of participants thought the quality of fish was good, and 33% thought the quality to be excellent, with the remaining 10% thinking the quality to be average. When asked about the factors that are most important in purchasing fish products, 20 of the 21 restaurants that answered this question listed quality as an important factor when purchasing fish, 14 listed sanitary handling and operation, 11 listed price, and 9 listed constant supply. Twenty-one out of the twenty-two surveyed restaurants stated they were interested in helping a cooperative of traditional fishermen and would consider buying products from Coope Isla Venado. We ran an analysis of variance (ANOVA) to compare the effect of size of the restaurant to the following variables 1) where the restaurant purchased its fish, 2) the restaurant's perception on price, 3) the restaurant's perception of quality, 4) the most important factors to the restaurant (price, constant supply, quality, sanitary handling and operation). From these analyses, we concluded that there was no significant effect of the size of the restaurant on the variables listed above.

Comparison Hotel Restaurants and Metropolitan Restaurants. Because sea bass and jumbo shrimp were the two main species caught by the cooperative, we compared the price and demand of both species with the data collected from both hotels and restaurants. Table 5 illustrates this comparison. Hotels paid an average of 4,450 colones per kilogram of sea bass (purchased by 55% of hotels) and 11,417 colones per kilogram of jumbo shrimp (purchased by 55% of hotels). Restaurants paid an average of 6,116 colones per kilogram of sea bass (purchased by 68% of restaurants) and 7,900 colones per kilogram of shrimp (purchased by 73% of restaurants). However, these restaurants did not specify which type of shrimp (jumbo or pinky) they purchased; thus this information was not available for comparison. This data is compared in Table 5. A chi-square analysis was performed to determine if there was a significant difference in the percent of hotels and percent of restaurants that purchased sea bass. The analysis indicated there was no significance difference between these percentages, $\chi 2$ (N = 33) = 1.37, p=0.24.

Species	Percent of Establishments	Average Price per Kg (colones)
Hotels		
Sea Bass	55	4,450
Jumbo Shrimp	55	11,417
Metropolitan Restaurants		
Sea Bass	68	6,116
Jumbo Shrimp	n/a	n/a

Table 5- Comparison of Hotel and Restaurant Purchasing Prices

Comparison of Producer and Hospitality Consumers. We also compared the fishermen's selling price of sea bass and jumbo shrimp to the hotels and restaurants' purchasing price of these species. To conduct this analysis, we averaged the prices that the hotels and restaurants paid for sea bass. This analysis showed that fishermen of Coope Isla Venado sold their unprocessed sea bass (1,625 colones per kilogram) for significantly less than what hotels and restaurants paid (5,283 colones per kilogram), $t(3)= 7.115$, $p<0.05$. Figure 6 illustrates this comparison.

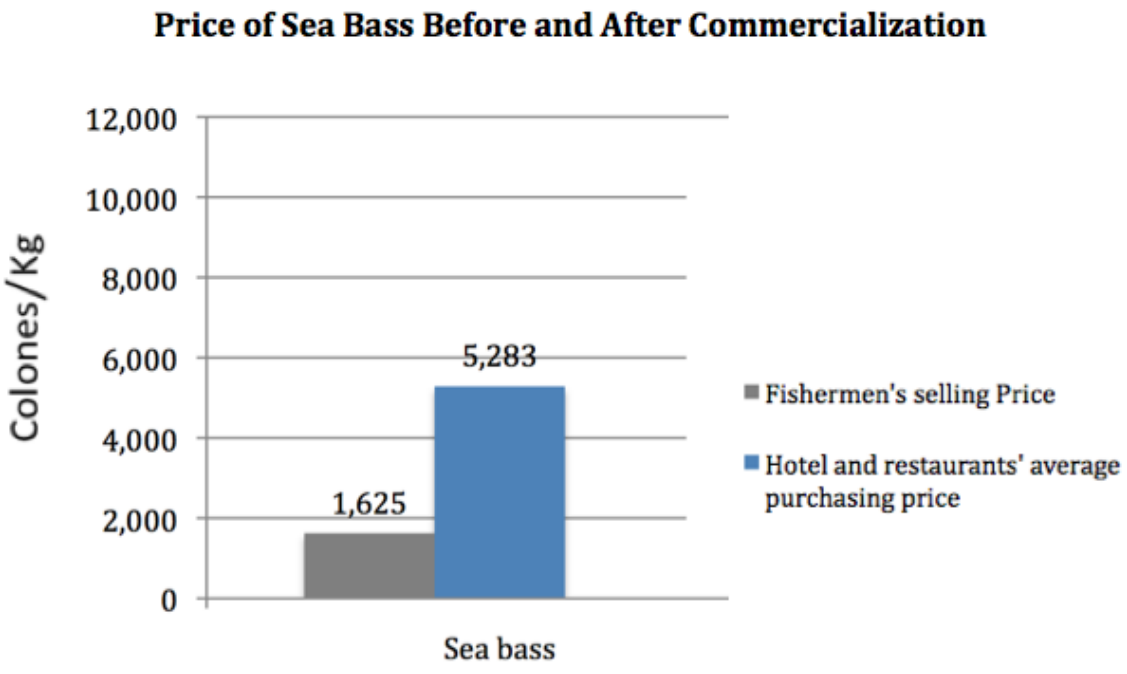

Figure 6- Price Comparison of Sea Bass Before and After Commercialization

Similar trends applied for jumbo shrimp. Fishermen sold unprocessed jumbo shrimp (5,500 colones per kilogram) for significantly less than what hotels paid for processed jumbo shrimp (11,417 colones per kilogram), t(3)= 10.27, p=0.002. Because the metropolitan restaurants did not specify what type of shrimp they buy, this data is not available for comparison. Figure 7 illustrates this comparison.

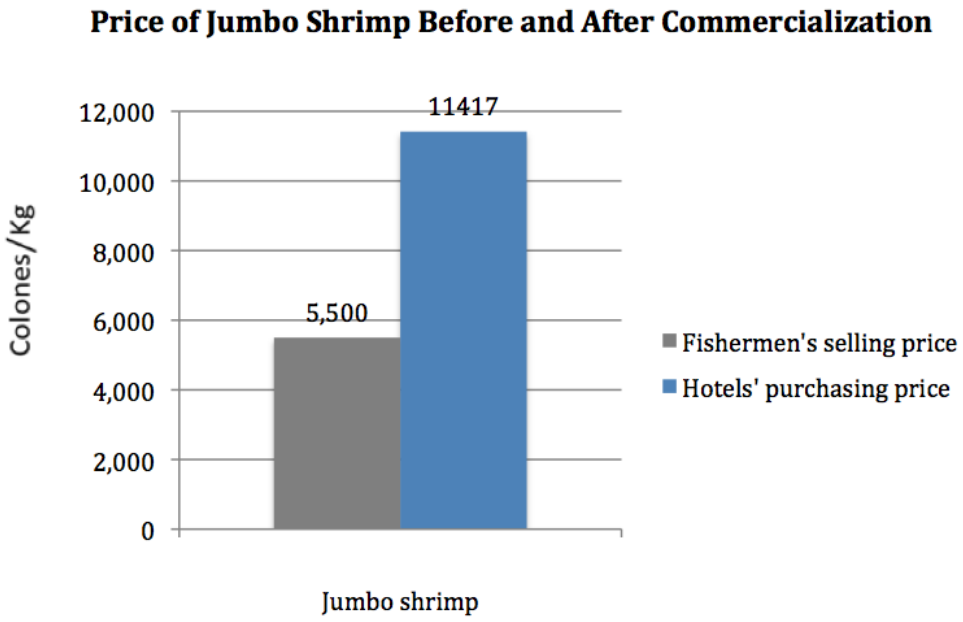

Figure 7- Price Comparison of Jumbo Shrimp Before and After Commercialization

Chapter 5: Discussion

Our project investigated the poverty surrounding rural fishing communities in Costa Rica and ways to end it. We accomplished this by analyzing a recently formed fishing cooperative on the island of Venado in the Nicoya Gulf. The success of the island's fishing industry plays an important role in the economy and wellbeing of the community as a whole. The cooperative members of Venado have formed this business venture as a way to combine their resources to work more efficiently, produce a more refined product, and increase their profits. We specifically explored ways to streamline the distribution of the cooperative's products to consumers. To accomplish this, we investigated the necessities of sustainable, quality commercialization and analyzed Coope Isla Vendo's production and consumer needs. We analyzed the current route of commercialization and concluded that more processed products are sold at higher prices and the use of intermediaries as processors is the main reason why fishermen lose profits. Thus, one way that the cooperative can increase their profits would be to remove the intermediaries and start processing the fish themselves. In particular, our survey data suggested that if the cooperative could supply high quality, fully processed seafood products directly to the consumer, then they should see an increase in profits.

5.1 Recommendations for Sustaining Quality Commercialization

Through our research, we were able to provide several recommendations for Coope Isla Venado in terms of its production, organization and development, and marketing in order to achieve sustainable quality commercialization.

5.1.1 Cooperative Production

Products that have undergone further processing steps (more labor involved, more finished product) have a higher market value and therefore yield a higher price (Regenstein, 1992). Based on our research, by establishing a processing facility and purchasing a means of transporting and storing fresh fish, the cooperative could process and deliver its own goods. This would eliminate their need to sell their products to intermediaries, and allow them to sell directly to consumers at a higher price. In this way, the members would be retaining more profit of their products rather than losing it in the multiple transactions currently involved in

marketing their fish. The processing facility would need to meet the standards set forth by Servicio Nacional de Sanidad Animal (SENASA). These regulations, which cover matters such as employee hygiene, storage conditions, and waste management, had been set to ensure the proper handling of all food set for human consumption so that it is of appropriate quality to not pose any health risks to the consumers. Similar regulations need to be followed both when storing and transporting the products in order to reduce the chances of product contamination and spoilage through proper temperature control and handling techniques (see Appendix E for a table summarizing these sanitary guidelines). The combination of these measures will help the cooperative provide high quality product to the market.

Quantity will be another important factor for Coope Isla Venado to take into account. Currently, the cooperative has a limited number of fishermen and the supply of fish in the ocean is depleting (Bardach, 1987). To account for these issues, we recommended that the cooperative invest in freezer space, allowing the cooperative to store any surplus catch for times when the supply is lacking. The cooperative could also look to additional methods of obtaining product in order to supply their customers. One option would be to recruit more members to join the cooperative in the role of fishing. The cooperative could also buy the product of independent fishermen either from the island or from nearby communities; this could increase both the volume of product and the variety of fish they sell. Aquaculture is another method of increasing the total volume of product the cooperative could sell.

Aquaculture refers to the farming of aquatic organisms and has already shown steady growth in Costa Rica in the past 30 years, with production reaching almost 27,000 metric tons in 2008, a more than 20,000 metric ton increase from 1993. It is a controlled method of raising fish and properly maintained conditions can provide a relatively constant supply of fish. This is of increasing importance as production from wild capture has leveled off in the past decade as a result of decades of overfishing (FAO, 2010; Bardach, 1987; Regenstein, 1992). From our research, we determined that developing an aquaculture facility would expand the scope of Coope Isla Venado as a business enterprise and further increase its profits. By investing in aquaculture technology and education, the cooperative could supplement the volume of fish it catches and have a more stable supply of product. The main problem with implementing this

technique is that there has been little work done in the field of farming marine species, which are what the cooperative captures and sells. For aquaculture to be a viable option, research and experimentation would need to be conducted in order to determine the proper equipment, practices, and conditions needed to successfully farm marine species, such as sea bass and snapper, in terms of quantity and quality.

5.1.2 Cooperative Organization and Development

Based on our research, we concluded that a cooperative can operate more efficiently if it is organized and managed well. Coope Isla Venado needs to designate different groups of people to perform the various tasks (catching fish, processing, transporting, selling); this will allow the designated members to hone their skill sets and achieve maximum production. We recommend investing in regular training sessions for all employees; regular training is shown to improve technical skills, procedural awareness, and employee attitudes, all of which can improve the individual's and organization's production and performance (Aguinis & Kraiger, 2009; Promotion of Cooperatives, 2002; Dearden, Reed, & Van Reenan, 2006). A study done by Bartlett (2001) also concluded that the access to regular training has a strong relationship with increased employee commitment to the organization, which is especially important in the beginning years of a business.

The administration should likewise participate in regular training sessions, although these sessions should focus on leadership, finances, and entrepreneurship (Promotion of Cooperatives, 2002). This would keep the cooperative's management up-to-date on leading an organization, the fish market, and ways to effectively participate in business deals and handle finances. Management of funds is particularly important to the cooperative to ensure equal profit distribution among members and to finance the purchase of necessary supplies and expansion endeavors. One way to accomplish this training would be to partner with the Instituto Nacional de Aprendizaje (INA), the National Institute of Learning, and hold regular training clinics in marketing and management practices (personal communication, 2011).

Training is not the only aspect necessary for a successful administration. Based on experiences of past cooperatives, it was recommended that the members of administration are native to the island of Venado to ensure that the administration is familiar with the dynamics of

the community, knows the individual members, has firsthand experience with any problems the cooperative might face, and eliminates outside interests. The administration should also take care to maintain detailed documentation of all production and sales transactions; documentation acts as an organized and reliable way to keep track of the business information. From our investigations, we discovered that there currently is limited documentation of production volumes and sale prices. In order to monitor trends and margins of improvement or decline, there needs to be documented records of production volumes and costs, as well as sales and prices. Therefore, we recommend that the cooperative start documenting production volumes and sales prices.

Our project analyzed the practical aspects of running a successful fishing cooperative, such as training and documentation, which gives the necessary foundation for business prosperity. However, the success of the cooperative will depend on the execution of these commercialization practices and financial management. Future research could assess the rural fishermen's perceptions of the business world, their awareness of business practices, and ways in which to teach business conscious strategies in an effective way.

5.1.3 Cooperative Marketing

When a new business enters a market, it is important to build credibility and gain a consumer following. Doing this requires meeting the consumers' expectations of product value by providing a quality product at a reasonable price in the proper quantities. The regulations discussed above will aid in ensuring the product quality and quantity. Pricing the product is a more variable process and relies on the production cost incurred by the cooperative, the demand of the market, and the offers of the competition. The cooperative needs to sell at a price that allows them to make profit but is also appealing to the consumer, especially as it introduces its products to consumers for the first time (Otárola & Ramírez, n.d; Piercy, n.d.; Slater & Narver, 1994; Antariska, n.d.). Eliminating the intermediary transactions will aid in creating a reasonable price while also reducing the amount of time it takes to bring the fish from the ocean to the consumer; thus the cooperative can also provide consumers with fresher product.

Once all the necessary components of the product meet consumer demands, the cooperative needs to advertise its product. Based on previous research, advertising can increase product sales, but only if it provides the consumer with information not previously known (Nelson, 1974). The cooperative is still new to the market, and the island is isolated relative to the consumer market on the mainland of Costa Rica. The cooperative members need to make contact with potential consumers, supplying information about its products and services. Research done by Ariely (2000) investigated methods of advertising and demonstrated that consumers had a better response to information when it was presented to them in an interactive way, giving the consumer more control over the information they were exposed to. In one of the experiments related to this research, participants were asked to evaluate different types of cameras; they were randomly assigned to more interactive conditions or less interactive conditions. Those participants who had more control of the information flow (more interactive) demonstrated better information retention and overall better comprehension of the product specifications (Ariely, 2000). Thus, we suggest that the cooperative explore methods in which to communicate product information to consumers in an interactive way, such as personal communication. This would aid in building long-term relationships with their consumers, which is shown to lead to increased profits over time (Kalwani & Narayandas, 1995).

In addition to marketing its product, the cooperative needs to market itself as an entity so the consumers are aware of its products. A study performed on agricultural cooperatives in New Zealand demonstrated that when cooperative members understood the value of branding, they were more likely to take measures, such as maintaining strong customer relationships, that supported long-term success in the market (Beverland, 2007). In creating a brand, a business must determine its purpose in the market, how it benefits its customers and society in general. Then a business must determine the principles it has that help it serve its purpose, what makes it unique and superior to its competitors. The final step is communicating this brand message both internally throughout the staff and externally to the consumer market. (Hendry, 2006; Nolan, 2006).

5.2 Conclusion

Rural fishermen throughout Costa Rica are supplying a profitable product and yet the members of the community are failing to collect the profits. We investigated this problem by evaluating Coope Isla Venado and its current methods of commercializing its products. We offered recommendations on how to enhance its operational aspects and create a new consumer market. These suggestions form a foundation for creating long-term business success in the Costa Rican fish industry. This project focused specifically on the island of Venado, but the practices put in place can easily be applied to other regions, with the potential of helping rural fishing communities throughout Costa Rica progress from chronic poverty to prosperity.

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Appendix A - Sponsor Profile

Instituto Costarricense de Pesca y Acuicultura (INCOPESCA) is a government organization charged with the regulation and support of fishing and aquaculture in Costa Rica. INCOPESCA was established in March 1994 with headquarters in the city of Puntarenas. Over the years, this institute has branched out and established new offices throughout Costa Rica, currently operating out of 14 offices nationwide (see Figure 8). INCOPESCA's vision is to conserve and use the Costa Rican marine and aquaculture resources in a sustainable way through consistent and effective regulation, protection, and management. INCOPESCA focuses on educating small traditional fishermen about effective management practices and marketing strategies.

Figure 8- Offices and Aquaculture Stations established by INCOPESCA (INCOPESCA, 2011)

Appendix B – Survey for Coope Isla Venado Members (English & Spanish)

Questionnaire For Coope Isla Venado Fishermen

1) What role does fishermen have _____
2) What is your preferred economic role

   Fishing____ Agriculture____ Tourism ___ Livestock ____
3) What is the total volume of fish you catch:

   Weekly: _____ Monthly:_____
4) What volume of each type of fish are you catching?

	Average volume in kg	
Species	Per Week	Per Month
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

5) What are your approximate profits?

   Per Week _____ Per Month _____ Yearly_____

6) What price is each type of fish sold at:

	Price per kg
Species	Colónes
_____	_____
_____	_____
_____	_____
_____	_____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

7) Which places are you selling your fishing? _____

_____

_____

8) Why did you join the cooperative? _____

_____

_____

9) What would you like to see improved within the cooperative? _____

_____

_____

_____

Cuestionario para Coope Isla Venado Pescadores

1) ¿Qué papel tienen dentro de la cooperativa? _____

_____

2) ¿Qué es su área preferida de la economía?

   a. Pescadería ___ b. Agricultura____ c. Turismo____ d. Pecuario ____

3) ¿Cuál es el volumen total de su pesca? (Kg)

   Por semana: _____ Por mes:_____

4) ¿Aproximadamente, qué volumen de cada especie pesca?

	Volumen promedio en Kg	
Especies	Por semana	Por mes
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

5) ¿Cuánto se gana aproximadamente?

   Por semana: _____ Por mes: _____ Por año:_____

6) ¿A qué precio se vende cada especie?

	Precio por Kg
Especies	Colones
_____	_____
_____	_____
_____	_____
_____	_____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

7) ¿En qué lugares vende su pesca? _____

_____

_____

8) ¿Por qué decidió unirse a la cooperativa?

_____

_____

9) ¿Qué le gustaría ver mejorado en la cooperativa? _____

_____

_____

_____

Appendix C – Survey for Centro de Acopio Owners (English & Spanish)

Questionnaire for Centro de Acopio

1. What supplies do you provide to the fishermen?

Gasoline	Ice
Bait	Water
Nets	Hooks
Other:	Oil

2. Volume of product you receive per:

Month: Kg

Year: Kg

3. What is the route of commercialization for the products that you buy?

Isla Venado→

Puntarenas	Surrounding communities
Hotels on the beach	(Jicaral-Nicoya)
Other:	Metropolitan area

4. What are the primary products that you buy and at what price?

Species:	Price/Kg	
	Colón	USD
Jumbo Shrimp		
Sea Bass (aguada)		
Sea Bass (reina)		
Other:		
Other:		
Other:		

7. What are the main problems that you have with obtaining product from the fishermen?

Cuestionario para Centro de Acopio

1. ¿Qué insumos suministra a los pescadores?

Gasolina	Hielo
Carnada	Agua
Trasmallos	Anzuelos
Otro:	Aceite

2. Volumen de productos que reciben por:

Mes: Kg

Año: Kg

3. ¿Cuál es la ruta de comercialización de los productos que compra?

Isla Venado→

Puntarenas	Comunidades cercanas
Hoteles de la playa	(Jicaral - Nicoya)
Otro:	Área Metropolitana

4. ¿Cuáles son las principales especies que comprar y precios?

Especies:	Precios/Kg	
	Colón	USD
Camarón jumbo		
Corvina aguada		
Corvina Reina		
Otro:		
Otro:		
Otro:		

7. ¿Cuáles son los principales problemas que tienen para obtener de los pescadores?

Appendix D – Survey for Hotels and Restaurants (English & Spanish)

Questionnaire for the Consumption and Purchase of Fishing Products

You can mark the boxes with an X

We are a group of students from Worcester Polytechnic Institute who, in collaboration with the Instituto Costarricense de Pesca y Acuicultura (Costa Rican Institute of Fishing and Aquaculture, or INCOPESCA), are working on a Project about the commercialization of fish products, focusing on a recently formed cooperative on the island of Venado. In this sense, we ask your cooperation in providing us with the information requested in the following questionnaire. Your job titles and the names of your hotels/restaurants will not be used in our report.

1) Hotel/Restaurant represented _____
2) Job Title _____
3) Hotel/Restaurant Capacity _____
4) Do you serve fishing products? ☐ Yes ☐ No
5) Where do you buy your fishing products from?
   ☐ Fishermen near the hotel ☐ Puntarenas ☐ Guanacaste
   ☐ San José ☐ They are imported
6) What is the total volume of fishing products that you buy per:
   Week: _____ Month: _____
7) What types of fishing products do you buy?

Species	Approximate Volume per Week (kg)	Approximate Volume per Month (kg)	Price USD	Price Colones
Tilapia				
Shrimp				
Trout				
Sea Bass				
Mahi-Mahi				
Snapper				
Catfish				

Porgy				
Shark				
Marlin				
Others				

8) What is your opinion of the price of seafood?

☐ Cheap ☐ Average ☐ Expensive

9) How would you categorize the quality of product that you receive?

☐ Poor ☐ Average ☐ Good ☐ Excellent

10) Would you be interested in supporting a cooperative of artisanal fishermen who want to commercialize their fishing products directly to consumers?

☐ Yes ☐ No

11) If you responded yes to the previous question, would you consider buying the product of Coope Isla Venado? ☐ Yes ☐ No

12) When you buy fish products, what is the most important factor to you?

☐ Price ☐ Constant supply ☐ Quality ☐ Sanitary handling/operation

Cuestionario sobre Consumo y Compra de Productos Pesqueros

Puede marcar las cajas con un X

Somos un grupo de estudiantes de Worcester Polytechnic Institute quienes en colaboración con el Instituto Costarricense de Pesca y Acuicultura, estamos realizando un trabajo sobre comercialización de productos pesqueros enfocado a una cooperativa de reciente creación en la Isla Venado. En este sentido solicitamos su amable cooperación para que nos suministren la información que se solicita en el cuestionario que se adjunta. Sus títulos y los nombres de sus hoteles/restaurantes no serán usados en nuestro reporte.

1) Hotel/Restaurante que representa _____
2) Cargo que ocupa _____
3) La capacidad del hotel/restaurante _____
4) ¿Sirve productos pesqueros? ☐ Si ☐ No
5) ¿De dónde compra sus productos pesqueros?
   ☐ Pescadores cercanos al hotel ☐ Puntarenas ☐ Guanacaste
   ☐ San José ☐ Importados
6) Cuál es el volumen total de productos pesqueros que compra por:
   Semana: _____ Mes_____
7) ¿Qué tipos de productos pesqueros compra?

Tipo	Volumen estimado por semana (kg)	Volumen estimado por mes (kg)	Precio USD	Precio Colones
Tilapia				
Camarón				
Trucha				
Corvina				
Mahi Mahi				
Pargo				

Bagre				
Porgy				
Tiburón				
Marlin				
Otros				

8) ¿Qué criterio tiene del precio de los mariscos?

☐ Baratos ☐ Regular ☐ Caros

9) ¿Cómo considera la calidad de producto que recibe?

☐ Malo ☐ Regular ☐ Bueno ☐ Excelente

10) ¿Estaría interesado en apoyar una cooperativa de pescadores artesanales, quienes quieren comercializar el producto de su pesca directamente? ☐ Si ☐ No

11) Si su respuesta anterior fue si, ¿podría considerar la compra de producto de Coope Isla Venado? ☐ Si ☐ No

12) Cuando se compra productos pesqueros, ¿qué es lo más importante para Uds.?

☐ Precio ☐ Constancia en la entrega ☐ Calidad ☐ Manejo sanitario

Appendix E – Sanitary Guidelines for Processing and Transporting Fish Products (English and Spanish)

Hazards	Precautionary Measures
Risks to product quality because of poor facility structure	• Establish building whose inside is well protected from outside elements • Build walls and floor of material that is easy to maintain and sanitize (such as ceramic tiles) • Install proper drainage in the flooring • Use smooth, non-absorbent, nontoxic processing surfaces • Place well labeled waste receptacles away from the products for consumption • Install screened/protected windows • Construct an adequate number of hand washing stations • Separate processing area from other areas that could cause contamination, such as the bathroom or the storage area for gasoline and cleaning products
Microbial contamination because of inadequate hygienic practices of employees	• Enforce wearing clean aprons, gloves, covered footwear, face masks and hair nets (tie back long hair) • Enforce frequent hand washing – before and after handling fish, after touching contaminated surfaces, after using the bathroom, eating, smoking, sneezing, coughing, etc. • Maintain facial hair and finger nails • Prohibit accessories such as watches, bracelets and rings • Cover properly all open wounds • Do not work when sick
Microbial contamination because of inadequate hygienic practices of facility	• Dispose the remaining fish matter into the garbage cans with lids and empty garbage regularly • Sanitize processing surfaces and tools regularly with a certified cleaner • Prohibit any animals in facility • Manage pests • Prohibit any products for consumption from coming in contact with the floor
Loss of quality because of lack of proper equipment	• Establish source of potable (safe for human consumption) water – hot when necessary • Establish on site ice machine – make ice with potable water • Purchase insulated storage containers and freezers that can be easily cleaned and drained • Use cutting tables made from metal not wood • Buy proper packaging equipment that will allow products to remain air tight

Loss of quality because of poor handling techniques	• Purchase good quality gutting and filleting tools • Gut fish as soon as possible • Wash fish products carefully and as soon as possible • Provide processing training
Spoiled products because of improper storage	• Build enough room for storage, and be prepared for an unexpected surplus • Regulate temperature of storage containers: Frozen fish temperature no higher than 18°C; chilled fish temperature approximately 0 °C with a maximum of 4^{o}C • Replenish ice regularly • Put product on ice as soon as possible • Reduce exposure to sun • Label all containers with products they contain
Damages to products because of transportation	• Choose smoothest and shortest route whenever possible • Supply transporting containers with adequate ice or refrigeration system • Monitor temperature of containers • Train and license drivers properly

(adapted from OSPESCA, 2010; Regenstein, 1992; Reglamento de Inspección, 2011)

Peligro	Medidas Preventivas
Riesgos a la calidad del producto por la mala estructura del edificio	• Establecer edificio cuyo interior es bien protegido de los elementos • Construir muros y suelos de un material que es fácil mantener y limpiar (como baldosa de cerámica) • Instalar drenaje apropiado en el suelo • Usar superficies de procesamiento lisas, no tóxicas, y no absorbentes • Mantener baldes de desechos, etiquetados apropiadamente, alejados de los productos de consumo • Instalar ventanas protegidas y/o malladas • Construir un número adecuado de lavamanos • Separar el área de procesamiento de otras áreas que puedan causar contaminación, como baños o áreas de almacenamiento de gasolina y productos de limpieza
Contaminación microbiana por prácticas higiénicas inadecuadas de los empleados	• Hacer cumplir normas que requieren ropa adecuada y limpia – delantales, guantes, calzado cubierto, máscaras, y redecillas para el pelo (para atar el pelo largo) • Establecer normas obligatorias del lavado de los manos con frecuencia – antes y después de manipular la pesca, después de tocar superficies contaminadas, después de ir el baño, comer, fumar, estornudar, toser, etcétera. • Mantener pelo facial y las uñas limpias • Prohibir accesorios como relojes, pulseras, y anillos • Cubrir heridas menores – abstenerse de trabajar en caso de heridas muy profundas. • No trabajar cuando se está enfermo
Contaminación microbiana por prácticas higiénicas inadecuadas del edificio	• Disponer los desechos de la pesca en los baldes de desechos con tapas; vaciar los baldes con frecuencia • Limpiar las superficies y utensilios de procesamiento con un producto de limpieza certificado frecuentemente • Prohibir animales en el edifico • Eliminar plagas oportunamente • Prohibir que los productos de consumo de entren en contacto con el suelo
Pérdida de calidad por una falta del equipo apropiado	• Establecer fuente de agua potable (que las personas puedan beber sin riesgo a su salud) – caliente cuando sea necesario • Obtener una máquina de hielo en el edificio – hacer hielo con agua potable • Comprar recipientes de almacenamiento y congeladores aislados que puedan ser limpiados y vaciados fácilmente

	• Usar mesas de procesamiento de metal y no de madera • Obtener equipo de envasado hermético.
Pérdida de calidad por un falta de técnicas de manejar apropiadas	• Comprar utensilios de cortar de buena calidad • Destripar el pescado lo antes posible • Limpiar los productos pesqueros cuidadosamente y lo mas antes posible • Proporcionar información y documentación de procesamiento adecuado
Productos estropeados por una falta de almacenamiento apropiado	• Construir espacio suficiente por almacenamiento – estar preparado para un excedente inesperado de producto • Regular le temperatura de recipientes de almacenamiento: la temperatura productos congelados no debe ser más baja de ⁻18°C; la temperatura de pescado fresco debe ser aproximadamente 0 °C con un máximo de 4^{o}C • Cambiar el hielo regularmente • Poner el producto en hielo lo antes posible • Minimizar la exposición al sol • Etiquetar todos los recipientes con los productos que contienen
Danos al productos por transportación mala	• Elegir la ruta más lisa y corta cuando es posible • Proporcionar recipientes de transportación con hielo suficiente o con un sistema de refrigeración • Controlar la temperatura de los recipientes • Entrenar y obtener las licencias apropiadas por los conductores

(adaptado de OSPESCA, 2010; Regenstein, 1992; Reglamento de Inspección, 2011)