Analyzing and Improving the Fishing Supply Chain in Costa Rica

Veronica Coyle, Ruxandra Duca, Courtney Jones, Kevin Roopcharan

2015

Fishing Supply Chain Cost Analysis:

A Study of Small-Scale Fisheries in the Gulf of Nicoya

An Interactive Qualifying Project
Submitted to the Faculty of
Worcester Polytechnic Institute
in partial fulfillment of the requirements for the
Degree of Bachelor of Science

Submitted by:
Veronica Coyle
Ruxandra Duca
Courtney Jones
Kevin Roopcharan

Submitted on:
5/6/2015

Submitted to:
La Fundación MarViva
Costado Norte, Nunciatura Apostólica, San José, Costa Rica

Project Advisors:
Prof. Aarti S. Madan and Prof. Ryan Madan

Abstract

For Costa Rican fishers, the benefits stemming from fishing responsibly are outweighed by the costs. Many are tempted by profit but some forsake it in the name of the environment and earn less than minimum wage. The financial burdens on fishers have led to widespread overfishing in Costa Rica. MarViva, a marine conservation organization, recognizes that they must incentivize responsible fishing to mitigate the damage. They work with AutoMercado, a responsibly-minded supermarket chain, to promote conservation. Through an analysis of costs, corporate responsibility, and consumer opinions we evaluated a supply chain that provides fish to AutoMercado. We suggest AutoMercado increase the market price of fish, provide financial aid to fishers, and begin an informative, in-store visual campaign.

Executive Summary

The responsible Costa Rican fisher works long, irregular hours to earn less than the minimum wage of an unskilled worker. He recognizes that the future of his profession depends on him fishing responsibly so he takes the financial hit. He remembers a time when sustainability and profit were not mutually exclusive.

Although a relatively new occupation, fishing in the Gulf of Nicoya has changed tremendously over the past 30 years. At first, fishers only used handlines. Catching one fish at a time, this method has a relatively small impact on the ecosystem. Since then, industrialization brought methods like the gill net and circular net to Costa Rica. These methods are more efficient in terms of catching, but in the long run they caused a depletion of the fish stock.

The government has tried to mitigate this problem but has fallen short. To allow the fish to reproduce and restock the gulf, the government imposed a three-month fishing ban called Veda. Although beneficial in theory, there are many problems with this initiative, most rooted in funding. To start with, the subsidies offered by the government to reimburse the fishers during this time are not sufficient to cover everyday expenses. The government does not always have the money to cover for these subsidies, thus the months of Veda often do not correspond with the months in which fish reproduce. On top of the financial problems, there is no patrolling to ensure that the fishers respect regulations, allowing them to continue working during this time with no fear of consequences.

Fishers are left with a choice about how they practice their craft. For many, the most obvious choice is to try to make the most profit, even if that means using damaging methods that have a negative impact on the marine environment. On the other hand, fishers who are responsible recognize the threats to the fish populations and choose to forsake profit in an effort to conserve the gulf. The MarViva Foundation realizes that neither of these extremes is sustainable. They want to incentivize the use of responsible practices to create a culture in which fishers do not need to forsake profit in the name of the environment.

Goals, Objectives, and Methods

Equilibrium between profit and the environment can be achieved by encouraging stakeholders to financially reward fishers for using responsible methods. Costa Rican supermarket chain AutoMercado has already recognized the environmental importance of responsible fishing and partnered with MarViva to learn ways to promote marine responsibility. To help MarViva and AutoMercado with this mission, our project aimed to increase the financial transparency and evaluate the levels of awareness and corporate responsibility along the supply chain from Costa de Pájaros to the AutoMercado supermarket chain.

Our first objective was **to conduct a cost analysis that calculated the breakdown of the market price into the overhead, expenses, and profit at each stage of the supply chain**, for one kilogram of Corvina Reina and Corvina Pequeña, two of the most commercially valuable species in Costa Rica. This cost analysis allowed us to determine who, if anyone, was being paid unfairly. To obtain all the numbers, we interviewed two fishers: a handliner and a netter, receiving center manager Luis Herrera (locally known as Don Chino), and DWT Sea Food processing plant manager Oscar Picado. Because different types of fish bring in different incomes, they have to cover for different percentages of the costs. We calculated the percentages of these costs associated with handling Corvina Reina and Corvina Pequeña.

We then evaluated the extent of the profits for the two species at each stage and determined whether they were excessive or insufficient. MarViva can use this analysis in discussions with primary stakeholders – namely AutoMercado, DWT Sea Food, and Don Chino's Receiving Center – about a financial reform of the supply chain with the intention of adding value to responsible fishing.

A cost analysis was not enough to determine how to add value to responsibly caught fish. Our second objective was to **evaluate the level of corporate responsibility at each stage of the supply chain**. Through our interviews, we determined the extent to which stakeholders value responsibility. Our investigation allowed us to understand which stage has the most influence on the rest of the supply chain and where we should target our initiatives.

Our third objective was **to assess AutoMercado customers' awareness about responsible fishing, willingness to pay more for a responsibly caught product, and the information they would like to know when purchasing fish**. To obtain an accurate sample of AutoMercado's client base, we conducted 384 surveys at the eight AutoMercado supermarkets in the San José area that sell the most fish. These eight locations are Plaza Mayor, Plaza del Sol, Escazú, Santa Ana, Guachipelin, Heredia, Moravia, and Trés Ríos. The survey answers directed our efforts towards designing recommendations tailored to the consumers' needs.

Findings

Following the completion of our cost analysis, we obtained the distribution of money along the supply chain and the monthly profits at each stage. We learned that the fishers sell Corvina Reina for ₡3,700 ($7) per kilogram and Corvina Pequeña for ₡2,200 ($4) per kilogram, which represents about a quarter of the price in the supermarket. We calculated that the **fishers' monthly profit is around ₡268,000 – ₡305,000 ($500 – $560) which is below the Costa Rican minimum wage** for an unskilled worker (₡323,000 or $600 per month). The two fishers we interviewed declared that they fish during Veda, the fishing ban, because the government subsidy of ₡140,000 ($260) per month is not enough. They claimed that a compensation of ₡220,000 ($400) would be closer to their typical monthly income. They recognize the theoretical benefits of Veda, but agree that the ban is ineffective due to the lack of enforcement. We deduced that **fishers need financial support, especially during Veda**.

The data we gathered at the receiving center allowed us to calculate its monthly costs and profits as well as correlate financial data with the work done at this stage. **The profit we calculated for the receiving center amounted to 2.4 million Costa Rican Colones per month ($4,400)**. The owner, Don Chino, only buys responsibly caught fish and so pays more than receiving centers that accept fish caught with harmful methods. Therefore, Don Chino recognizes the added value of responsibly caught fish. Furthermore, he supports the fishers by lending them money and helping with equipment. Based on all his efforts to encourage responsible fishing as well as the number of hours he works, we determined that the **profit for the receiving center is justifiable**.

Unfortunately, we were not able to complete the cost analysis for the Processing Plant due to some currently unavailable information. We obtained all of the expenses at this stage, but without any data about the amount of product the plant handles, we could not attribute a fraction of the costs to the two types of fish that we tracked: Corvina Reina and Corvina Pequeña. Although the overhead at this and the next stage seems to be excessive, we recognize that a number of factors have to be taken into account. Arguably the most important factor is that only 50-75% of the fish is kept for AutoMercado while the rest – such as the skin and bones – goes to waste. This filleting process means that the amount of kilograms of fish that exit this stage is less than the amount of kilograms that enters it. The income, thus, has to be calculated differently and the profit becomes less than the difference between how much the plant charges for a kilogram of fish and how much they pay for it. Furthermore, the work done at this stage is more extensive than that at the receiving center. **Despite the seemingly large profit margin, we cannot draw any conclusion without additional data**.

During our interview with processing plant manager Oscar Picado we learned that **DWT Sea Food's purchasing decisions are based solely on client demand**. The company itself does not value environmental responsibility as anything other than an opportunity to make more profit. During Veda, the only real change is that DWT Sea Food does not receive fish from Don Chino. Because AutoMercado demands responsibly caught fish, DWT Sea Food is willing to buy from responsible receiving centers, such as Don Chino's. Without this pressure from AutoMercado, DWT Sea Food would have no reason to purchase the more responsible product.

The cost analysis at AutoMercado was less comprehensive. The costs at this stage, such as electricity or employee uniforms, have to be covered by the profit from all products in the supermarket. We assumed that the fraction that has to be covered by one kilogram of fish was negligible. We concluded that, for this stage, **the difference between how much AutoMercado charges for a kilogram of fish and how much it pays for it was an accurate value of the profit per kilogram**. However, without the data from the processing plant, **we could not obtain this value.**

AutoMercado is a company committed to being environmentally conscious. This supermarket only sells responsibly caught fish and attempts to promote their efforts through a sign displayed in the fish market. Unfortunately this sign is dull and often goes unnoticed.

Current sign at AutoMercado fish market

We surveyed 384 consumers to see how AutoMercado's initiatives are perceived and if they influence any purchasing decisions. The results of this survey are summarized below:

Awareness:

- 37% of consumers could not name any endangered marine species
- 74% of consumers claimed they were not informed of the origin of fish they bought, even though this information is displayed on the label
- 37% of consumers wanted to be informed of the size and sexual maturity of the fish they bought, leading us to believe as much as 63% did not understand the importance of allowing the fish to grow and reproduce before catching it
- 59% of consumers identified the gill net as a dangerous method, a method that can be responsible depending on the size of the net holes

Willingness to pay

- 83% of consumers considered quality a factor when buying fish
- 33% considered price a factor when buying fish
- 92% of consumers said they would pay at least 5% more for a responsibly caught fish, with 23% willing to pay as much as 20% more

Curiosity about methods, origins, and endangerment:

- 72% of consumers would like to know the method used to capture the fish
- 58% of consumers would like to know the origin of the fish they buy
- 68% of consumers would like to know the level of endangerment when purchasing fish
- 67% of consumers would like to know whether the fish was caught artisanally or industrially

Conclusions

Based on our findings, we concluded that **fishers need financial support, especially during Veda, the fishing ban.** During these three months the subsidies are small, and fishers believe that ₡80,000 ($150) more per month would be sufficient. Through our evaluation of stakeholder responsibility, we determined that AutoMercado has the most impact on the supply chain. Because AutoMercado has the power to influence the demand of consumers through marketing as well as to dictate business practices down the supply chain, MarViva should **target AutoMercado with initiatives** intended to affect the entire supply chain. Through our consumer analysis, we concluded that **AutoMercado should inform consumers about responsible fishing topics** that the consumers currently misunderstand do not know about. Additionally, we determined that **AutoMercado should provide the consumers with more information regarding the fish they buy.**

Recommendations

Based on our findings from stakeholder interviews and consumer surveys, we recommend that:

- **AutoMercado increase the price of responsibly caught fish by 5%.** Doing so would have little effect on consumers, but if all of it were given to the fishers, it would result in ₡60,000 ($110) more per month for each fisher, even with a projected 10% decrease in AutoMercado sales.

- **AutoMercado begin a visual campaign** that includes the following changes:
    - **Redesign the current sign behind the fish market** to include (1) which fish they do not sell, (2) why they elect not to, and (3) why the sexual maturity of the fish is important.
    - **Implement an interactive display explaining the gill net** and the regulations and reasoning behind the different net hole sizes.
    - **Redesign the current fish label** to include information the consumer wants to know, in a visually appealing manner.

Proposed design for AutoMercado fish market

Proposed display stand to explain the gill net

Current AutoMercado fish label

Proposed label

- **AutoMercado finance fishers through its Social Responsibility Fund to supplement the small Veda subsidies**, as follows:
    - Fishers receive vouchers from AutoMercado that they can use to purchase equipment at stores pre-approved by AutoMercado.
    - Fishers work as guest workers in the fish market for one week during each month of Veda to bridge the gap between the supermarket employees, customers, and fishers.
    - Fishers work with MarTec Fishery to (1) transport and release juvenile fish during the months of Veda from their existing fish hatchery in Puntarenas, and/or (2) develop a similar hatchery in Costa de Pájaros.

Acknowledgements

Team Nemo would like to thank the people who helped us tremendously with this project. Without your support and insight we could not have completed our analysis and we are forever grateful!

First and foremost we would like to thank our advisors, **Dr. Aarti Madan and Dr. Ryan Madan**, for their support and guidance throughout preparation for and completion of the project, and for allowing us to meet their wonderful daughter Sulakshmi.

We would like to thank **Irene Morales** for guiding us throughout our project, giving us direction and advice, bringing us to Costa de Pájaros, and always being a friendly face to encourage us throughout our time in Costa Rica.

We extend our gratitude to the **MarViva Foundation** and **Don Jorge Jimenez** for hosting us and providing us with valuable learning opportunities and the resources necessary to complete our project. We would especially like to thank **Karen Arias** for driving us to Costa de Pájaros and being a friend to us, and to **Dr. Erick Ross Salazar** for providing valuable information and insight to guide our project.

We would like to thank **Don Chino** for welcoming us in his home and business, providing us with wonderful coffee and juice, and giving us valuable information necessary to complete our project.

Thank you to **Oscar Picado** for showing us how the fish is processed and providing us with information for our cost analysis.

We would like to thank **Dr. Robert Traver** for helping us with all preparation, providing valuable insight, and encouraging us throughout the project. Hang loose, stay focused!

We would like to thank **Dr. Oleg Pavlov** and **Dr. Laureen Elgert** for speaking with us and providing valuable context for our project.

Authorship

All – Veronica Coyle, Ruxandra Duca, Courtney Jones, and Kevin Roopcharan all contributed to writing of the introduction, background, and methodology. All sections of the paper were edited by every team member. The team formulated recommendations together. We all contributed to developing the presentation, interview questions, and cost spreadsheets.

Veronica Coyle – Veronica wrote the acknowledgements, results, and recommendations sections. Also, and she was a writer of the abstract. She conducted a portion of the consumer surveys and she took notes on the interviews with stakeholders. Veronica translated the interviews and costs spreadsheets.

Ruxandra Duca – Ruxandra wrote the executive summary. She conducted the interviews with stakeholders and a portion of the consumer surveys. She performed the cost analysis. Ruxandra formatted the paper and the PowerPoint presentation. She made the cover page, title page, and appendices.

Courtney Jones – Courtney wrote the abstract and executive summary. She inputted and processed the survey results. She took pictures and made observations during field work.

Kevin Roopcharan – Kevin wrote the authorship, abstract, and the executive summary. He conducted a portion of the consumer surveys and made observations at the receiving center.

Table of Contents

List of Figures and Tables

Chapter 1 - Introduction

The name Costa Rica translates to “rich coast” in English. The country is surrounded by 800 miles of coastlines that offer some of the most lively and diverse marine ecosystems in the world. Naturally, Costa Ricans have discovered ways to utilize this resource. Fishing constitutes an integral aspect of the country’s culture, providing food for the people of Costa Rica, as well as income for many coastal citizens and their families. These fishers aim to catch as many fish as possible in order to maximize their income. Unfortunately, this desire for profit has led to years of overexploitation of coastal marine resources, which in turn has damaged the local ecosystem. The presence of fishers in shallow waters compromises many marine species’ breeding and feeding grounds. The fish cannot reproduce fast enough to keep up with the demand of fishers, causing the fish stock to plummet in recent years. A stark example of this depletion can be seen in the Gulf of Nicoya, a major Costa Rican fishing ground that presents the geographic focus of our study. On top of overfishing, some fishers use methods with a low level of selectivity, consequently catching non-target animals that lack commercial value. This waste adds to the degradation of the fishing grounds and marine ecosystems.

Environmentally conscious fishers recognize the imminent threat of these damaging practices. In an effort to reduce their impact, they use more selective, or responsible, practices. However, selective fishing lowers the amount of fish caught in a given amount of time. The decreased catch results in low incomes for the responsible fishers. The combination of a low fish supply and selective practices has threatened these artisanal fishers’ quality of life. The desperation in the coastal communities is evident, some fishers even resorting to drug trafficking to supplement their low incomes.

Supermarket AutoMercado is a responsible corporation that buys only responsibly caught fish. They recognize the threat to the gulf and reward responsible fishers by paying more for their product. Within the supply chain there are also many hidden costs that contribute to this price increase. Fishers see these high market prices and feel that they are being exploited. The fishing supply chain lacks transparency, so fishers are not aware of the extent of work being done at subsequent stages. Likewise, supermarkets do not have any information about the intermediate costs and about how little the fishers truly receive. Throughout the supply chain, it is uncertain whether the prices stem from the value of work done or the influence of more powerful stakeholders. It is necessary to determine whether the price increases along the supply chain are justifiable or if the fishers are being unfairly compensated.

Expenses along any supply chain lead to increased final market prices. Responsibility adds another layer of expenses not necessary in a general supply chain. These higher final prices can

discourage consumers from purchasing responsible product. If there is little demand for responsibly caught fish, fishers cannot afford to continue using the responsible practices. Many organizations and initiatives in Costa Rica seek to resolve the conflict between profit and responsibility by encouraging all stakeholders in the supply chain to value responsibility in the fishing industry. Chief among them is our sponsor, the MarViva Foundation, which is a non-profit organization that works with small-scale fishers along with local corporate buyers in Panama, Costa Rica, and Columbia. As stated by their mission, MarViva strives to promote the conservation and responsible use of coastal and marine resources.

In the context of the current Costa Rican fishing industry, MarViva aims to create an economically fair supply chain while protecting marine life. In order to encourage responsible fishing, MarViva wants the rest of the supply chain, especially corporate buyers and consumers, to value responsibility as well. In 2014, MarViva launched the Environmental Responsibility Standard for Marine Fish Commercialization, an initiative providing incentives for corporate buyers to sell selectively caught fish. These incentives encourage buyers to choose responsibly caught fish over less expensive fish caught with dangerous but cost-efficient methods. By increasing demand for responsible product at the corporate level, this initiative aims to allow fishers to continue using environmentally friendly methods without compromising profit.

To differentiate between the responsibly caught and non-responsibly caught fish, a previous research team from Worcester Polytechnic Institute optimized a traceability system for MarViva. This database recorded where and how the fish were caught as well as specifications about the fish. It also outlined the various locations where the fish were transported along the chain. This system established where costs were incurred, but not their extent at each stage. In addition to tracking locations, the costs throughout the chain needed to be tracked. MarViva lacked economic data, making it difficult to determine the distribution of income and cost. Without this information, MarViva could not make any conclusions regarding the fairness of wages throughout the supply chain.

Our project aimed to determine the costs incurred along one supply chain in Costa de Pájaros, a small community in the Gulf of Nicoya. We researched the fishing industry in Costa Rica, as well as other relevant topics. This research allowed us to conduct appropriate interviews with supply chain stakeholders as well as surveys with consumers. These survey tools were used to gain insight and data about costs and income, as well as public opinion about responsibility. The responses led to conclusions about costs and value along the supply chain, and the resulting cost analysis pinpointed the economic disparities. MarViva hopes to emphasize the need for increased transparency and corporate responsibility throughout the supply chain. With this focus they will use our analysis to conduct wage negotiations for fair incomes throughout the fishing supply chain.

Chapter 2 – Costa Rica's Fishing Industry Past and Present

To contextualize the framework of our project, we provide information about the current state of Costa Rica's fishing industry and the changes that have occurred over the past half-century. In order to understand the root of the financial issues, we first focus our research on the country's constant efforts to improve sustainability without hurting the economy. We present this information from a variety of standpoints in an effort to grasp the bigger picture about the situation in the Gulf of Nicoya. Next, we describe the monetary discrepancies that exist between the two ends of the supply chain and highlight the need to examine them. Finally, we give an overview of the work conducted at each stage along the supply chain to postulate possible cost sources that affect the profits of the stakeholders.

2.1 The Battle Between Sustainability and Profit in Costa Rica

Costa Rica takes pride in its efforts to be environmentally conscious. According to the World Energy Council's 2014 Energy Trilemma Index, Costa Rica has been classified as the second most environmentally stable country in the world (Wyman, 2014). Although Costa Rica works hard to maintain this distinction, the economy depends on the use of their natural resources, especially marine assets. Costa Rica has a reputation for being one of the best locations for fishing in the world. Its two oceans and hundreds of lakes and rivers set the scene for a thriving fishing industry. The industry consists of small-scale fisheries that do not require expensive equipment (Carvalho, 2011). Because of these low-cost opportunities, small-scale fishing is the main occupation for poor families residing in coastal regions of the country (Madrigal, 2014).

Surprisingly, though, fishing is a relatively new occupation, having started in Costa Rica in the 1960s. To this day one can find fishers from the very first generation practicing their craft. For these people, fishing is truly an art. With years of experience and a deep understanding of the sea, this community recognizes the value of a healthy marine ecosystem (I. Morales, personal communication, March 17, 2015). These fishers also realize that, in recent years, many changes in the fishing industry have damaged the coastal environment.

Some fifty years ago, fishing was a simple occupation. Armed with only a handline (Figure 1A), fishers would depart in the early morning with the expectation of catching a full day's worth of fish in a relatively short time. Although not a luxurious lifestyle, fishing was enough to make a living. (Venegas, 2007) As with any industry, people sought to improve efficiency, leading to

many innovations in catching practices. At first these new practices had positive effects on fishers' incomes, but they eventually had long term deleterious effects on the local environment. (I. Morales, personal communication, March 17, 2015).

One of these innovative practices was the "Red de Arrastre," a large net that traps all marine animals it reaches (Figure 1B). This method was introduced by foreign fishers and adopted by novice fishers trying to make immediate profits (Venegas, 2007). Similarly, some fishers began to combine their efforts in an attempt to catch more fish. They used a method called "Red de Cerco" which involves multiple boats dropping nets around a school of fish and closing in on them (Figure 1C). This practice allows the groups to trap significantly more fish, and the higher profit to be shared by all. Another potentially damaging practice is the gill net, which consists of layers of nets that trap the fish inside (Figure 1D). This practice can be made selective, in terms of catching desired species and fish size, by using appropriate net hole sizes. By flouting guidelines, however, some fishers negligently catch non-target species, giving this practice what MarViva calls a "medium level of selectivity." (MarViva, "Guía de conceptos", 2014)

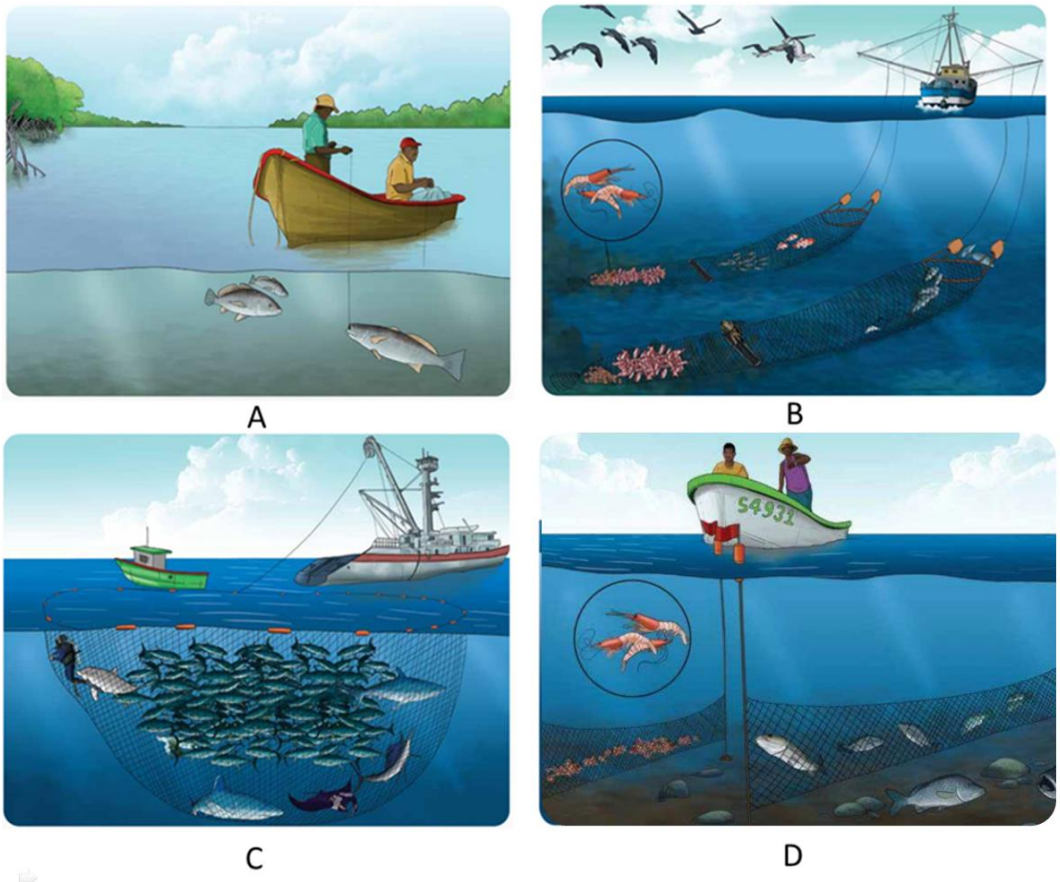


Figure 1 - Various Fishing Practices: A. Handline; B. Arrastre net; C. Circular net; D. Gill net

When these methods first began to show up in the waters around Costa Rica, they appeared to revamp the fishing industry. Fishers would return from a few hours at sea with more fish than had ever been previously seen. Eventually, however, these methods began to take their toll. According to the U.N. Food and Agriculture Organization, all target species in Costa Rican waters were overfished by 2014 (State, 2014). Through innovative practices, fishers caught fish at a faster pace than the fish could reproduce. Additionally, the bycatch from these non-selective methods was discarded as waste because it lacked commercial value. This onslaught of overfishing and waste production caused the degradation of the area, and subsequently a drop in fishers' incomes. (Project on Sustainable Fisheries, 2007). Figure 2 presents this trend in fish catch over a span of twenty years in the Gulf of Nicoya.

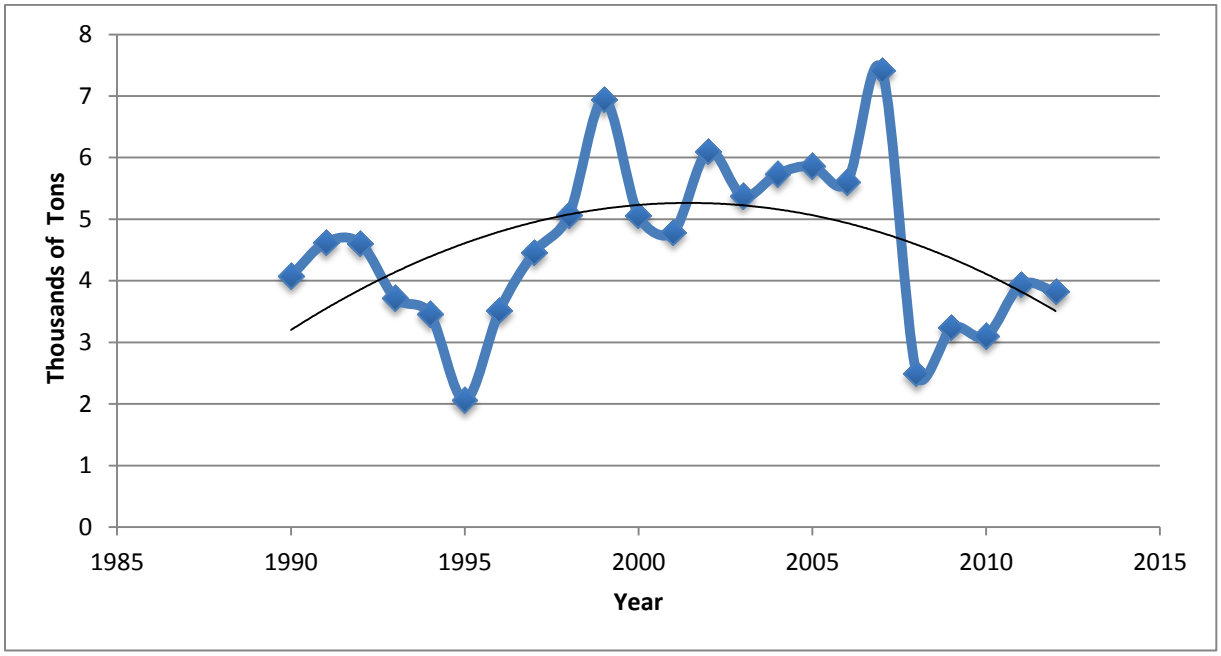


Figure 2 - Fish Catch in the Gulf of Nicoya from 1990 – 2012

The initial drop in catch in 1992 could be accredited to a drop in fish population in the Gulf. The subsequent spikes from 2000 to 2007 emerged from the innovative practices that greatly increased the efficiency of fishing. These methods eventually negatively impacted the environment and caused a sharp decrease in the amount of fish caught in the Gulf after 2007.

More experienced fishers realized that the fish stock was being depleted and came together to try to reverse the damage that had been done. INCOPESCA, the governmental agency that oversees fishing in Costa Rica, also took note of these changes and worked to correct them. To improve the practices used in the Gulf of Nicoya, INCOPESCA partnered with Japan, a country well-versed in fishing. As a result of this project, the government took the drastic measure of implementing an annual fishing prohibition called Veda. By establishing Veda, INCOPESCA aimed to allow fish stocks to replenish by banning fishing at key points in fish reproduction

cycles. To effectively accomplish this goal, Veda is not a fixed period of time. This flexibility was meant to allow evolving scientific data concerning fish life cycles and habits to dictate the most effective time for the ban. While Veda limits fishers' opportunities to make income, many of these fishers recognize its importance. In fact, Nicholas Villegas, a fisherman in the Gulf of Nicoya, was quoted as saying that "[t]he Gulf of Nicoya is collapsing… if we do not respect [Veda], we will destroy our own future". (Venegas, 2007). To assist with this financial burden and promote the conservation of the marine ecosystem, the government offers financial assistance to over 3,500 licensed fishers during the months of the ban (Project, 2007).

Veda, while beneficial in theory, is limited by the economic resources available. While the ban is in place, the Costa Rican government provides monetary aid to licensed fishers who complete 30 hours of community service, such as volunteering in local churches and schools (Arias, 2013). The flexibility of the months of Veda was meant to maximize fish reproduction, but in reality the months arise from political, rather than conservational, motivations. The months of Veda are currently determined by the availability of subsidy funds, and generally disregard the reproductive patterns of the marine organisms. Fisher Oscar Luis García explains the uselessness of this system, saying "[a] closure that doesn't correspond with the spawning season does not help us" (Sherwood, 2007). Additionally, not all fishers comply with the restrictions. There are many un-licensed fishers in the Gulf of Nicoya who are ineligible for the monetary aid. For these fishers, refraining from fishing for three to four months of the year represents a total cessation of income. Even if the fishers do qualify for the aid, it is often not enough to live comfortably. Whether or not they recognize the value of the ban in protecting the environment, some fishers cannot afford to stop fishing during this time. García explains that fishers "understand about closed seasons, and need to protect our fish, but we also must feed our families" (Sherwood, 2007). Even the most environmentally conscious fishers feel trapped in the battle between preserving the environment and making a living.

Stuck in a seemingly hopeless occupation that barely allows them to make returns on their investments, these fishers are desperate to make money in any way they can. In a tale as old as time, this desperation drives some to partake in illicit activities, namely drug trafficking. Jorge Jiménez, MarViva's President, said that the economic distress combined with the lack of enforcement along the gulf "is a precarious combination" (Dyer, 2014). A single drug trafficking trip can bring in ₡12,500,000 ($25,000). To put this in perspective, over half of coastal fishers in the Gulf of Nicoya make less than ₡150,000 ($300) per month (Dyer, 2014). Sometimes temptation is too great to ignore.

Non-profit organizations such as MarViva aim to supplement government conservation initiatives like Veda to allow fishers to earn sufficient money while following the regulations. The very nature of a non-profit allows MarViva to allocate more resources to these issues than

the government alone can. While environmental and social responsibility may be the driving forces for MarViva, the foundation realizes that such is not the case for all companies. (Legal Information Institute). As in any capitalist society, Costa Rica's business practices are heavily influenced by profit. Instead of fighting this well-established social construct, MarViva must work within the confines created by capitalism to encourage corporate responsibility. In this case, corporate responsibility encompasses the need for increased wages for poor fishers as well as the need to protect the environment.

As a way to increase the value of responsibly caught fish, MarViva initiated a program to incentivize the purchase of responsibly caught seafood. This program, called The Environmental Responsibility Standard for Marine Fish Commercialization, provides certification for responsibly caught fish. This distinction allows corporate buyers to market the fish as environmentally friendly, adding tangible value to responsible product. This increased value is meant to raise the price of responsibly caught fish, subsequently raising the profit for responsible fishers. By earning more money, responsible fishers can compete with the more "innovative" fishers who bring in larger amounts of fish. For this certification standard to be effective, consumers must recognize this added value, and be willing to pay more for the product. The efficacy of this certification program is limited to responsibly minded consumers who understand the various fishing practices and threats to the environment (MarViva, "Guía de conceptos", 2014). To verify which fish is caught responsibly, the receiving center records all relevant information pertaining to the product that comes in, which includes both location and method of catch. A traceability system compiles this information and passes it to each stage of the supply chain (Civitarese, Hulburt, Ketchum, & Tran, 2014). While useful in a sense, this system does not track economic data. Financial transparency would allow for discussion between the stakeholders to encourage the use of responsible practices through financial incentives.

2.2 Cost and Transparency in the Fishing Supply Chain

As the fishing industry exists today, communication between stages of the supply chain is limited. Figure 3 shows a simplified breakdown of the fishing supply chain. Fishers in particular have very little knowledge concerning what happens to the fish after they sell it. Upon noticing that market prices are much higher than their wages, fishers feel that their efforts are being exploited (Dyer, 2014). Middlemen – the receiving centers and processing plants – claim that the steep price increase is necessary to cover operational expenses involved in their work (Institute of Management Accountants). Direct costs of buying and preparing the product obviously contribute to the higher final price and are universally accepted as necessary facets of any business. Fishers and relevant outside parties, however, cannot easily identify the hidden,

or indirect, costs, giving the middlemen the opportunity to blur the line between reasonable and excessive price inflation. This lack of transparency hurts the entities at both ends of the supply chain. (I. Morales, personal communication, January 29, 2015) According to Laureen Elgert, a Professor of Social Science and Policy Studies at Worcester Polytechnic Institute, wage and price determination should be based on value. If middlemen control the industry, these incomes become a question of power rather than value. (L. Elgert, personal communication, March 4, 2015) Exploitation by the middlemen takes money from the hands of the people who need it, in this case the fishers, and discourages them from participating in the responsible fishing chain.

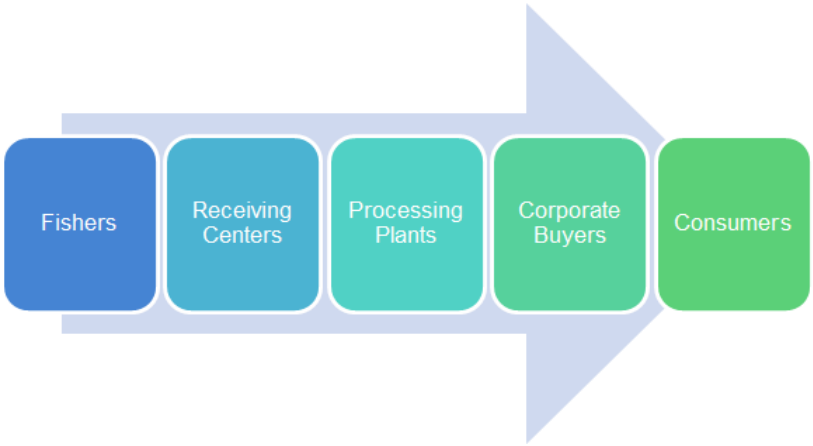


Figure 3 - Simplified Breakdown of a Small Scale Fishing Supply Chain

The fishing supply chain begins with coastal residents who practice small-scale fishing to make a living. Fishers use a variety of materials that assist with their endeavors. Responsible fishers opt to use handlines and small nets, while others use larger nets and longer lines. In order to transport their catch to receiving centers before the fish becomes contaminated, the fishers must also invest in small ice bins or coolers and instruments necessary to gut the fish and dispose of the waste. The costs of these components must be offset by the fishers' income for them to make a profit. (MarViva, "Responsible Markets"2014).

Once the fish is brought to shore, it is not yet ready for sale. Many regulations exist regarding the handling of fish during preparation for the market. These regulations include quality and temperature control, as well as measures to avoid contamination of the product. The fishers are not capable of completing all of this preparation alone, which is why each subsequent stage plays an important role in the supply chain.

Receiving centers put in a significant amount of work to prepare, transport and sell the fish to the processing plants. The receiving center staff works to clean and further gut the fish as needed and ensure high quality of the product. The fish must be kept on ice before and during transportation to the processing plant. These processes involve various costs that must be covered by the sale of the fish. Overall, the work performed at the receiving centers is essential

to delivering a high quality final product to supermarket shelves. After completing their portion of the work, receiving centers transport the fish inland to processing plants. Here the product is again checked for quality. Further preservation methods are undertaken, and the fish is filleted. The plants then transport and sell the fish to the corporate buyers, such as supermarkets, for final sale. The costs of these processes are accounted for in the final price to corporate buyers. (I. Morales, personal communication, March 17, 2015)

Supermarkets receive the fully prepared final product, and sell it to the general public. One such supermarket is AutoMercado. AutoMercado is one of the largest supermarket chains in Costa Rica, and one that values responsibility greatly. This is evident in that they have a Corporate Social Responsibility Fund. This money is allotted for programs that promote the social and environmental welfare of Costa Rica as a whole. Programs paid for by this fund also serve to promote AutoMercado as a responsibly minded company, and thus entice consumers looking to make conscious decisions about the products they buy. Corporate buyers like AutoMercado recognize the added value of responsibly caught fish, and pay processing plants more for such product. (FECOP, 2014; Lopez, 2013).. Moreover, value is added by the work done at each stage of the supply chain. The final cost to AutoMercado includes all normal procedures as well as the expenses involved in verification paperwork that must be completed for certification purposes. (I. Morales, personal communication, March 17, 2015). Consequently, the final price to consumers is often much higher than what the fishers receive for the fish.

MarViva recognizes that, without increasing transparency in the fishing industry, conditions in the Gulf of Nicoya will not improve. Unless all stakeholders along the supply chain actively work together, the destruction of the marine ecosystem will continue. If wages remain completely unregulated, those in positions of power have little incentive to change their business practices. And as long as fishers continue to feel exploited by the industry, they will in turn be forced to continue exploiting the environment to support their families.

For the reasons stated above, MarViva planned to facilitate wage negotiations between all stakeholders along the fishing supply chain to determine fair wages for all involved. For leverage in wage negotiations, MarViva needed concrete economic data tracking the expenses incurred throughout the supply chain. This project aimed to conduct a cost analysis to identify and analyze these costs to assist in negotiations. Furthermore, this project attempted to gain some insight on the subject of consumer awareness, willingness to pay, and desired information. If demand for responsible product was high enough, market prices could potentially be increased to augment incomes throughout the supply chain.

Chapter 3 – Methodology

Fair and reasonable profits lead to a healthier marine ecosystem by allowing fishers to continue practicing responsible fishing even though these practices may not be the most efficient. To help MarViva achieve their mission of maintaining and protecting this thriving marine ecosystem, our project determined the distribution of money and stakeholder opinions along the fishing supply chain. With this information we made financial and educational recommendations.

To accomplish our goal, we developed the following objectives:

1. Understand Costa Rica's culture, economy, and commitment to sustainability
2. Identify costs along the supply chain
3. Perform a cost analysis
4. Determine stakeholders' opinions about the fishing industry and gauge corporate responsibility
5. Determine public awareness and consumer willingness to pay for more responsible product

3.1 Understand Costa Rica's Culture, Economy, and Commitment to Sustainability

Our first objective was to collect relevant information about Costa Rica's culture and economy and its fishing industry in particular. This data was necessary for us to understand the context of our work, develop suitable methods and formulate appropriate interview questions. We interviewed individuals with knowledge pertinent to our needs.

To launch our project, we interviewed our sponsor, Irene Morales, MarViva's Program Officer of Responsible Markets. Through this first discussion, we gained an initial understanding of our goal. The unstructured nature of this interview allowed for a productive two-way conversation. We provided our interpretation of the project and received sufficient feedback to direct our focus and formulate our subsequent objectives. We also learned about the fundamental conflicts and desires driving our project.

Once we had an idea about the direction of our project, we wanted to understand how to conduct a cost analysis of the supply chain. To identify the factors involved and understand the effect of indirect costs on the final price, we interviewed Dr. Oleg Pavlov, a Professor of Social Science & Policy Studies and an expert in Economics at Worcester Polytechnic Institute. This

interview elucidated the best practices for extracting cost information and presenting it in an efficient way. Dr. Pavlov recommended a follow-up interview with Dr. Laureen Elgert, also a Professor of Social Science and Policy Studies at Worcester Polytechnic Institute. This interview focused on the subject of perceived value, rather than the numerical expenses, within a sustainable market, specifically in the food industry. Both of these interviews were semi-structured to allow the Professors to elaborate on relevant topics that we did not ask about ("Tool 9: Semi structured interviews").

With knowledge of the type of information necessary for our cost analysis and recommendations, we recognized that some questions we would ask could touch upon sensitive subjects. Sensitive questions included those about income and business practices. To address this concern we set out to learn about the Costa Rican culture and social norms. We interviewed Fernando Gonzalez, a student at Worcester Polytechnic Institute and a native of San José, Costa Rica. Our questions focused on the openness and friendliness of locals as well as their predisposition to share intimate details of their personal and professional affairs. This information helped us formulate our future interview questions in an appropriate manner to obtain reliable data on-site without offending interviewees. Due to scheduling conflicts and time constraints, this interview was conducted in a structured manner to ensure that all necessary information was gathered.

3.2 Identify Costs Along the Supply Chain

With the relevant economic information as a basis for our work, our second objective was to gather cost data from all stakeholders in the supply chain. This cost data included all intermediate costs incurred during receiving, handling, and transportation of the fish. To conduct our cost analysis, we needed concrete data regarding these expenses at each stage. To identify these expenses, we interviewed stakeholders along the supply chain.

3.2.1 Overview of the Supply Chain

A typical Costa Rican fishing supply chain consists of fishers, receiving centers, processing plants, and corporate buyers. For our project, we focused on one specific supply chain with ties to MarViva, starting with the fishers in Costa de Pájaros in the Gulf of Nicoya. The fishers we interviewed deliver their catch to a receiving center on the coast, owned and managed by former fisher Luis Herrera, known to locals as “Don Chino”. This receiving center transports the product to DWT Sea Food, a processing plant located in San José. From here, DWT Sea Food transports the fish to various supermarkets, including AutoMercado locations throughout Costa Rica. We focused on the sale of Corvina Reina and Corvina Pequeña, the two most commercially significant species caught in the Gulf of Nicoya. The responsibly caught fish that Don Chino buys

ends up on the shelves of AutoMercado. This supermarket chain has a reputation of exhibiting high levels of corporate responsibility, which led MarViva to develop a working relationship with the company. We utilized the existing relationship between MarViva and AutoMercado to facilitate communication and information transfer. This communication and culture of responsibility enabled us to work with AutoMercado and collaborate with other stakeholders within this supply chain for the duration of our project.

We identified the costs at each step of this supply chain. These costs included everything from the initial price of the fish, employee salaries, tools used to prepare the product, utilities, and any other expenses incurred in the normal functioning of the business.

3.2.2 Interviews

Prior to conducting our interviews, we brainstormed possible expenses using MarViva resources regarding fishing practices and product handling procedure. With this information we created an Excel spreadsheet, as shown in Appendix A, outlining potential costs incurred by the fishers, receiving center, and processing plant. The spreadsheet served as an organizational tool for the team, as well as a baseline for formulating interview topics and questions. As none of us had ever worked in this industry, we recognized that this was not a comprehensive list, and planned for additions to be made. We presented the spreadsheet to interviewees at each stage of the supply chain, and worked with them to fill in the cost information as completely and accurately as possible.

We conducted individual interviews with two fishers in Costa de Pájaros who sell to Don Chino. One fisher practiced handline fishing while the other was the owner of four boats that used the gill net. We asked about the items they use when fishing, how much of each they have and the duration of use of each item. These expenses included fishing equipment, materials needed to gut the fish, fuel, and ice. We also inquired about the fishers' incomes in order to correlate their responses with the receiving center's claims of how much they pay the fishers. It was important to collect this data from both sources to ensure the accuracy and validity of the numbers collected. We developed these questions with great attention towards creating a friendly and unthreatening tone. Our goal was to build a foundation of trust with the fishers to allow us to ask about these sensitive subjects. The questions asked during the interviews with fishers appear in Appendix B.

To gather the costs incurred at the receiving center, we interviewed the owner and manager of the center, Don Chino. We spoke with Don Chino twice; once for our initial interview and the second time to clarify information and ask any new questions that came up during our analysis. We asked questions targeting all expenses including, but not limited to salaries, tools, utilities, and transportation. For utilities, we focused our attention on electricity and clean water, as each plays an essential role in the appropriate treatment and preservation of fish. We asked

Don Chino what he pays fishers for the product to validate what fishers claimed they earn. Additionally, we asked what he charges DWT Sea Food for his fish. A list of the expenses of the receiving center and associated calculations appear in Appendix C.

Another subject that we asked about was loans between fishers and Don Chino. In times of hardship, Don Chino often finances operational, and occasionally personal, expenses incurred by the fishers. We asked questions about the payment methods of these debts and if there was interest involved. While these loans do not affect the final market price, they do have an effect on both fishers' and Don Chino's income, so were considered in the final analysis. The questions asked during the interviews with Don Chino appear in Appendix D.

To understand the expenses at the next stage of the supply chain, we conducted an interview with Oscar Picado, the manager of DWT Sea Food Processing Plant. We asked about all expenses incurred by the plant, and how much each contributes to the preparation of Corvina Reina and Corvina Pequeña to determine their contribution to the selling price. We aimed to determine the magnitude of costs associated with the filleting process, which is carried out at the processing plant, as well as administrative costs necessary to the functioning of the plant. We obtained information about what percentage of the fish remained after the filleting process, which was important to our cost analysis as it provided an understanding of what the market price truly means. To verify Don Chino's claims and identify any discrepancies, we inquired about the price DWT Sea Food pays for his fish. We also asked about the processing plant's selling price to AutoMercado. We could not verify this value with AutoMercado because we did not have authorization to obtain specific numerical data from the company.

In order to maximize the information gained, we utilized individual, semi-structured interviews at all stages. When interviews are conducted with an audience in addition to the interviewer, the interviewee "may be tempted to answer in a way that gives him/her credibility in the eyes of onlookers, rather than giving a truthful reply" (Crawford, 1997). Privacy provided by the individual interviews created a safe space for interviewees to express honest answers without fear of embarrassment or repercussion. Because we conducted the interviews in Spanish, we audio-recorded them for later analysis. To alleviate fishers' concerns about these recordings, we asked no identifying questions on tape, and destroyed all recordings following analysis. This allowed the fishers to speak freely about opinions about the government, and admit to any of their less responsible practices. The semi-structured nature of the interviews allowed us to ask follow up questions where we saw fit, and enabled interviewees to expand on their answers. This strategy widened the range of information we gathered regarding both costs and the inner workings of each stage. When a question was met with an unexpected but relevant answer, we were able to explore this avenue.

To get an accurate market price for our final cost breakdown, we observed the prices at a local AutoMercado throughout the seven weeks that we were in San José. Having multiple entries over a longer period of time assured a more accurate average. Unfortunately, we were not able to directly observe entries over a year's span, which would have accounted for seasonal price inflation.

Overall, time was the limiting factor in the thoroughness of completing our objectives. More time with the fishers would have allowed us to utilize the already established sense of community through focus groups. These groups could have sparked productive conversations regarding expenses, methods, and opinions about the current state of the gulf. During the time we did have in the community, many fishers were not available due to a recent string of robberies. After being held at gunpoint for their motors, many fishers were fearful of fishing at night. Consequently, they did not come to the receiving center in the morning on the day that we were there.

The time constraint also prevented us from obtaining information from DWT Sea Food about the amount of product sold to AutoMercado and the price charged for it. Manager Oscar Picado did not have authorization to share this information with us at the time of the interview, and was unable to obtain this authorization by the completion of our project. Unfortunately, this missing information prevented us from finalizing our cost analysis.

We also had to rely on the honesty of the interviewees and trust that they genuinely wanted to help us, as we could not verify all of the information that they provided. To reduce the impact that this obstacle had on our results, we tried to verify as much information as possible at other stages of the supply chain, but some information could only come from one source. The language barrier provided an additional challenge. We drafted the content of our interview questions in English, and then worked with one of our advisors, Dr. Aarti Madan, and our sponsor, Irene Morales, to translate the text. Nevertheless, some of the meaning may have been lost in translation, or misinterpreted due to pronunciation issues on our part. These interviews were audio-recorded because we did not want to risk missing crucial information while scribing nor did we want to miss opportunities for dialogue.

3.3 Perform Cost Analysis

To determine who, if anyone, was being paid unfairly, and to evaluate the extent to which intermediate costs influenced the market price of the fish, our third objective was to calculate the breakdown of the market price into income, expenses, and profit at each stage along the supply chain. For consistency across our analysis, we ultimately wanted our data in terms of per

kilogram of fish. In order to convert the raw expenses into these terms, we obtained the amount in kilograms of each type of fish handled in March, and the monthly expenses.

We determined the monthly expenses using the costs and their durations. For example, if an item were to be replaced every two months, we divided its cost by two and the result was the monthly expense. For these calculations, we assumed that a month was equal to 4.35 weeks.

Once we had the monthly expenses, we used the total kilogram amount of each type of fish per month to see what fractions of these expenses had to be covered by each type of fish. We did this by calculating the income percentage and weight percentage attributed to each type of fish.

To calculate the fraction by income, we divided the income brought in by a type of fish by the total income from all types of fish. This calculation is illustrated below:

$$Reina\ income\% = \frac{income\ brought\ by\ Corvina\ Reina\ in\ a\ month}{income\ brought\ by\ all\ types\ of\ fish\ in\ a\ month}$$

To obtain the weight percentage, we divided the number of kilograms of a type of fish handled by the stage in a month to the total number of kilograms of other fish, as seen below:

$$Reina\ weight\% = \frac{\#\ kilograms\ of\ Corvina\ Reina\ handled\ by\ stage}{\#\ kilograms\ of\ all\ types\ of\ fish\ handled\ by\ stage}$$

An income percentage is more accurate than a weight percentage because one kilogram of Corvina Reina is worth more money than one kilogram of Corvina Pequeña, and therefore, has a greater contribution to expenses than Pequeña. For example, in a typical month for a handliner, Corvina Reina makes up 60% of the kilograms of fish he caught, but it brings in 71.8% of the income, therefore it has to cover for 71.8% of the expenses. Consequently, the sale of Corvina Pequeña has to cover for the rest of 28.9% of the expenses.

However, this method could only be applied at the fishers' stage, because of complications created by the multitude of other species sold at the following stages, and the little available information about their prices. For all other stages, we used the weight percentage instead.

The previous calculations allowed us to determine the fraction of expenses that had to be covered by each type of fish in a month. To obtain the more general cost per kilogram, we divided these values by the number of kilograms of the fish handled by the stage in a month. For example, a handliner typically catches 200 kilograms of Corvina Reina in a month, and that amount of Corvina Reina has to partially cover for ₡200,000 ($370) worth of monthly expenses. The cost that each kilogram of Corvina Reina has to cover from this monthly amount is 1/200 of ₡200,000 ($370).

Once we obtained all the costs, we determined the profits using different methods based on the stage.

The main variation between the two types of fishers – handliners and netters – was that the handliners owned the boat, but the netters worked on another person's boat. Therefore the costs and profits were split differently for the two types of fishers. Another difference was that the handliners borrowed money from Don Chino to buy the boat and the motor, while the owner of the net boat bought the equipment with his money. Therefore, we did not include the price of the boat and the motor in the handliners' costs, but we did include a loan payment, which accounts for these prices. On the other hand, for the owner of the netter boats, we included the cost of the boat and motor as part of his expenses but assumed that he did not pay any loans.

Because two handliners fish together in a boat, we calculated the catch, income and costs per boat. When they bring the fish to the shore, Don Chino deducts the cost of ice and fuel from their payment. Then, Don Chino takes an additional 25% to pay for a portion of the fishers' ongoing loan. We performed this calculation to determine how much money they actually receive, and then deducted all other costs. The remaining profit was split by two, and the value obtained represented the monthly profit per handliner.

Similarly, two netters work on a boat, but because they do not own it, they do not cover any costs associated with the gear. Every time they bring fish to the shore, Don Chino deducts the cost of ice and the fuel from their income from the fish. Each of them takes 25% of what is left as their income. The only other cost they have to cover with this money is the price of their license; the remainder represents their profit. The other 50% of the money paid by the receiving center goes to the owner, who has to cover for all other costs. Because the owner we interviewed has four such boats, his profit is multiplied by 4. The formulae used to calculate the profits for the netters and the owner are illustrated below:

$$Netter\ monthly\ profit = (income\ form\ fish - ice\ and\ fuel\ cost) * 25\% - \frac{1}{12} * (annual\ license\ cost)$$

$$Owner\ monthly\ profit = [(income\ form\ fish - ice\ and\ fuel\ cost) * 50\% - (all\ other\ costs)] * 4$$

We then compared the monthly profit with the minimum wage for an unskilled worker in Costa Rica. In Costa Rica, the minimum wage is provided in terms of hours. Based on the interview answers, we approximated 12 hours of work per day for an average of 15 days of work per month.

The accuracy of all these calculations is limited by the fact that we approximated the number and kilograms of fish brought in a month by each type of fisher. In an attempt to collect precise

averages, we asked about more information than needed, to be able to calculate these numbers through different methods. For example, we asked the fishers how many kilograms of fish they usually bring in a day and how many days per month they work, to calculate the number of kilograms per month. To obtain the same value, we asked them how many fish they usually bring in a month and how much each type of fish usually weighs. Having multiple data points made our analysis more accurate.

The calculations for the receiving center were more straight-forward. To obtain the profit per kilogram of fish, we subtracted all the costs per kilogram from the price per kilogram that Don Chino sells the fish for.

We used a different method to calculate the profit per month. First, we calculated the total income, taking into account the money received from the processing plant for the fish, as well as the money received from the fishers for the ice. We multiplied the number of kilograms sold of each type of fish by the corresponding overhead. We also multiplied the price paid by the fishers for each crate of ice, by the number of crates they buy each month. All of these values added together constituted the income of the receiving center. To obtain the monthly profit, we subtracted all monthly costs.

We processed all the numbers using Microsoft Excel. From the resulting data, we created waterfall charts that showed the breakdown of cost, income and profit at each stage. We chose this type of chart because it is a simple way of visually displaying the breakdown of the market price into the profit and expenses at each stage. For a full documentation of assumptions, see Appendix E.

We recognized that one kilogram of fish sold by the fishers is not commercially equal to one kilogram of fillet sold in AutoMercado. Only a percentage of that initial kilogram of fish ends up on the shelves of AutoMercado, in the form of two different cuts (loin and filet). To obtain an accurate market price, we first asked the processing plant workers about the percentages of products resulting from each type of fish. To account for the volatility of the market, we calculated an average price for each cut using the prices in AutoMercado. To find the value of the "market price" for the fish as it was sold by the fishers, we processed the results using the following formula:

$$Market\ price = \sum (\%product * price\ of\ product)$$

To illustrate an example, the following formula was obtained for Corvina Reina:

$$Market\ price = 0.30 * Price_{loin} + 0.45 * Price_{fillet} + 0.20 * Price_{head} + 0.05 * Price_{waste}$$

In this formula the price of the waste is, of course, 0. The head is not sold at AutoMercado and we were unable to verify its price. Therefore, we considered its price to be 0 as well. These assumptions shortened the formula to:

$$Market\ price = 0.30 * Price_{loin} + 0.45 *\ Price_{fillet}$$

After checking the prices in AutoMercado, we used this formula to calculate the "market price" that could later be broken down into costs and profits for all stages of the supply chain in terms of the initial kilogram of fish sold by the fishers in Costa de Pájaros.

Once all the needed information is obtained from DWT Sea Food, the analysis can be completed. The first step is to obtain the amounts in kilograms of all the species processed here in a month. Then it is imperative to calculate the percentage of this total weight that is made up of Corvina Reina and Corvina Pequeña. This weight percentage calculation was previously described in the receiving center section. The two percentages obtained represent what fractions of the monthly costs will be covered by these two types of fish. To obtain the actual values, the sum of all monthly costs has to be multiplied by these percentages. The two values obtained can then be divided by the number of kilograms of each species, to obtain cost per kilogram. It is important to note that the number of kilograms used thus far should be the amount of unprocessed fish that is delivered to the plant in a month.

To calculate the income, the number of kilograms of fish bought by AutoMercado should be multiplied by prices charged to AutoMercado for them. Adding the incomes from all cuts results in the monthly income obtained specifically from Corvina Reina and Corvina Pequeña. To obtain the monthly profit associated with these two species, each of the two fractions of costs previously calculated has to be subtracted from the respective income. To finalize the analysis per kilogram of fish, these two values of monthly profit have to be divided by the initial numbers of kilograms of unprocessed fish entering the processing plant. The whole process is described below, for Corvina Reina:

$$Monthly\ Corvina\ Reina\ Income =\ N_{kg\ loin} *\ P_{loin} + N_{kg\ fillet} *\ P_{fillet}$$

$$Monthly\ Corvina\ Reina\ Profit =\ Monthly\ Corvina\ Reina\ Income - Monthly\ Corvina\ Reina\ Costs$$

$$Monthly\ Corvina\ Reina\ Profit\ per\ Kilogram\ = \frac{(Monthly\ Corvina\ Reina\ Profit)}{\#\ kg\ of\ Reina\ entering\ the\ processing\ plant\ in\ a\ month}$$

3.4 Determine Stakeholders' Opinions on the Fishing Industry and Gauge Corporate Responsibility

Performing a cost analysis was not enough to understand the intricacies and motivations involved at each stage of the supply chain, so our next objective focused on evaluating stakeholder opinions about the Costa Rican fishing industry and gauging corporate responsibility at every level. We incorporated questions about these topics into our interviews in order to contextualize the cost data. Obtaining both costs and opinions from the same entities allowed us to synthesize the information and contextualize our analysis. This information also helped us to understand the challenges added by working within a responsible market.

3.4.1 Interviews and Observations

During our interviews with the two fishers we asked questions focused on understanding their lives, experiences with the fishing industry, and opinions regarding various topics related to responsible fishing. The questions we used to guide the interviews are provided in Appendix B. In particular we focused on their opinions on the fishing ban, Veda, and the effectiveness of recent government initiatives aimed at conserving the Gulf of Nicoya. We also asked them about the one thing they would most like to change in the Costa Rican fishing industry, in an attempt to gain some insight into the development of suggestions that had the potential for successful implementation in Costa de Pájaros. Unfortunately our interview with the handliner was cut short due to time constraints, and focused more on the cost data necessary for our cost analysis than on opinion questions. We asked some of the main questions about Veda and his opinion of the fishing industry, but were unable to ask about these topics in depth.

When interviewing Don Chino we asked questions similar to those we asked the fishers, as he lives in the same community and faces many of the same challenges. We also asked some questions about the other fishers that supply him in order to obtain data about more than just the two fishers we were able to interview. We asked about how he promotes responsible fishing, and about his opinions of initiatives enacted by INCOPESCA and MarViva. We asked about any negative effects these initiatives had on his business and the lives of the fishers, as well as how the initiatives have proved beneficial. Our initial interview with Don Chino also served as an opportunity to foster a friendly relationship, which was necessary to enable us to initiate dialogue with the fishers since he was our main point of contact in Costa de Pájaros. For this reason we worked with our sponsor, Irene Morales, to make sure to avoid any questions that may have come off as accusatory.

During the interviews with the fishers and Don Chino, one of our Spanish speaking team members maintained the conversation while another took notes and added input where necessary, such as for clarification or if a new idea came up. We also recorded the interviews to

listen to later in case we missed anything. To assist with the language barrier, a bilingual worker for MarViva was present during each interview in case we ran into trouble communicating. During the interviews the other two members of our team observed the workers of the receiving center and took notes. This insight provided us with a deeper understanding of the typical functioning of the receiving center, and allowed us to verify whether or not what Don Chino told us was accurate.

When we visited DWT Sea Food Processing Plant we began with a complete tour of the facility. During this tour we observed the entire filleting process, as well as the measures taken to ensure quality, sanitation, and separation of responsibly caught fish from the rest. These observations aided us in including all items in our cost analysis, as well as in understanding how much work goes into the fish sold at AutoMercado.

After the tour we interviewed plant manager Oscar Picado. The questions used to guide this information are provided in Appendix F. The questions for this interview focused on the extent to which DWT Sea Food valued responsible fishing and aimed to understand the level of corporate responsibility present within the company. We predicted that responses to these questions could have been biased, as many companies may claim that they value environmental conservation more than they do in practice. Due to this predicted response bias, we instead asked what measures the company took to promote responsible fishing, and what influences the company's decision to buy responsibly caught product. We also asked the plant's understanding about responsible fishing methods, and how Veda affects the business. At first, Mr. Picado was reluctant to answer many of our questions, but we reworded them and repeated the important ideas until we received answers. As with the other interviews, one team member led the conversation while another took notes and provided input.

For all interviews we maintained the semi-structured style previously mentioned to maximize flexibility and the amount of information gained. We integrated cost questions with opinion questions in an attempt to avoid overwhelming the interviewee, and worked with Irene Morales to produce questions that would allow us to gain the information we wanted without appearing offensive.

3.5 Determine Consumers' Awareness, Willingness to Pay, and Interest

Our sixth objective was to determine Costa Rican consumers' awareness of the fishing industry, willingness to pay elevated prices for responsibly caught product, and desire for more information. One possible conclusion of our project was a suggestion to increase all wages along the supply chain by raising the final market prices of responsibly caught fish. This solution

would not be effective if consumers were not open to the idea of paying more, as it would decrease demand, thereby decreasing wages along the supply chain. It would also be ineffective if consumers did not understand what they were being asked to pay more for. For this reason, we constructed and distributed a survey to assess both public knowledge and willingness to pay more for a responsibly caught product.

3.5.1 Survey Construction

In order to both determine the information necessary for our analysis and aid MarViva in their ongoing efforts to encourage AutoMercado to evaluate their own customer base, we adapted a survey MarViva had previously distributed in Bógata, Colombia. This survey was originally administered online rather than in person, so in addition to adding pertinent questions, we tried to clarify questions that may have been confusing when given verbally. The survey presented consumers with a convenient opportunity to share their knowledge and opinions with very little time commitment required on their part. It also allowed us to gather data from a large sampling of the AutoMercado customer base. The surveys remained anonymous to encourage honest responses from the subjects. Information about age, gender, and education level was recorded only for demographic analysis.

The finalized survey, presented in its entirety in Appendix G, consisted of 20 questions covering a range of topics. The survey began with the three demographic questions asking the respondents' age, gender, and level of education. The most important of these was the level of education, as responsible product is a niche market, and this question allowed us to ensure that respondents represented our target audience. After the demographics, we asked respondents to provide a list of marine species they knew to be in danger of extinction. We also asked respondents to select which of six fishing methods appeared to be bad for the environment. The methods listed were the gill net, handline, longline, dynamite and venom, harpoon, and the trawling net. We provided images to accompany each technique, as these names may not be common knowledge to those not involved in the fishing industry. These images are provided in Appendix H. We elected not to provide a written description of the methods, as this could lead respondents to view certain methods negatively without thinking for themselves. Following this question, we asked what the respondents understood by the term "responsible fishing". This open-ended question forced consumers to truly think about the topic of the survey. We then asked if they knew of any programs or initiatives in Costa Rica related to responsible fishing to gauge awareness about current marine conservation efforts.

The next section of the survey was designed to analyze the habits and preferences of the typical AutoMercado consumer. We began by asking how, where, and how frequently the respondents bought or consumed fish to ensure that our results were from people who typically consumed

fish and would be affected by future efforts. We then asked what information they considered when buying fish, and what information was typically provided for them.

The final questions focused on the specific fish the respondents typically bought. We asked what species was their favorite, and then asked if they would be willing to stop buying that species if they knew that it were in danger of extinction. Asking this question in regards to their favorite fish made the response more honest than if it were about any species, as the respondents actually considered the impact this would have on them if they stopped eating the fish. Following this question, we directly asked consumers if they would be willing to pay more for product that they knew was responsibly caught. As with the previous question, we wanted respondents to consider the real impact that paying more would have on them, so we added a follow-up question to determine what percentage of the current price more they would be willing to pay. We hoped that these additions would help to reduce the effect of "'politeness or courtesy bias,' when respondents […] lean toward an answer that they think will please the interviewer" (Iarossi, 2006). We feared that subjects might just say yes to both not eating endangered species and paying more for responsible fish because we self-identified as MarViva volunteers. Forcing something other than a yes or no answer likely aided in reducing this bias. The final question asked what information consumers would like to know about the fish that they purchase. The question asked respondents to rank five options in order, but this proved to be confusing and time consuming, so during the surveys we instead asked consumers to elect as many options as they wanted in no particular order.

In adding to and editing the original survey, we carefully formulated each question. Studies show that "the way a question is worded can often lead the respondent toward one answer […] and this effect can be significant, in the order of up to 30 percent change in attitude" (Iarossi, 2006). Wording was especially crucial in translating the questions to Spanish. Iarossi says that "it is not sufficient to ensure that all respondents understand the words used, it is necessary that they all understand the words in the same way" (Iarossi, 2006). Because of this need, one of our advisors, Professor Aarti Madan, assisted with initial translations. Our sponsor, Irene Morales, then helped ensure that the translations would be understood by locals of Costa Rica, known as *ticos*, and suggested phrases that would appeal to consumers of all education levels. The images we used to depict the fishing methods were obtained from MarViva's marketing department to ensure that they were accurate but not leading. This also eliminated any need to obtain permissions for the images.

3.5.2 Survey Distribution

As our study focused on the supply chain that provides fish to AutoMercado locations throughout Costa Rica, this is where we focused our analysis of consumer opinions. In order to obtain a statistically significant sample size of the 217,000 registered AutoMercado customers,

we completed 384 surveys. AutoMercado provided us with this number, claiming that it is the minimum sample size needed to accurately represent their customer base. We split these surveys between the eight AutoMercado locations in or around the San José area that had recorded the highest sales of fish in the last year. The three team members who could speak Spanish conducted the surveys individually, over a span of 4 days. All three had different skill levels with the language, which could have led to some variation in phrasing and pronunciation, and therefore affected respondents' understanding of the survey. To reduce the effect of the language barrier, we allowed respondents to view the survey and read any difficult questions.

Going to various locations on different days at different times helped reduce some selection bias. Unfortunately, some level of bias was added by the very nature of surveys, in that the respondents were only the people willing to take the time to respond (Iarossi, 2006). Especially as we self-identified as partners of MarViva, these may have been people who already had some interest in sustainability. Higher levels of interest in the topic could lead to higher instances of both awareness and willingness to pay than may be seen of a truly random sampling of the general public.

The main factors that we believe may have influenced survey responses were the language barrier and the length of the survey. If respondents asked for clarification on a question, it is possible that our responses were not given in perfect Spanish. There was also some variation in each of our phrasing of some questions, and unintended changes of meaning could have occurred. The main reason behind our decision to phrase some questions a little differently than they were written was the fact that some questions were wordy and difficult for the customer to understand without reading it themselves. We wanted to reduce the time commitment to the consumer.

After completion of each survey, the fourth member of our team entered the responses into an online version of the survey that we created. The program recorded all responses in a spreadsheet and the program produced graphs of each question, allowing us to quickly and easily analyze the responses and come to conclusions.

Chapter 4 – Results and Analysis

Through interviews, observations, and surveys we gained valuable insight into the inner workings of one of the supply chains that provides fish to AutoMercado supermarkets. Each stage has its own challenges that they must overcome to successfully deliver the responsibly caught product sold on the shelves of AutoMercado. These challenges present opportunities for improvement along the supply chain. We evaluated the costs, policies and opinions of the fishers, Don Chino's receiving center, and DWT Sea Food Processing Plant. We also analyzed the current state of the market from a consumer standpoint.

4.1 Fishers

Upon arriving to Costa de Pájaros we learned that fishers were facing yet another hardship. None of the fishers who usually bring their catch in the morning had gone out the night before. They had been the target of a recent string of robberies in which masked men would approach a boat and hold the fishers at gunpoint. Many fishers had to give up their motors to avoid losing their lives. Without a motor, which typically costs 2 million Costa Rican Colones ($4,000), a fisher is out of work indefinitely.

Later in the afternoon two fishers who had made the trip during the daylight were available for interviews. One of these worked with his brother using the traditional handline, while the other was the owner of four boats with two fishers using gill nets on each. Through these interviews we learned that the robberies represented only a part of the issues plaguing fishers in recent years. The owner of the gill net boats summed up his experience with the fishing industry over the past 20 years with a simple, yet eloquent, statement: "Before, there were many fish and few costs; now there are few fish and many costs."

Both men took issue with the implementation and regulation of Veda, the annual fishing ban instituted by INCOPESCA. Both recognized the importance of initiatives to conserve the Gulf of Nicoya but stated that, currently, Veda is worthless for that purpose. They pointed out that the economic motivations that dictate when Veda is implemented limit its effectiveness in curbing overfishing and promoting reproduction. The boat owner repeatedly indicated that he felt the government did not care about protecting the gulf or the people around it. The handliner went as far as to say that Veda is downright bad for the gulf, though he admitted that it has the potential to be useful.

Both the handliner and boat owner said the biggest obstacle preventing Veda's success was the current lack of any type of regulation and enforcement. The owner of the gill net boats said that the majority of fishers continue to fish during Veda, a statement echoed by the handliner's nonchalant admission that he fishes throughout the entirety of the ban. He said that he actually brings in more fish during this time than the rest of the year, a fact that can partially be attributed to the increased presence of breeding fish in the shallow waters. This income comes on top of the subsidy he receives from INCOPESCA, which is supposed to supplement fishers who abstain from fishing. Because the requirement to receive this aid is only 30 hours of community service per month, the fishers have no real time commitment that prevents them from fishing. With the knowledge that there will likely be nobody patrolling, the fishers are free to continue business as usual.

In the event that there does happen to be someone patrolling on any particular day, the fishers have ways to avoid being caught. We learned that some fishers form groups that communicate with each other to warn of inspectors and share where to fish without being caught. Some fishers, like the handliner, choose to only fish at night during Veda in order to reduce their risk of being seen. Both fishers confirmed that the driving factor behind the decision to fish during Veda was simply a need for the money they would lose by not fishing. Both claimed that the subsidy of ₡140,000 ($260) per month is not enough for someone to survive. When asked what would be sufficient, the hand liner said ₡220,000 ($410) per month would be necessary to get through Veda without needing to fish.

Fishers clearly need financial aid during Veda, but this fishing ban lasts for only three months of the year. During the other nine months fishers strive to earn as much as they can. We aimed to uncover their monthly profits throughout the rest of the year to see if responsible fishing is a feasible choice. To form a picture of the expenses involved in responsible fishing, we performed a cost analysis. The values used coincided with those for the month of March, as the fishers could easily recall this information. The fishers told us that March was a good month for fishing, and so the values we calculated represent a peak of average income.

We learned from Don Chino that he pays every fisher ₡3,700 ($7) per kilogram of Corvina Reina, regardless of the method of capture. During our interviews with the fishers we obtained a list of all expenses, the quantity of each typically on a boat, and each item's duration of use. Table 1 shows these values for the handliner we interviewed, as well as the total monthly cost calculated from these numbers. A similar table for a netter and all values for Corvina Pequeña appear in Appendix I. We learned that large items, such as boats or motors, are often paid for through loans from Don Chino, rather than up-front by the fishers themselves. We found out that these debts are repaid on a per catch basis, whereby Don Chino keeps 25% of what would

be the profit from each trip. We also learned that fuel and ice is often bought from Don Chino, and paid for out of the money he owes the fishers when they bring in the fish.

Table 1 - Items, costs, quantities, and lifespans, as well as calculated monthly costs for the handliner that we interviewed

Item (Artículo)	Cost (Costo)	Quantity (Cantidad)	Total Cost (Costo total)	Lifespan (Duración de uso)	Monthly Cost (Costo mensual)
Handline (Cuerda)	₡ 5,000	2	₡10,000	2 months / meses	₡ 5,000
Bait (Carnada)	₡ 6,000	5	₡ 30,000	1 week / semana	₡ 135,000
Hooks (Anzuelos)	₡ 500	10	₡ 50,000	2 months / meses	₡ 2,500
Paddle (Remos)	₡ 9,000	1	₡ 90,000	10 years / años	₡ 75
Fuel (Combustible)	₡ 2,200	30	₡ 66,000	1 month / mes	₡ 66,000
Licenses (Permisos)	₡ 23,000	2	₡ 46,000	1 year / año	₡ 3,834
Lamp (Lámpara)	₡ 4,000	4	₡ 16,000	1 year / año	₡ 1,334
Battery (Batería)	₡ 60,000	1	₡ 60,000	2 years / años	₡ 2,500
Battery recharge (Batería recarga)	₡ 1,000	1	₡ 10,000	2 days / días	₡ 10,000
Knife (Chuchillo)	₡ 1,500	1	₡ 15,000	1 year / año	₡ 125
Ice bin (Nevera)	₡ 80,000	1	₡ 80,000	10 years / años	₡ 667
Ice (Hielo)	₡ 1,800	1	₡ 18,000	1 day / día	₡ 36,000

From the information we gathered, we learned that netters generally catch more fish during one trip, but handliners have to cover fewer expenses. We also learned that profits are split differently based on individual agreements between those involved, so we conducted a separate cost analysis for each fisher.

The handliner we interviewed worked with his brother, with whom he equally split costs and profits. These men took advantage of Don Chino's loans for both the boat and motor because of their inability to buy this equipment from their small income. We learned that a handliner fishes when the tide is high and brings fruitful waters, which averages to 20 days each month. Ten of these days are devoted to capturing Corvina Reina, and the other ten for Corvina Pequeña. Even if the handliners are lucky one day and catch fish after fish without a break, there are days in which they do not catch anything. However, on an average day, the two men will bring in either four Corvina Reina, at about 5kg (11lb) each, or 11 Corvina Pequeña, at about 1.2kg (2.64lb) each. As these fishers stay relatively close to shore, their fuel usage amounts to about 1.5 gallons per trip, but because they have licenses, they are eligible to buy fuel at a discounted rate of ₡2,200 ($4) per gallon. In the month of March the handliners brought in 200kg (90lb) of Corvina Reina and 132kg (60lb) of Corvina Pequeña, making it a "good month". After accounting for all expenses, this resulted in ₡267,700 ($496) of profit for each fisher, less than the minimum wage for an unskilled worker of ₡323,000 ($600). To allow MarViva to compare this data with market prices, we calculated values per kilogram, rather than per month. A breakdown of the costs and incomes related to Corvina Reina is shown in Figure 4. A similar breakdown for Corvina Pequeña is provided in Appendix I.

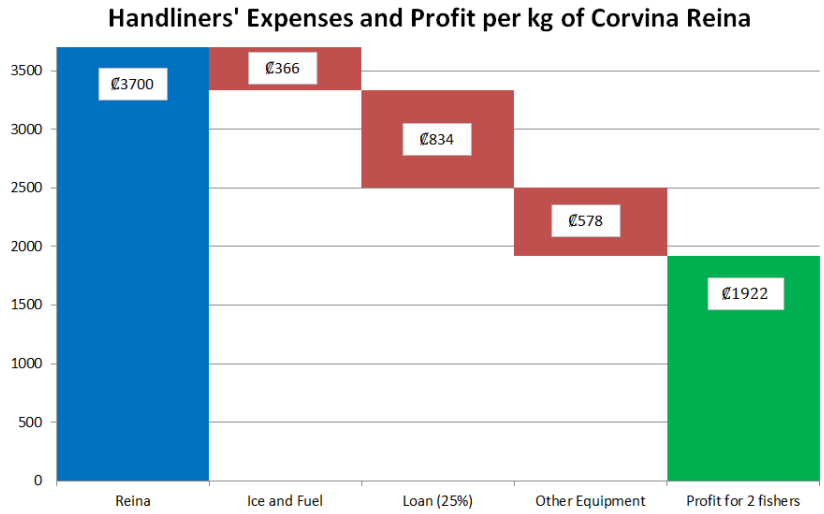


Figure 4 - Waterfall chart detailing the costs, income, and profit for two handliners for each kilogram of Corvina Reina

The netter we interviewed was actually not a fisher himself, but the owner of four fishing boats. Two fishers worked on each boat, and all used the gill net. The owner paid for all expenses other than fuel and ice, which were split between all from the profit each day. We learned that the owner had an agreement whereby he received 50% of each boat's daily profits, and the fishers split the remaining 50% evenly.

Each of these boats goes out an average of 15 days each month; ten for Corvina Reina and five for Corvina Pequeña. On any given day, each boat brings in an average of five Corvina Reina or 11 Corvina Pequeña. As these fishers travel further from shore than the handliners, they used about 4.5 gallons of fuel per trip. Like the handliners, each of these fishers had a license, and therefore was eligible to buy this fuel at ₡2,200 ($4) per gallon. A list of all of these costs is provided in Table 2.

Table 2 - Items, costs, quantities, and lifespans, as well as calculated monthly costs for the netter we interviewed

Item (Artículo)	Cost (Costo)	Quantity (Cantidad)	Total Cost (Costo total)	Lifespan (Duración de uso)	Monthly Cost (Costo mensual)
Boat (Bote)	₡1,200,000	1	₡1,200,000	20 years / años	₡ 5,000
Motor (Motor)	₡2,160,000	1	₡2,160,000	20 years / años	₡ 9,000
Net and equipment (Trasmallo)	₡4,000,000	1	₡4,000,000	11 years / años	₡ 30,303
Ice bin (Nevera)	₡300,000	1	₡300,000	3 years / años	₡ 8,334
Gloves (Guantes)	₡ 500	2	₡ 1,000	1 year / año	₡ 83
Fuel (Combustible)	₡ 2,200/gal	67.5 gal	₡ 148,500	1 month / mes	₡ 148,500
Licenses (Permisos)	₡ 13,000	2	₡ 26,000	1 year / año	₡ 2,166
Lamp (Lámpara)	₡ 70,000	1	₡ 70,000	2 years / años	₡ 2,917
Battery (Batería)	₡ 60,000	1	₡ 60,000	2 years / años	₡ 2,500
Knife (Chuchillo)	₡ 2,000	2	₡ 4,000	3 months / meses	₡ 1333
Ice (Hielo)	₡ 1,800	1	₡ 1,800	1 day / día	₡ 27,000
Cleaning supplies (Cloro)	₡ 1,000	1	₡ 1,000	4 days / días	₡ 4,000
TOTAL					**₡ 241,136**

In the month of March, each of these boats brought in an average of 250kg (550lb) of Corvina Reina and 324kg (713lb) of Corina Pequeña, resulting in a total monthly profit of ₡1,159,064 ($2,146) per month per boat. When distributed amongst the fishers and owner, each fisher receives ₡305,092 ($565) per month the owner receives ₡548,830 ($1,016) per month per boat. Because the owner we interviewed has four boats, his profit is multiplied by four, resulting in ₡2,195,320 ($4,065) per month. A breakdown of the costs and incomes related to Corvina Reina for the netter is shown in Figure 5. A similar breakdown for Corvina Pequeña is provided in Appendix I.

Based on our findings, we concluded that fishers need financial support, especially during the fishing ban Veda. During these three months, fishers believe that their subsidies are small and ₡80,000 ($150) more per month would be sufficient.

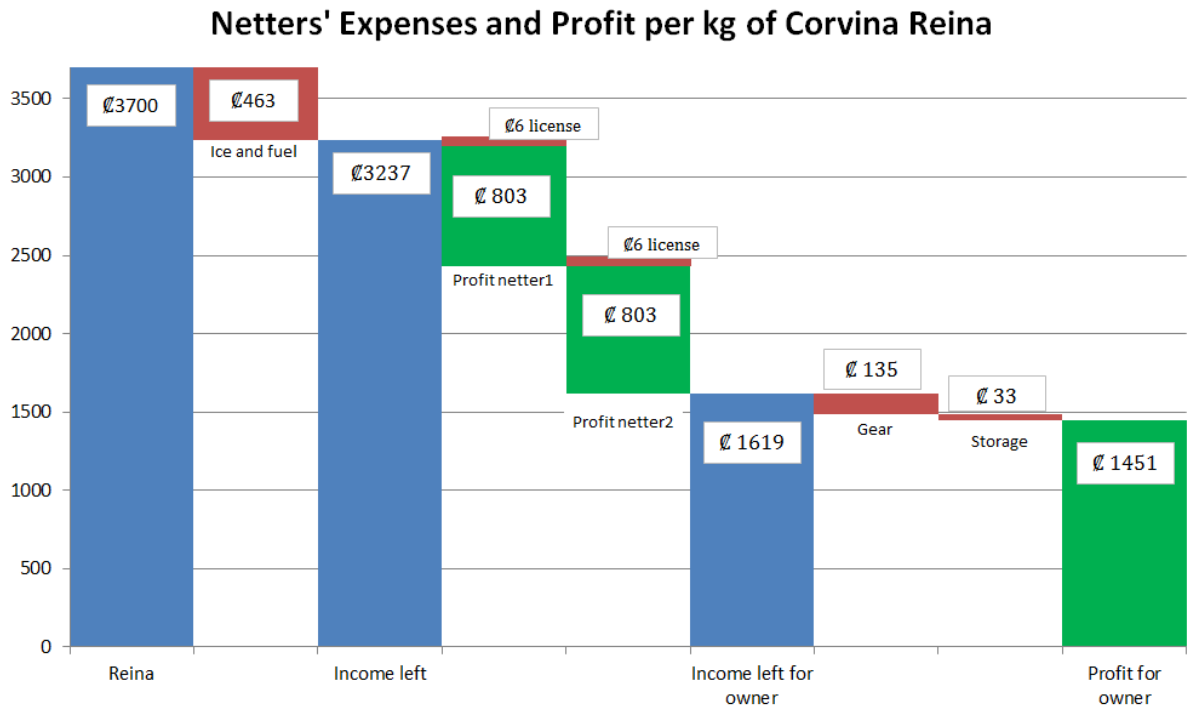


Figure 5 - Waterfall chart detailing the costs, income, and profit for two netter and for the boat owner

4.2 Receiving Center

Supplying fishers with cheap ice and fuel Don Chino is conscious of his colleagues' daily struggles and does his best to ease their unnecessary burdens. Prior to 1986, Don Chino was a fisher himself, giving him some insight into the lives of the fishers he works with. This sense of

camaraderie may drive his decision to provide all fishers with food and coffee free of charge every time they come to shore. During our interview we learned that after 29 years of building his business and network of suppliers, Don Chino has 44 fishers regularly bringing him fish. In the past four years he has formed a working relationship with DWT Sea Food Processing Plant and, by extension, AutoMercado. Years of delivering high quality and responsibly caught product strengthened this relationship.

Don Chino's years of experience lead him to flout some regulations imposed by the government and MarViva. Through our observations of the receiving center during the 6:00 a.m. "rush hour," we observed inconsistency in the use of the fish ruler provided by MarViva to ensure adequate size and age of the fish. Even though during our first visit Don Chino did not measure any fish, during the second trip we saw him pull aside his assistant following which they measured every fish. We partially attributed this change to the presence of Irene Morales, our sponsor and MarViva representative. We deduced that measuring was not in fact common practice but rather something of a "show" put on for MarViva's benefit. Additionally, Don Chino claimed that the ice used to transport fish to the processing plant was not the same as the ice used to store the fish, as required by SENASA, the governmental agency that oversees the quality of animal-based food products in Costa Rica. During our two days of observations we noticed almost all ice being re-used. We inquired about this observation and Don Chino admitted to recycling ice in times of emergency. It appeared to us that the recycling of ice was primarily a way to cut down on costs that Don Chino believes to be extraneous. We calculated that the amount of money spent on making ice solely for transportation would amount to about ₡48,000 ($89) per month, so eliminating some or all of this expense would certainly be beneficial for the receiving center in terms of profit.

While some of the observations we made during our visit illuminated the fact that Don Chino does not run a perfect business, the majority of what we learned supported our basic sense that his receiving center promotes responsible fishing. Through our interviews we learned that Don Chino is a big supporter of the reasoning behind Veda, at least in theory. He, like the fishers, commented on the lack of law enforcement limiting the ban's ability to positively impact the Gulf of Nicoya. Despite the shortcomings of Veda, Don Chino said he does respect the restriction and closes the receiving center during the months allotted for it. Unlike Don Chino's, most receiving centers in Costa de Pájaros do not close during Veda. During the months of the ban, Don Chino focuses on the management and maintenance of a shrimp farm, a business he has on the side to supplement the income he gets from the receiving center. This additional income likely plays a role in Don Chino's ability to close his receiving center during Veda.

Although 88.7% of the fish that comes to Don Chino's receiving center eventually ends up on the shelves of AutoMercado, we learned that some of the fish does not meet the high-end store's standards. We observed that any non-target species and immature fish were put in a bucket labelled "chatarra," meaning "junk". These species were not sent to DWT Sea Food processing plant, and instead went to other plants whose clients did not demand high quality or responsible product. With this information we realized that Don Chino's business practices are largely dictated by the demand of clients. Don Chino does recognize and work to alleviate the impact that the industrialization of fishing has had on the gulf, but he can only do so with a demand for responsibly caught fish.

To understand if running a responsibly minded receiving center is currently an economically viable option, we obtained all expenses and incomes and performed a cost analysis at this stage. We learned that Don Chino pays fishers ₡3,700 ($7) and ₡2,200 ($4) per kilogram of Corvina Reina and Corvina Pequeña, respectively. We also learned that he charges DWT Sea Food Processing Plant ₡4,100 ($8) and ₡2,600 ($5) for each kilogram of these two species respectively. This leaves him with an overhead of ₡400 ($0.74) per kilogram of Corvina, which he uses to pay for the expenses involved in operating the receiving center. A list of the receiving center's expenses, the quantity of each, and their duration of use, along with their calculated monthly costs, is provided in Table 3.

We learned that Don Chino loaded fish onto a truck and drove it to DWT Sea Food Processing Plant in San José twice a week. He paid all expenses including fuel costs and salaries for the drivers. These costs amounted to ₡1,138,865 ($2,109) per month. We found out that not all receiving centers operate in the same way, so we separated the transportation costs to provide an accurate picture of the operational costs that pertain solely to the receiving center.

We found that the largest expense of the receiving center was salaries. This included the actual salaries of the five workers regularly employed by the receiving center, as well as our approximation of a salary for Don Chino and his wife. As the owners, Don Chino and his wife do not give themselves a direct salary, but receive all monthly profit to use for themselves and the receiving center as they see fit. This caveat results in widely varied amounts, as they are entirely vulnerable to any fluctuations in the market. We calculated a theoretical salary based on the assistant's salary, as the tasks were mostly the same. We estimated a 90-hour work week between Don Chino and his wife, as they were available day and night – which is to say, whenever fishers showed up – but did have many periods of downtime in between rush hours. This calculation allowed us to determine the salary Don Chino would likely pay someone if he were to hire them to complete his job.

Table 3 - Items, costs, quantities, and lifespans, as well as the calculated monthly costs for Don Chino's Receiving Center

Item (Artículo)	Cost (Costo)	Quantity (Cantidad)	Total Cost (Costo total)	Lifespan (Duración de uso)	Monthly Cost (Costo mensual)
RECEIVING CENTER					
Electricity ice maker (Electricidad maquina)	₡ 500,000	1	₡500,000	1 month / mes	₡500,000
Electricity (Electricidad)	₡ 100,000	1	₡ 100,000	1 month / mes	₡ 100,000
Water (Agua)	₡ 40,000	1	₡ 40,000	1 month / mes	₡ 40,000
Boots (Botas)	₡ 7,500	2	₡ 15,000	6 months / meses	₡ 2,500
Gloves (Guantes)	₡ 4,000	1	₡ 4,000	1 week / semana	₡ 17,400
Scale (Romana)	₡ 300,000	1	₡ 300,000	2 years / años	₡ 12,500
Thermometer (Termometro)	₡ 25,000	1	₡ 25,000	1 year / año	₡ 2,084
Registry (Registro)	₡ 4,000	12	₡ 48,000	6 months / meses	₡ 8,000
Receipt book (Facturel)	₡ 1,000	1	₡ 1,000	2 days / días	₡ 15,000
Cleaning supplies (productos de limpieza)	₡ 3,000	3	₡ 9,000	1 week / semana	₡ 39,150
Big Containers (Recipientes grandes)	₡ 1,000,000	1	₡ 1,000,000	5 years / años	₡ 16,667
Small Containers (Recipientes pequeños)	₡ 60,000	6	₡ 360,000	5 years / años	₡ 6,000
Crates (Canastas)	₡ 7,000	20	₡ 140,000	1 year / año	₡ 11,667
Battery 1 (Batería 1)	₡ 5,000	2	₡ 10,000	2 years / años	₡ 417
Battery 2 (Batería 2)	₡ 12,000	2	₡ 24,000	5 months / meses	₡ 4,800
Additional ice (Hielo Adicional)	₡ 20,000	8	₡ 160,000	1 month / mes	₡ 160,000
License (Permiso) INCOPESCA	₡ 48,000	1	₡ 48,000	1 year / año	₡ 4,000
License (Permiso) SENASA	₡ 55,500	1	₡ 55,500	1 year / año	₡ 4,625
Salary: Don Chino + wife (Salario Don Chino+esposa)	₡ 84,000	1	₡ 84,000	1 week / semana	₡ 365,400
Salary:helper (Salario ayudante)	₡ 140,000	1	₡ 140,000	15 days / días	₡ 280,000
Salary:paperwork (Salario papeles)	₡ 10,000	8	₡ 80,000	1 month / mes	₡ 80,000
Salary:accountant (Salario contadora)	₡ 250,000	1	₡ 250,000	1 year / año	₡ 20,834
Taxes (Impuestos)	₡ 300,000	1	₡ 300,000	1 year / año	₡ 25,000
Ice for transportation (hielo para tansportacion)	-₡ 130,240	1	-₡ 130,240	1 month / mes	-₡ 130,240
INCOME ice (ingreso hielo)	- ₡ 1,800	180	-₡ 324,000	1 month / mes	-₡ 324,000
TOTAL					₡ 1,261,800
TRANSPORTATION					
Salary: driver (Salario chofer)	₡ 30,000	8	₡ 240,000	1 month / mes	₡ 240,000
Salary: helpers (Salario ayudantes)	₡ 15,000	24	₡ 360,000	1 month / mes	₡ 360,000
Fuel (Combustible)	₡ 50,000	8	₡ 400,000	1 month / mes	₡ 400,000
License (Permiso) INCOPESCA	₡ 48,000	1	₡ 48,000	1 year / año	₡ 4,000
License (Permiso) SENASA	₡ 55,500	1	₡ 55,500	1 year / año	₡ 4,625
Ice (Hielo)	₡ 130,240	1	₡ 130,240	1 month / mes	₡ 130,240
TOTAL					₡ 1,138,865

The second largest expense to the receiving center is the production of ice. Rather than paying for ice from a store, Don Chino makes ice with a machine in the receiving center. The cost of the ice therefore consists of cost of electricity and water. Electricity for the ice machine is actually a separate bill than for the rest of the center, so its cost was easily determined. Don Chino said that 75% of the water used by the receiving center is devoted to the ice machine. We learned that ice represents such a large portion of the receiving center's costs because of its importance to the functioning of the center and Don Chino's image within the industry. He told us that he wants to make sure all fish are perfect, because "if only one fish goes bad it's enough to destroy [his] entire reputation." Because of the importance of ice, Don Chino claimed that there are times that he has to buy ice from nearby stores when the machine can't keep up with the amount of ice needed.

While ice represents a large portion of the receiving center's expenses, it also makes up a portion of the income. Six crates, or half of the ice made, are sold each day to fishers to keep fish between 0-4°C during transport to shore. Each crate holds 240kg of ice, and is sold at ₡1,800 ($3). This amounts to ₡324,000 ($600) in income per month for the receiving center.

The largest source of income for the receiving center is, as expected, the sale of fish to the processing plant. Corvina Reina made up 37% of the weight of product received in March, and therefore had to cover 37% of the center's expenses. Similarly, Corvina Pequeña had to cover 46% of expenses. Each kilogram of Corvina Reina and Pequeña left ₡189 ($0.35) of profit for the receiving center. The average monthly profit for the receiving center, based on values obtained for the month of March, amounted to ₡2,357,515 ($4,366). Figure 6 shows a waterfall chart breaking down monthly costs, incomes, and total profit per kilogram from Corvina Reina for is stage.

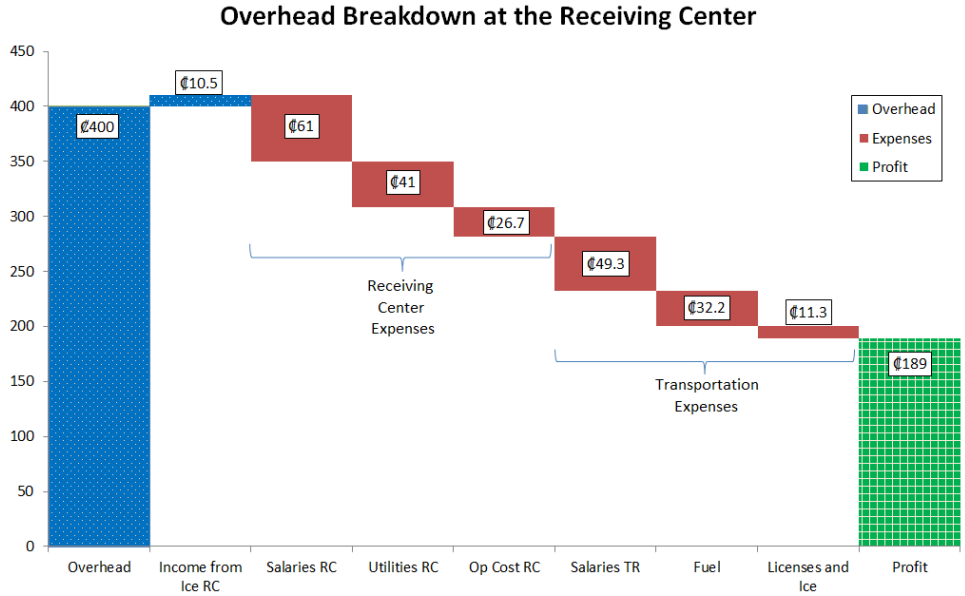


Figure 6 - Waterfall chart detailing the costs, income, and profit for the receiving center for each kilogram of Corvina Reina

Factoring in the three-month hiatus for Veda, the total annual income for the receiving center amounted to ₡21,217,635 ($39,293). We also learned that Don Chino gave loans to fishers for whatever they may need, and did not charge interest. They often amounted to hundreds of thousands of Costa Rican Colones, and were paid off slowly. Don Chino kept 25% of a fisher's profit each day to go towards any loans the fisher has. The initial money for these loans came from this receiving center profit, but was not accounted for in expenses, as in the end the net loss amounts to zero. Based on all his efforts to encourage responsible fishing as well as the number of hours he works relentlessly, we determined that the profit for the receiving center is justifiable.

4.3 Processing Plant

When we visited DWT Sea Food Processing Plant, the atmosphere was markedly different than during our trips to Costa de Pájaros. Before we were even able to enter the building, we had to wait at the entrance for half-an-hour, which contrasted with the welcoming nature of Don Chino's receiving center. When we toured the facility, we wore uniforms and washed our boots and hands before entering. In addition, we observed signs throughout the facility describing all safety and sanitation requirements. These practices show their regard for regulations which speaks for the quality of the fish sold to AutoMercado. The industrial nature of this facility increased the amount of costs and decreased the level of hospitality in comparison with the receiving center in Costa de Pájaros.

We observed that the fish is processed for sale in a single room with three tables. Two of these tables handle only responsibly caught product, and are dedicated to AutoMercado. The third handles the rest of the product that enters the processing plant for various other corporate buyers. Containers are marked clearly to differentiate responsibly caught product from the rest, as shown in Figure 7.

Figure 7 - Label on Container with Product Destined to AutoMercado

We observed the workers at the AutoMercado tables while they filleted the fish. We noticed that these workers completed their work with greater precision than at the third table, and left cuts that were entirely devoid of skin and bone. The quality of the product destined for AutoMercado was clearly higher than that destined for other corporate buyers. Whenever the workers moved a new set of fish to the table, they washed the utensils and replaced the ice needed to keep the fish between 0-4 C°.

During our interview with processing plant manager Oscar Picado we learned that DWT Sea Food's purchasing decisions are based solely on client demand. The company itself does not value environmental responsibility as anything other than an opportunity to make more profit. This motivation became abundantly clear when we learned that this processing plant does not close during Veda. They also sell endangered species such as shark to other clients. During Veda, the only real change is that DWT Sea Food does not receive fish from Don Chino.

Because AutoMercado demands responsibly caught fish, DWT Sea Food is willing to buy from responsible receiving centers, such as Don Chino's. Without this pressure from AutoMercado, DWT Sea Food would have no reason to purchase the more responsible product. The influence from AutoMercado also explains the amount of time and effort put into preparing the product that goes on its shelves. We learned that AutoMercado makes up a large portion of the processing plant's income, so it is imperative that DWT Sea Food provide exactly what they demand. If DWT Sea Food fails to do so, they could lose one of their biggest clients.

Unfortunately, we were not able to complete the cost analysis for the Processing Plant, due to some missing information from manager Oscar Picado. This information was not available due to a lack of authorization to share data regarding AutoMercado. We obtained all of the expenses at this stage, but without any data about the amount of product the plant handled, we could not attribute a fraction of the costs to the Corvina Reina and Corvina Pequeña.

One important factor that we learned was that only 50-75% of the fish was kept for AutoMercado while the rest went to waste. This filleting process means that the amount of kilograms of fish that exit this stage is less than the amount of kilograms that enters. Therefore, the profit was not the difference between how much the plant charges for a kilogram of fish and how much they pay for it. The income, thus, had to be calculated differently than at other stages. Furthermore, the work done at this stage was more extensive than that at the receiving center. Table 4 shows a list of all expenses incurred by DWT Sea Food, the quantity and duration of use of each item, and the total monthly cost of each.

If MarViva obtains access to this information in the future, the company can complete the cost analysis for this stage using the methods used for the fishers and receiving center.

Table 4 - Items, quantities, and lifespans, as well as calculated monthly costs for DWT Sea Food Processing Plant

Item (Artículo)	Cost (Costo)	Quantity (Cantidad)	Total Cost (Costo total)	Lifespan (Duración de uso)	Monthly Cost (Costo mensual)
Uniforms (Uniformes)	₡300,000	1	₡300,000	1 year / año	₡ 25,000
Gloves (Guantes)	₡ 180,000	1	₡ 180,000	1 month / mes	₡ 180,000
Boots (Botas)	₡ 150,000	1	₡ 150,000	1 year / año	₡ 12,500
Polisher (Chaira)	₡ 30,000	1	₡ 30,000	1 year / año	₡ 2,500
Pliers (Alicates)	₡ 10,000	1	₡ 10,000	1 year / año	₡ 834
Brush (Descamador)	₡ 10,000	1	₡ 10,000	1 year / año	₡ 834
Cutting Board (Tabla de corte)	₡ 60,000	3	₡ 180,000	1 year / año	₡ 15,000
Ice shovels (Palas)	₡ 60,000	1	₡ 60,000	1 year / año	₡ 5,000
Knives (Cuchillos)	₡ 25,000	10	₡ 250,000	1 year / año	₡ 20,834
Office supplies (Material de oficina)	₡70,000	1	₡70,000	1 week / semana	₡ 304,500
Disinfection and Cleaning Supplies (Productos de desinfeccion y limpieza)	₡ 150,000	1	₡ 150,000	1 month / mes	₡ 150,000
Scale Maintenance (Mantenimiento romana)	₡ 30,000	1	₡ 30,000	1 month / mes	₡ 30,000
Vacuum Bags (Bolsas de vacio)	₡ 1,000,000	1	₡ 1,000,000	1 month / mes	₡ 1,000,000
Carton Packaging (Material de empaque de carton)	₡ 50,000	1	₡ 50,000	1 month / mes	₡ 50,000
Vacuum machine maintenance (Mantenimiento máquina de hielo)	₡ 160,000	2	₡ 320,000	1 year / año	₡ 26,667
Water filer (Filtro de agua)	₡ 360,000	1	₡ 360,000	1 year / año	₡ 30,000
Electricity (Electricidad)	₡ 1,350,000	1	₡ 1,350,000	1 month / mes	₡ 1,350,000
Wate disposal fees (Precio para el desecho)	₡ 25,000	1	₡ 25,000	1 month / mes	₡ 25,000
Salaries (Salarios)	₡1,450,000	1	₡1,450,000	1 week / semana	₡ 6,307,500
Salary: Vet (Salario regente)	₡ 300,000	1	₡ 300,000	1 month / mes	₡ 300,000
Salary: Accountant (Salario Contador)	₡ 230,000	1	₡ 230,000	1 month / mes	₡ 230,000
The 13th salary (El tercero salario)	₡ 5,000,000	1	₡ 5,000,000	1 year / año	₡ 416,667
Checkbook (Talonario de cheques)	₡ 6,000	10	₡ 60,000	1 year / año	₡ 5,000
Water containers (Contenedores de agua)	₡ 540,000	1	₡ 540,000	4 years / años	₡ 11,250
Water lab exam (Examen de laboratorio para el agua)	₡ 65,000	1	₡ 65,000	1 month / mes	₡ 65,000
Taxes (Impuestos)	₡ 3,500,000	1	₡ 3,500,000	1 month / mes	₡ 3,500,000
Rent (Alquilo)	₡ 3,000,000	1	₡ 3,000,000	1 month / mes	₡ 3,000,000
Insurance (Seguro)	₡ 600,000	1	₡ 600,000	1 month / mes	₡ 600,000
Fuel for trucks (Combustible para los camiones)	₡ 23,000	1	₡ 23,000	1 week / semana	₡ 100,050
Fuel for company car (Combustible para el carro)	₡ 30,000	1	₡ 30,000	1 week / semana	₡ 130,500
Transportation Maintenance (Mantenimiento transporte)	₡ 750,000	4	₡ 3,000,000	1 year / año	₡ 250,000
Ice machine cleaning cost (Limpieza para la máquina de hielo)	₡ 50,000	1	₡ 50,000	2 years / años	₡ 2,084
TOTAL					₡ 18,146,720

4.4 AutoMercado

During our consumer surveys, we learned a lot about both the consumers and AutoMercado as a whole, allowing us to understand more about the upper end of the supply chain. We did not perform a cost analysis at this stage, as costs associated with the supermarket contributed an insignificant amount to the final market price of each kilogram of fish, so we assumed they were negligible. We assumed the difference between the market price and the cost of the fish was entirely profit for AutoMercado.

Because of the fact that a cost analysis was not necessary, our analysis of AutoMercado as a company was limited to observations within the stores. The stores were always well taken care of, and customer service was exceptional. One thing we noticed was that AutoMercado maintains a clean, minimalist image within its stores. This image was exemplified by the sign, shown in Figure #, which is displayed in the fish market to inform customers that AutoMercado does not sell certain types of fish.

Figure 8 - AutoMercado signs displaying "In AutoMercado we made the commitment to care for our seas. For this reason we do not sell shark, Marlin, or swordfish."

We only noticed the sign in one of the eight locations we visited, and when we did, we understood the wrong information. We believed that the choice not to sell the three species listed stemmed from their levels of endangerment. In reality, shark was the only species listed that was classified as in threat of extinction. Having swordfish on the sign was actually an error; we learned that the third species not sold at AutoMercado is really sailfish. Marlin and sailfish are both not sold at AutoMercado because these two species bring more money to the Costa Rican economy as revenue from sportfishing and tourism than domestic commercialization. We do not believe this was an issue caused by the language barrier, but rather the result of an ineffective message. Even with the sign displayed nearby, 37% of consumers could not name at least one marine species currently in danger of extinction, implying that the sign is not currently

functioning as an informational tool for consumers. This conclusion was supported by the fact that, of those that could name a species in danger of extinction, only 35% named shark among them. The 63% of consumers that could identify at least one marine species currently in danger of extinction positively correlated with the 68% of consumers that said they would be interested in knowing the species' level of endangerment when they buy fish. From this correlation we concluded that almost a third of consumers do not understand the importance of protecting endangered species.

We also noticed that there was nothing aesthetically pleasing about the labels for fish, shown in Figure 9. These labels offer the bare minimum of information, as required by the government. We concluded that the labels were not serving their sole purpose of providing information to the consumer when we learned that 75% of consumers claimed not to know the origin of the fish they buy, despite the fact that the country of origin is included on the label. While we could attribute this lack of knowledge to apathy, 58% of survey respondents insisted that origin was something they would like to know about the fish they buy.

Figure 9 – Current fish label displayed in AutoMercado

Overall we observed that AutoMercado is an upscale supermarket chain with high-quality service and products. The majority of customers that shop at AutoMercado are likely upper class, a conclusion we confirmed by the fact that 88% of survey respondents had at least a university-level education. We recognize that the education level, which has been shown to correlate with higher income levels, influenced what consumers took into consideration when buying fish. Unsurprisingly, only 34% of consumers claimed to consider price, while 86% considered the quality of the fish. Only 22% of consumers said they considered whether or not the fish was caught responsibly when buying fish, which corresponded closely with the 19% who said they were informed of whether or not the fish they bought was caught responsibly. An astonishing 92% of the consumers we surveyed said that they would pay at least 5% more for fish if they knew it was caught responsibly, with 25% of these consumers saying they would pay 20% more. This contrast led us to conclude that the root of their answers was not a lack of

interest, but rather a lack of availability of the information. Overall, AutoMercado customers are interested in responsible product and willing to pay more for it, but do not currently have the information necessary to make an informed decision.

In addition to knowing if their fish was responsibly caught, consumers were curious about much more. Most consumers were at least vaguely aware of what responsible fishing is. When asked what the term “responsible fishing” meant to them, consumers usually gave answers such as “not taking more than you need”, “not using dangerous methods”, “not fishing when or where it is prohibited”, and “not taking non-target species”. There appeared to be a good general understanding of the idea of responsible fishing. Most consumers were also able to differentiate responsible fishing methods from dangerous ones. The gill net was the only method that showed discord amongst responses, likely due to the subtle differences that determine whether a gill net is responsible or not. What makes a gill net responsible is a hole size large enough to allow immature fish to pass through, a characteristic that consumers seemed to be unaware of.

Customers want to know more about the fish they buy than the origin and threat level of the species. More than 70% of the people surveyed said they would like to know what methods were used to catch the fish they bought, and whether the fishing was artisanal or industrial. The only information consumers were not interested in knowing was the size, or sexual maturity, of the fish, with only 37% of respondents desiring this information. We believe this does not indicate a sense of indifference, but rather a lack of understanding about the importance of allowing a fish to reach reproductive age before capturing it.

Often times consumers appeared to lose interest towards the end of the survey, so we tried to finish quickly. It is possible that some of the answers to the final questions were not well thought out, and consumers may have answered with whatever came to mind first. Despite these limitations, we feel that the numbers obtained were consistent and the resulting analysis conclusive.

Chapter 5 – Conclusions and Recommendations

Based on the conclusions of our study, we developed six recommendations to increase the level of responsibility present in the Costa Rican fishing industry as well as to improve the quality of life of the fishers. We recommend that AutoMercado finance work programs and equipment for fishers, as well as institute a 5% increase to the final market price of this product. We also recommend the implementation of a visual education campaign and an increase in the amount of information provided on fish labels at AutoMercado. We provide potential prototypes for these campaigns that would engage consumers and increase public awareness. We also recommend improvements to our survey instrument so that MarViva can use or modify it for future studies. Finally, we recommend an extension of these initiatives in other, less responsibly minded supply chains, with a focus on encouraging corporate buyers to exert pressure on their suppliers to promote the responsible use of marine resources.

Our vision is that the implementation of these six recommendations will increase the monetary value of responsibly caught fish and encourage environmentally friendly practices at every level of the fishing supply chain. With increased value of responsible product and public awareness about its importance, the threat that the Costa Rican marine ecosystem is currently facing will be greatly reduced.

5.1 AutoMercado Finances Alternative Work for Fishers During Veda

Based on information gained from our interviews with fishers in Costa de Pájaros, we recognize that fishers should receive at least ₡80,000 ($150) more per month during Veda. This would bring the ₡140,000 ($260) subsidy from INCOPESCA up to ₡220,000 ($400), which more closely resembles their typical monthly income. Currently, the Costa Rican government does not have the additional money to pay for these increased subsidies. **We recommend that AutoMercado finance equipment and alternative work for these fishers during Veda through their Corporate Social Responsibility Fund.** With increased subsidies, fishers will not feel forced to fish during Veda in order to support their families. Substitute employment, however, does not guarantee that fishers will not fish during their free time to supplement the subsidies, as they do now. For this reason we propose programs that will take up a fairly large portion of the fishers' time, so they will be less likely to fish. These programs will both help conserve the environment and support locals, and also align with AutoMercado's commitment to corporate social responsibility.

5.1.1 AutoMercado Finances Equipment for Fishers Through a Voucher System

The first of our financing recommendations aims to reduce the financial burden on fishers by suggesting that **AutoMercado finance their equipment and supplies throughout the year**. We propose that this initiative amount to ₡240,000 ($450) spread throughout the year, amounting to the ₡80,000 ($150) per month that they are lacking during Veda. If AutoMercado were to finance equipment for the fishers, the fishers would be able to save the money for themselves and their families.

The equipment that AutoMercado would finance could include anything from big ticket items, such as boats and motors, to daily expenses such as ice and fuel. Of course, larger expenses could only be partially covered by this financial aid, as their costs amount to much more than ₡240,000 ($450). Reimbursing fishers for essential items like bait, ice, and fuel will help alleviate the fishers' financial burden on a daily basis. To ensure that fishers are spending this money on equipment, we propose that AutoMercado give the aid in the form of vouchers. AutoMercado could approve select vendors where these vouchers will be accepted to reduce the risk of fraudulent receipts. Once a vendor receives these vouchers they could turn them into AutoMercado for reimbursement. Figure 10 shows an example of such a voucher.

Figure 10 - Proposed Voucher for Equipment Financed by AutoMercado

One obstacle that must be overcome in implementing this system would be the distribution of vouchers. It is unlikely that many fishers have access to advanced technology, so the distribution would have to occur manually. AutoMercado could work with a third party, such as Don Chino, to distribute the vouchers to fishers as needed. Another potential problem is that approved vendors could raise the prices of what they sell to the fishers. The fact that the fishers are no longer paying for these items out of their own pocket may reduce their disposition to spend frugally, so the onus to monitor prices would be on AutoMercado.

AutoMercado could advertise this initiative in order to market themselves as a responsibly minded company, improving their own image. This would also bring the fishers' monthly incomes closer to the minimum wage of unskilled workers in Costa Rica. Unfortunately, this initiative would not prevent fishers from fishing during Veda. Although it would eliminate much of the need for the income during Veda, the fishers would still have time to do so. For this reason we came up with recommendations that would both provide fishers with income and take up their time during Veda.

5.1.2 AutoMercado Begins a Guest Worker Initiative with Fishers from Costa de Pájaros

The second of our financing recommendations involves bringing the fishers from the Gulf of Nicoya to the AutoMercado locations in and around San José. We learned that the AutoMercado employees and consumers are often unaware of what happens at the Gulf, and fishers are unaware of what happens to their fish after they bring it to the receiving center. We propose that **each of Don Chino's fishers spend one week per month during the months of Veda as a guest worker at AutoMercado**.

During this time they can interact with the employees by taking customers' orders, helping sell the fish and providing information about the fishing industry. Many employees have never even seen the fish they sell when it was alive. Working with the fishers would be an eye-opening opportunity. The employees can pass the information they learn on to the consumers throughout the year. As we determined with our surveys, there is much work to be done to educate consumers about the impacts of responsible fishing. Through this initiative, employees will become a source of information about this topic and encourage consumers to see the added value of responsibly caught fish.

This initiative will provide fishers with paid work during the months of Veda, and since they would not be on the coast during this week, the initiative would prevent fishers from going out on their boats during the ban. Unfortunately, because the fishers would be in San José for only one week out of each of the three months, they are free to fish for the remaining three weeks. For this reason, we came up with another recommendation that would further consume the fishers' time during Veda.

5.1.3 AutoMercado Facilitates a Relationship Between the Fishers in Costa de Pájaros and MarTec Hatchery in Puntarenas

Our third recommendation for a financing project by AutoMercado is the coordination of a working relationship between the fishers in Costa de Pájaros and MarTec, a fish hatchery in nearby Puntarenas. One of the projects currently in place at MarTec is to cultivate endangered marine species for future release into the wild. We recommend that the fishers in Costa de Pájaros either **work with MarTec to transport and release juvenile fish during the months of**

Veda, or work with the company to develop a similar hatchery directly in Costa de Pájaros. AutoMercado would pay for or subsidize the salaries and expenses of the fishers as part of their Corporate Social Responsibility Fund. Either of these initiatives will increase the population of fish in the Gulf of Nicoya, benefitting the fishers and AutoMercado by increasing supply.

Working with the current MarTec facility would allow for immediate implementation of the population-replenishing initiatives in Costa de Pájaros. The initial cost to AutoMercado would be lower than that of the second option, as it would only include transportation and fishers' salaries. This option may eventually prove to become costly, as the continued transportation costs will add up. Additionally, some fishers may not feel as though the distance travelled is worth their time for the money they would receive. If this is the case, the second option, though a larger initial investment, would likely be a better solution. Once the hatchery is set up in Costa de Pájaros, AutoMercado would only have to finance the fishers' salaries.

One obstacle in setting up a relationship between AutoMercado and MarTec is the fact that MarTec historically exports the majority of its product. To alleviate this concern, we recommend a contract be created between AutoMercado and MarTec that stipulates that AutoMercado can purchase a fixed amount of product from MarTec at a discounted rate as long as they finance the fishers that work for MarTec.

By supporting efforts to repopulate the gulf and help the people living around it, AutoMercado will both decrease its costs and improve its public image. This partnership between MarTec, AutoMercado, and the fishers will have far-reaching and long-term positive outcomes for both the environment and the stakeholders along this supply chain.

5.2 Visual Campaigns at AutoMercado to Increase Public Awareness

Based on the results of our consumer surveys, we recommend that AutoMercado increase the presence of its current in-store visual campaign. Our findings suggest that the design of the posters currently displayed in the AutoMercado fish market, shown in Figure 8, does not draw customers' attention. For those shoppers who do notice and read the posters, the message displayed does not convey information regarding why AutoMercado refuses to sell certain types of fish. We recommend that **AutoMercado design posters that will interest consumers while providing specific details about (1) which fish they do not sell and (2) why they elect not to.** These details will include information about endangered species, species crucial to the maintenance of a healthy marine ecosystem, species commonly caught as bycatch, species important for Costa Rican tourism, and immature fish. We designed a prototype, shown in Figure 11, that will accomplish both of these objectives. This sign is both visually appealing and

informative, making it more effective than the sign currently displayed in some AutoMercado fish markets. The use of vibrant primary colors, pictures, and a style reminiscent of comic books will entice children to read the sign, allowing this sign to concurrently educate Costa Rica's youth.

Figure 11- Proposed Sign to be Displayed in the Fish Market of AutoMercado

In addition to changing the signs displayed behind the fish market, we recommend that, next to the fish being sold, **AutoMercado implement an interactive display explaining the gill net**. The gill net is a method commonly used to catch the species sold at AutoMercado, yet based on our survey results AutoMercado consumers did not understand the subtle differences that distinguish responsible gill nets from the rest. We recommend that AutoMercado display information about both the net hole size that is required by law as well as the size req

uired for MarViva's classification as "responsible." Because the concept of the gill net is foreign to the average consumer and is somewhat difficult to grasp, we also recommend that AutoMercado provide physical examples of the different nets. Like the vibrant poster, this would serve the dual purpose of informing consumers and enticing and educating youth. We designed a potential display, shown in Figure 12, that would both interest and inform consumers.

These initiatives should not be considered cost-prohibitive, as they will also serve as advertising for AutoMercado by way of improved public image. These campaigns will highlight initiatives already in place by the company, allowing for recognition of their efforts to protect the environment. If designing a visually appealing and informative campaign proves difficult for AutoMercado, we recommend a joint effort with MarViva to create these posters. With only a small initial investment needed by AutoMercado, this campaign will increase consumers'

knowledge, enabling them to make more informed purchasing decisions. The new insight will incentivize consumers to purchase responsibly caught fish, and, in turn, motivate fishers to fish responsibly to keep up with the demand. The consumers' awareness will be spread by word of mouth, as will AutoMercado's reputation as an environmentally conscious corporation. By informing their customer base and differentiating themselves even further from their competition, AutoMercado will help both itself and the environment.

Figure 12 - Proposed Gill Net Stand to be Displayed in AutoMercado

5.3 AutoMercado Increases the Amount of Information on Fish Labels

In addition to implementing the new signs, we recommend that **AutoMercado redesign the label for all fish sold in the fish market to provide consumers with more information about the specific fish they buy**. The current label, shown in Figure 13, displays the price as well as some information required by law.

Figure 13 - Current Label on the Fish Sold at AutoMercado

The information on the label does include the country of origin, yet many of our survey respondents claimed to be unaware of this information. Survey respondents said they would like to know where and how the fish was captured, whether it was caught by artisanal or industrial fishers, and the threat level to the specific species. We recommend that AutoMercado redesign the label displayed in front of each type of fish to include this information in a visually appealing manner. We designed a prototype, shown in Figure 14, that will efficiently convey this information to consumers.

Figure 14 - Proposed Label for Fish Sold at AutoMercado to Include Information About the Threat Level, Origin, Form of Capture, and Type of Fishing Used

By adding the flag, consumers will be immediately alerted to the country of origin. Consumers who desire more information about the origin can find a more detailed description beneath the

flag. Here consumers will also be alerted to whether or not the fish was caught by artisanal fishers. Next to the species name is an indicator used by MarViva to show the threat level to the species. A legend could be provided on the back wall or with the gill net display for consumers interested in learning more about this information. Additionally, this label provides an image showing the method used to catch the fish. This image would both inform consumers and reinforce the information learned from the visual public awareness campaign.

While this label provides all information required by law, it may not comply with AutoMercado's internal policies regarding product labels. If this is the case, AutoMercado could display this label in addition to the one currently in use, or work with MarViva to integrate this information in a way that would satisfy company requirements.

If the cost of implementation proves to be a concern for AutoMercado, we recommend that they consider the positive impact such a change will have on their reputation. This improved image will likely result in increased profits for the company in the long run. A more visually appealing campaign may also entice more consumers to look at and subsequently purchase the product. Previous studies have shown that up to 85% of consumers claimed that the "color, lighting, ambience and attractive visuals" encourage them to spend more time in the store. More time in the store often results in increased sales (Kaur, 2013). Additionally, by informing customers about factors relevant to the product they are buying, AutoMercado will allow consumers to make informed purchasing decisions. This will increase demand for responsibly caught fish and aid in the preservation of the marine ecosystem.

5.4 Increase the Price of Responsibly Caught Fish at AutoMercado

Based on the fact that 91% of survey respondents indicated a willingness to pay more for product that they knew was responsibly caught, we recommend that **AutoMercado increase the final market price of responsibly caught fish by 5%**. A 5% increase of the price of Corvina Reina and Corvina Pequeña would result in an increase of about ₡790 ($1.5) and ₡660 ($1.2) per kilogram, respectively. As 67% of AutoMercado consumers indicated that price was not a factor in their decision to buy fish, this small increase would likely be insignificant in their eyes. Even though this price increase could lead to a loss of about 10% of consumers, it would still result in ₡60,000 ($110) more per month entering the market.

Because we identified the fishers as stage of the supply chain most in need of increased profits, we recommend that most, if not all, of this additional income trickle all the way down to them. Unfortunately, giving all added profit would likely result in a reduction of profit for AutoMercado, as they would be forced to take the 10% loss in sales and would not benefit from

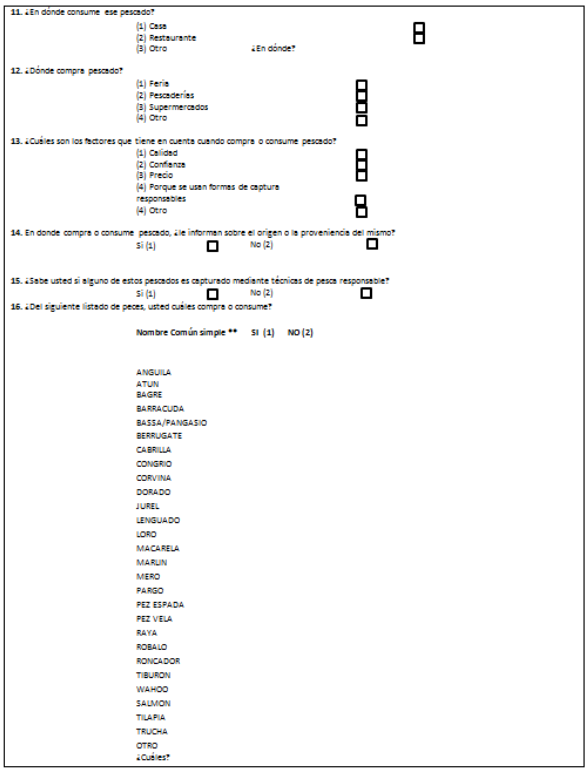
the increased price of the fish they do sell. As we determined that AutoMercado already has a large profit margin per kilogram of fish, we do not foresee this as negatively affecting AutoMercado's bottom line. However, previous efforts by MarViva to institute a price increase at AutoMercado for this very reason have been met with much resistance by the company. The fish sold at AutoMercado is already some of the highest priced fish in Costa Rica, making the company reluctant to further separate themselves from more affordable competition.

Taking these factors into account, we recognize that there are obstacles in the way of the implementation of this price increase. We do believe that, if these obstacles can be overcome, the price increase has the potential to greatly improve the lives of the fishers and promote the responsible use of Costa Rica's marine resources.

5.5 Improvements to MarViva's Fish Consumption/Awareness Survey

While conducting the consumer surveys, we noticed some areas that should be improved before further distribution. **We recommend that MarViva shorten the length of this survey for consumer convenience and modify some of the questions for clarity**. These recommendations are made with the intention of using this survey for an analysis with a goal similar to ours, and should be modified based on the intent of the study being conducted. The updated survey is provided in Appendix J.

In order to shorten the total length of the survey, we recommend the elimination of certain questions that we perceive to have little value to the researcher. We first suggest the elimination of questions 9 and 10, which provide information about how and where the respondents consume fish. The responses to this question varied very little, and the results did not prove useful for our analysis. We also suggest removing questions 15 and 16, which ask what fish the respondent consumes and which is their favorite. These questions added a personal touch to the survey, and would be beneficial for a study focused on fish consumption, but they did not add anything to our analysis. Figure # shows the long list of possible fish respondents could select. From a visual standpoint, the size of the list of species may have been somewhat intimidating and lowered enthusiasm for the survey. The removal of these questions would eliminate the need for a third page of the survey.


11. ¿En dónde consume ese pescado?
(1) Casa
(2) Restaurante
(3) Otro ¿En dónde?

12. ¿Dónde compra pescado?
(1) Feria
(2) Pescaderías
(3) Supermercados
(4) Otro

13. ¿Cuáles son los factores que tiene en cuenta cuando compra o consume pescado?
(1) Calidad
(2) Confianza
(3) Precio
(4) Porque se usan formas de captura responsables
(4) Otro

14. En donde compra o consume pescado, ¿le informan sobre el origen o la procedencia del mismo?
Si (1) No (2)

15. ¿Sabe usted si alguno de estos pescados es capturado mediante técnicas de pesca responsable?
Si (1) No (2)

16. ¿Del siguiente listado de peces, usted cuáles compra o consume?

Nombre Común simple **	SI (1)	NO (2)
ANGUILA		
ATUN		
BAGRE		
BARRACUDA		
BASSA/PANGASIO		
BERRUGATE		
CABRILLA		
CONGRIO		
CORVINA		
DORADO		
JUREL		
LENGUADO		
LORO		
MACARELA		
MARLIN		
MERO		
PARGO		
PEZ ESPADA		
PEZ VELA		
RAYA		
ROBALO		
RONCADOR		
TIBURON		
WAHOO		
SALMON		
TILAPIA		
TRUCHA		
OTRO ¿Cuáles?		

Figure 15 - Survey Second Page With List of Species Taking Up About Half of The Page

We also suggest the modification of specific questions that were either too vague to produce results we could interpret, or too confusing to the respondents. The first modification we suggest is for question 6, which was an open-ended question asking what the respondents understood by the phrase “responsible fishing”. As this was open-ended, some respondents gave responses that in reality said very little, such as that responsible fishing means “protecting the environment”. We believe that the respondent should answer this as if it is an open-ended question, but the researcher should have a list of potential answers to check off if the respondent answers them. This would prevent the researcher from leading or biasing the respondent while allowing for an analysis that would pinpoint areas in need of more public awareness efforts.

Additionally, we suggest changing question 11, which asks where the consumers typically buy fish, to include various supermarket chains instead of just the term “supermarkets”, to allow a better analysis of where the consumers shop. This is especially important if the survey is distributed to a group other than AutoMercado customers. We recommend that questions 13 and 14, which ask about awareness of the origin and method of capture of the product, be combined into one. Doing so will make the survey shorter and reduce the risk of respondents losing interest midway through the survey. We suggest moving question 17, which asks about willingness to stop buying endangered fish, to right after question 4, which asks about

awareness about endangered species. In its current place, question 17 likely influences answers to the following question about willingness to pay more for responsibly caught fish by leading the respondent to believe that the fish they are agreeing to pay more for is an endangered species.

We especially recommend changing the wording of the four most important questions to our analysis. Question 12 asks which factors the consumer considers when buying fish, and lists the options of "quality", "trust", "price", and "because they used responsible forms of capture". An overwhelming majority of respondents chose quality, but we were concerned that some may have just chosen the first option they heard without considering other options. This concern stemmed from our own experience of being cut off in the middle of reading the options. Even though we continued reading them, it often appeared that the respondent was no longer listening. We also believe that the length of the final option deterred respondents from listening to it in full. We suggest that the options are changed to read "trust", "responsible catch", "price", and "quality" in this order. By ending with the options that were chosen most frequently during this study, it is more likely that respondents will wait until the end to make their choice. Questions 18 and 19 ask consumers if they would be willing to pay more for fish they knew was responsibly caught, and if so, how much. The highest option was 20%, yet some consumers said they would pay even more. We believe these two questions could be combined into one, with percentage ranges given as options. Many consumers said they would like to pick more than one option, and many who picked 20% said that in reality they would pay more than that. Giving a greater range of options will provide a more accurate analysis of what consumers are willing to pay. We propose the question to be changed to "How much more would you pay for fish you knew was responsibly caught?" and the options changed to "0%", "1-5%", "6-15%", "16-30%", and "31%+". Finally, we recommend changing Question 20, seen in Figure #. This question asks consumers to rank five factors in terms of their importance to purchasing decisions. We proposing rewriting the question to simply ask, "Which of the following would you like to see on the label?" This rephrasing would eliminate the variation between how respondents interpret the question, thus improving the accuracy of analysis.

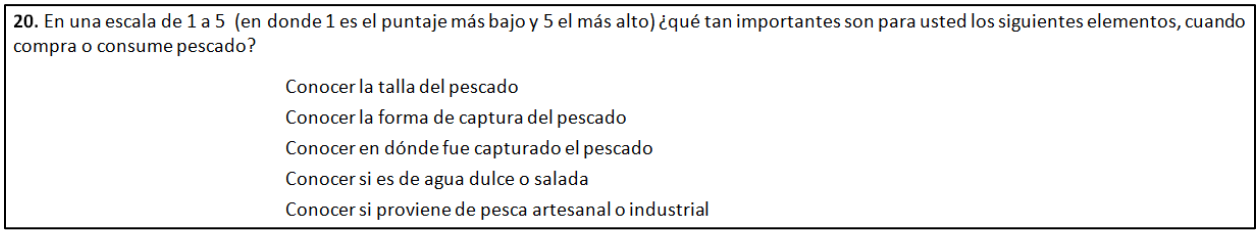


Figure 16 - Question 20 of the Survey

In an attempt to understand and identify the factors influencing consumers' knowledge of the various fishing methods, we recommend that Question 5, which provides both the names and

pictures of these methods, be distributed with a control and test group. The control group would not be given images of the techniques, and would have to identify dangerous methods by name. The test group would be given both the images and names, as they were in our distribution of the survey. Utilizing a control would help determine if consumers' actually knew which methods were dangerous, or if they just guessed based on the images.

In order to obtain consistent results and allow for comparison, this revised survey would have to be redistributed in both Costa Rica and Colombia, where MarViva previously sent out the survey online. While this will involve a significant amount of effort, the improvements to this survey will maintain respondents' enthusiasm, eliminating the likelihood of rushed answers, and will significantly decrease the effect of confounding variables on the answers. The resulting analysis will be more accurate and informative to the researchers conducting studies similar to our own.

5.6 Extension of the Analysis to Other Supply Chains

While the subjects of our study represented the target audience for current MarViva initiatives, we recommend **that future studies focus on other supply chains that may not have the same commitment to responsibility as the AutoMercado supply chain**. We recognize that responsible product is a niche market with fairly specific consumers, but suggest that more initiatives be targeted towards different consumers in order to increase demand. With the knowledge that corporate buyers hold the most weight in their respective supply chains, we recommend MarViva work with corporate buyers to increase the demand of responsible products from consumers and use that demand to create pressure along the supply chain.

We recommend that MarViva begin this process by partnering with various corporate buyers, including supermarkets and restaurants, throughout Costa Rica. This partnership should be pitched as a win-win relationship, wherein MarViva benefits from the protection of the marine ecosystem and the corporation benefits from an improved public image. It is possible that MarViva will face some resistance from corporate buyers that do not want to invest in responsible fishing initiatives. Multiple motivations could drive this resistance, including a companywide sense of apathy or a fear of reduced profits. Contingent upon the successful implementation of our recommendations at AutoMercado, MarViva may be able to cite the store as an example of the benefits received through a MarViva partnership. We hope that AutoMercado will prove a good model for future initiatives and partnerships with MarViva, and that these recommendations will pave the way for increased responsible fishing and a healthier marine ecosystem.

References

Alvarado, J., Cortés, J., Esquivel, M., & Salas, E. (2012). Costa Rica's Marine Protected Areas: Status and perspectives. Revista De Biologia Tropical, 60(1), 129-142.

Arias, L. (203, June 4). Costa Rican Fisheries Institute to apply fishing ban in Gulf of Nicoya. Retrieved March 24, 2015, from http://www.ticotimes.net/2013/06/04/costa-rican-fisheries-institute-to-apply-fishing-ban-in-gulf-of-nicoya

Carvalho, N., Edwards-Jones, G., & Isidro, E. (2011). Defining scale in fisheries: Small versus large-scale Fishing operations in the Azores. Fisheries Research, 109(2-3), 360-369.

Civitarese, A., Hulburt, T., Ketchum, C., & Tran, L. (2014). Improving Traceability Systems: A Study of the Fishing Communities of Palito and Costa de Pájaros. Worcester, Massachusetts (MA).

Cost of Living Comparison Between the US – Costa Rica. (2007). Retrieved February 1, 2015, from http://www.dreamthefuture.org/crecovillage/comparison.pdf

Costa Ricans are Eating More Fruits, Veggies, and Fish Than Ever Before. (2014, April 23). The Costa Rica News (TCRN). Retrieved February 10, 2015, from http://thecostaricanews.com/costa-ricans-are-eating-more-fruits-veggies-and-fish-than-ever-before

Costa Rica Launches Carbon Trading, a First For a Developing Country. (2013, November 4). Retrieved February 1, 2015, from http://www.sustainablebusiness.com/index.cfm/go/news.display/id/25332

Dapp, D., Arauz, R., Spotila, J., & O'connor, M. (2013). Impact of Costa Rican longline fishery on its bycatch of sharks, stingrays, bony fish and olive ridley turtles (Lepidochelys olivacea). Journal of Experimental Marine Biology and Ecology, 448, 228-239.

Dyer, Z. (2014, August 5). Drug traffickers lure Costa Rica's struggling coastal fishermen with offers of easy money. Retrieved March 21, 2015, from http://www.ticotimes.net/2014/08/05/drug-traffickers-lure-costa-ricas-struggling-coastal-fishermen-with-offers-of-easy-money

Evans, M. (2013, September 26). Excess of Restaurants is Asphyxiating Costa Rica Hospitality Industry. The Costa Rica Star. Retrieved February 10, 2015, from http://news.co.cr/excess-of-restaurants-is-asphyxiating-costa-rica-hospitality-industry/27901/

FECOP. (2014, July 29). Auto Mercado aims at responsible consumption. Retrieved March 25, 2015, from http://www.fecop.org/en/auto-mercado-apunta-al-consumo-responsable/

Fisheries and Aquaculture Department. (2009, July 29). FAO National Aquaculture Sector Overview (NASO). Retrieved February 1, 2015, from http://www.fao.org/fishery/countrysector/naso_costarica/en

Institute of Management Accountants. (n.d.). Managing the Total Costs of Global Supply Chains. Business Performance Management

Kaur, A. (2013). Effect of Visual Merchandising on Buying Behavior of Customers in Chandigarh. *International Journal of Engineering Science and Innovative Technology (IJESIT),* 2(3)

Little, M. (2014, December 4). Water Solutions in Santa Teresa Bring More Challenges to Light. Retrieved February 1, 2015, from http://www.explore.fieldstudies.org/blog/2014/12/faculty/water-solutions-in-santa-teresa-bring-more-challenges-to-light

Lopez, J. (2013, July 29). Surviving the Supermarket Wars in Costa Rica. Retrieved March 25, 2015, from http://news.co.cr/surviving-the-supermarket-wars-in-costa-rica/23754/

Madrigal, R., Alpízar, F., & Capitán, T. (2014). Spatial decisions and livelihoods of small-scale fisheries in Costa Rica. Retrieved February 1, 2015, from http://www.efdinitiative.org/publications/spatial-decisions-and-livelihoods-small-scale-fisheries-costa-rica

MarViva. (2014). Guía de conceptos y procedimientos orientados hacia una pesca responsable.

MarViva. (2014). Responsible Markets: Building fishing value chains.

Non-profit organizations. (n.d.). Retrieved March 25, 2015, from https://www.law.cornell.edu/wex/non-profit_organizations

Pagiola, S. (2008). Payments For Environmental Services In Costa Rica. Ecological Economics, 65(4), 712-724.

Project on Sustainable Fisheries Management for the Gulf of Nicoya. (2007). Retrieved February 1, 2015, from http://www.jica.go.jp/english/our_work/evaluation/tech_and_grant/project/term/latin_america/c8h0vm000001rz7x-att/costa_2007_01.pdf

Rankin, M. (2012). The Liberación Economy. In The history of Costa Rica (p. 122). Santa Barbara, California: Greenwood, an imprint of ABC-CLIO, LLC.

Responsible Markets: Building fishing value chains. (2014, January 1). Retrieved February 1, 2015, from http://www.marviva.net/Publicaciones/FolletoCadenasdeValor-ingles.pdf

Sherwood, D. (2007, September 21). Pacific Gulf of Nicoya 'Dying a Slow Death' Retrieved March 24, 2015, from http://www.ticotimes.net/2007/09/21/pacific-gulf-of-nicoya-dying-a-slow-death

Smith-Palliser, C. (2012, January 5). Costa Rica Retail Foods. Retrieved February 23, 2015, from http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Retail%20Foods_San%20Jose_Costa%20Rica_6-25-2012.pdf

State of world aquaculture 2014. (2014). Rome: Food and Agriculture Organization of the United Nations.

The Fundamentals of Price and Cost Analyses. (n.d.). Retrieved March 5, 2015, from http://www.thomasnet.com/articles/engineering-consulting/price-cost-analysis

Venegas, M. (2007). Generational Transition of Subsistence Fishing Practices in the Pacific Community of Venado Island, Costa Rica. McNair Scholars Research Journal, 3(1), 65-81. Retrieved February 1, 2015, from http://scholarworks.boisestate.edu/cgi/viewcontent.cgi?article=1040&context=mcnair_journal

Villalobos, W. (2013, July 10). Nicoya fishermen live in poverty during fishing prohibition - Inside Costa Rica. Retrieved February 23, 2015, from http://insidecostarica.com/2013/07/10/nicoya-fishermen-live-in-poverty-during-fishing-prohibition/

World Bank. (n.d.). Costa Rica. Retrieved February 1, 2015, from http://data.worldbank.org/country/costa-rica

Wyman, O. (2014, November 5). Energy Trilemma Index. Retrieved February 1, 2015, from http://www.worldenergy.org/data/trilemma-index/

Appendix A – Cost Lists for all Interviews

FISHERS

Cosa	Costo	Cantidad	Duración de Uso
Barco			
Motor			
Combustible			
Aceite			
Linea			
Red			
Anzuelo			
Cebo/Carnada			
Lámparas			
Boyas			
Pesos			
Contenedor/Salmuera			
Recipiente de Hielo			
Cuchillos			
Food / Comida			
Productos de Limpieza			
Guantes			

RECEIVING CENTER

Centro de Acopio			
Cosa	Costo	Cantidad	Duración de uso
Pescado			
Agua Limpia			
Batas (gabachas)			
Botas			
Redes para el Cabello			
Guantes			
Báscula/Pesa			
Termómetros			
Registros, suministros papeleo			
Productos de Limpieza			
Recipientes			
Salario: Control de Calidad			
Salario: Limpieza de Pescado			
Salario: Trazabilidad			
Salario: Transporte			
Electricidad			
Utilidades			
Combustible			
Seguro			
Alquilee o Hipoteca			
Préstamos para los Pescadores			

PROCESSING PLANT

Item / Cosa	Cost / Costo	Amount / Cantidad	Lifespan / Duración de Uso
Fish / Pescado			
Ice Flakes / hielo			
Ice Sheets / hielo			
Robes / Batas (gabachas)			
Hair Nets / Redes para el Cabello			
Gloves / Guantes			
Face Masks / Máscaras Faciales			
Boots / Botas			
Water storage devices / Contenadores de agua			
Registers, paperwork supplies ? registros, suministros papeleo			
Chemical Containers / Contenadores de sustancias quemicas			
Chemical Products for Disinfection / Sustancias quimicas para desinfecion			
Cleaning supplies / Articulos de limpieza			
Thermometers / Termómetros			
Refrigerator / Refrigerador			
Waste equipment / Equipo de Desecho			
Packaging Equipment / Equipo de Envasado			
Assembly Line Equipment / Equipos de la Línea de Montaje			
Knives / Cuchillos			
Quality Control Salary / Salario: Control de Calidad			
Fish Cleaning Salary / Salario: Limpieza de Pescado			
Fish Cutting Salary / Salario: Corte de Pescado			
Traceability Salary / Salario: Trazabilidad			
Packaging Salary / Salario: Envase			
Transportation Salary (Driver + Load) / Salrio: Transporte			
Vet Salary / Salario: Veterinario			
Electricity / Electricidad			
Water / Aqua			
Fuel / Combusitble			
Insurance / Seguro			
Rent or Mortgage / Alquilo o Hipoteca			
Regulations and Inspections costs / los costos de regulación e inspección			

Appendix B – Fishers Interview

1. How often do you go fishing?
   ¿Con qué frecuencia pesca?

2. Family / La Familia
   a. Are you the only person who works in your family?
      ¿Ud. es la única persona que pesca en su familia?
   b. If not, what do the others do?
      ¿Si no, que hacen los demás?
   c. Do you consider fishing a good profession for someone with a family?
      ¿Cree que el pescar es un buen trabajo para personas con familias?

3. Fishing Industry / La Industria de Pescados
   a. What are your thoughts on the current state of the fishing industry in Costa Rica?
      ¿Qué piensa sobre el estado actual de la industria de pescar en Costa Rica?
   b. And in the Gulf of Nicoya?
      ¿Y en el Golfo de Nicoya?
   c. What kinds of fish do you catch?
      ¿Cuáles tipos de pez atrapa?
   d. What methods do you use to catch the fish?
      ¿Qué método de pesca Ud. usa?
   e. What equipment do you need?
      ¿Qué equipo de pesca necesita?
   f. Do you own this equipment?
      ¿Este equipo le pertenece a Ud.?
   g. What are the costs of this equipment?
      ¿Cuánto cuesta tal equipo? * start filling the spreadsheet *****
   h. Are there any other costs that you have not mentioned yet?
      ¿Hay otros costos que faltan para mencionar? * show spreadsheet to them? *****
   i. If you could change one thing about the fishing industry in Costa Rica what would it be?
      ¿Si podría cambiar alguna cosa en la industria de pesca en Costa Rica, cuál sería?

4. Veda:
   a. Do you think Veda is necessary?
      ¿Cree que Veda es necesaria?
   b. Do you think Veda is working as it is used now?
      ¿En tu opinión, Veda funciona bien tal como se usa actualmente?

c. Do you know about the financial aid available from the government during Veda?
¿Sabe si hay ayuda financiera del gobierno disponible durante Veda?
d. Do you take advantage of this aid?
¿Ud. se aprovecha de esta ayuda?
e. Do you think this aid is sufficient?
¿Cree que esta cantidad es suficiente?
f. If not, what do you think would be sufficient? Si no, cuanto sería suficiente?
Si no, ¿cuánto sería suficiente?

5. Income / Ingresos:
   a. In general, do fishers in this area believe that they make a sufficient amount of money to survive?
   Por lo general, ¿los pescadores en esta área creen que ganan una cantidad suficiente para vivir?
   b. If not, what would be a sufficient amount?
   Si no, ¿cuánto sería lo suficiente?
   c. How much do you make (average colones/kilo and/or per day)?
   ¿Cuánto dinero gana (colones por kilo y/o colones por día)?
   d. How much does your income vary?
   ¿Por cuánto varía su ingreso?
   e. Describe your fishing experience during the past ten years.
   Describe su experiencia con la pesca durante los últimos diez años.

   ASK ABOUT OTHER INCOMES

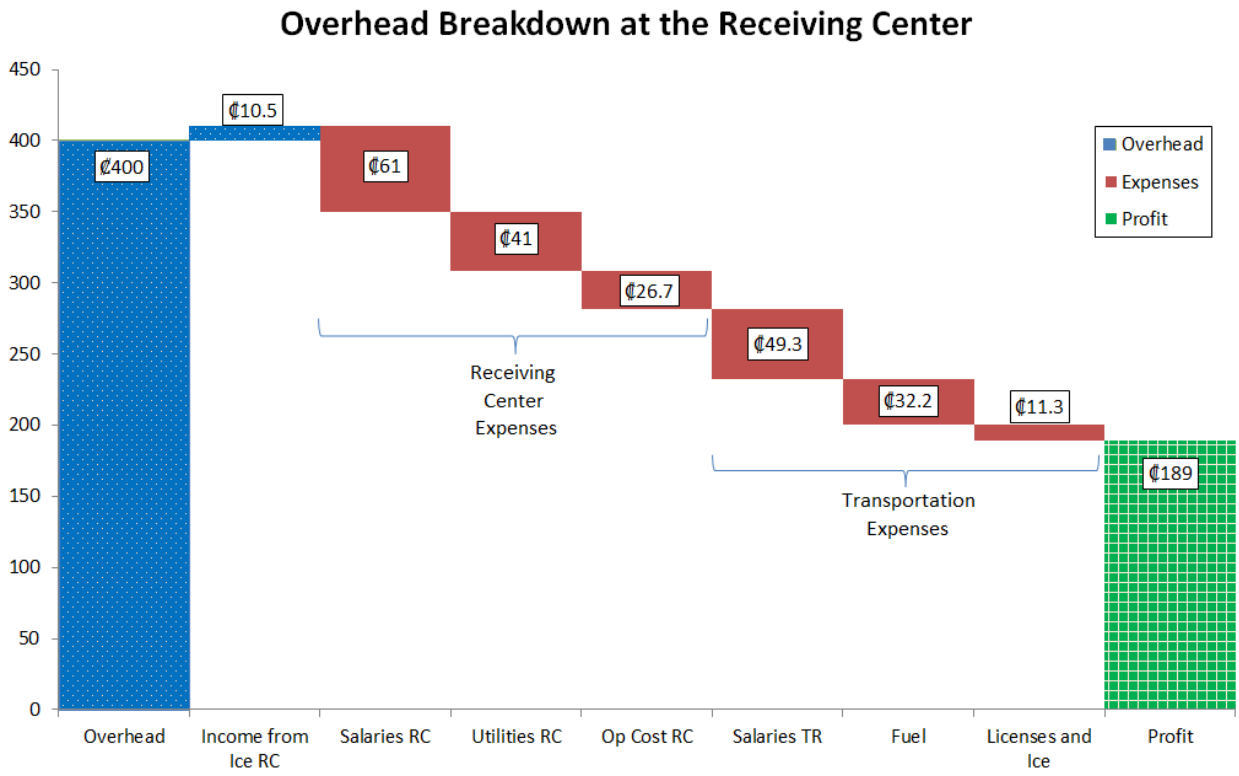
Appendix C1 – Receiving Center Costs

Item (Artículo)	Cost (Costo)	Quantity (Cantidad)	Total Cost (Costo total)	Lifespan (Duracion de uso)	Monthly Cost (Costo mensual)
RECEIVING CENTER					
Electricity ice maker (Electricidad maquina)	₡ 500,000	1	₡500,000	1 month / mes	₡500,000
Electricity (Electricidad)	₡ 100,000	1	₡ 100,000	1 month / mes	₡ 100,000
Water (Agua)	₡ 40,000	1	₡ 40,000	1 month / mes	₡ 40,000
Boots (Botas)	₡ 7,500	2	₡ 15,000	6 months / meses	₡ 2,500
Gloves (Guantes)	₡ 4,000	1	₡ 4,000	1 week / semana	₡ 17,400
Scale (Romana)	₡ 300,000	1	₡ 300,000	2 years / años	₡ 12,500
Thermometer (Termometro)	₡ 25,000	1	₡ 25,000	1 year / año	₡ 2,084
Registry (Registro)	₡ 4,000	12	₡ 48,000	6 months / meses	₡ 8,000
Receipt book (Facturel)	₡ 1,000	1	₡ 1,000	2 days / días	₡ 15,000
Cleaning supplies (productos de limpieza)	₡ 3,000	3	₡ 9,000	1 week / semana	₡ 39,150
Big Containers (Recipientes grandes)	₡ 1,000,000	1	₡ 1,000,000	5 years / años	₡ 16,667
Small Containers (Recipientes pequeños)	₡ 60,000	6	₡ 360,000	5 years / años	₡ 6,000
Crates (Canastas)	₡ 7,000	20	₡ 140,000	1 year / año	₡ 11,667
Battery 1 (Batería 1)	₡ 5,000	2	₡ 10,000	2 years / años	₡ 417
Battery 2 (Batería 2)	₡ 12,000	2	₡ 24,000	5 months / meses	₡ 4,800
Additional ice (Hielo Adicional)	₡ 20,000	8	₡ 160,000	1 month / mes	₡ 160,000
License (Permiso) INCOPESCA	₡ 48,000	1	₡ 48,000	1 year / año	₡ 4,000
License (Permiso) SENASA	₡ 55,500	1	₡ 55,500	1 year / año	₡ 4,625
Salary: Don Chino + wife (Salario Don Chino+esposa)	₡ 84,000	1	₡ 84,000	1 week / semana	₡ 365,400
Salary:helper (Salario ayudante)	₡ 140,000	1	₡ 140,000	15 days / días	₡ 280,000
Salary:paperwork (Salario papeles)	₡ 10,000	8	₡ 80,000	1 month / mes	₡ 80,000
Salary:accountant (Salario contadora)	₡ 250,000	1	₡ 250,000	1 year / año	₡ 20,834
Taxes (Impuestos)	₡ 300,000	1	₡ 300,000	1 year / año	₡ 25,000
Ice for transportation (hielo para tansportacion)	-₡ 130,240	1	-₡ 130,240	1 month / mes	-₡ 130,240
INCOME ice (ingreso hielo)	- ₡ 1,800	180	-₡ 324,000	1 month / mes	-₡ 324,000
TOTAL					₡ 1,261,800
TRANSPORTATION					
Salary: driver (Salario chofer)	₡ 30,000	8	₡ 240,000	1 month / mes	₡ 240,000
Salary: helpers (Salario ayudantes)	₡ 15,000	24	₡ 360,000	1 month / mes	₡ 360,000
Fuel (Combustible)	₡ 50,000	8	₡ 400,000	1 month / mes	₡ 400,000
License (Permiso) INCOPESCA	₡ 48,000	1	₡ 48,000	1 year / año	₡ 4,000
License (Permiso) SENASA	₡ 55,500	1	₡ 55,500	1 year / año	₡ 4,625
Ice (Hielo)	₡ 130,240	1	₡ 130,240	1 month / mes	₡ 130,240
TOTAL					₡ 1,138,865

Appendix C2 – Receiving Center Calculations

Item (Artículo)	A. Monthly Cost (Costo mensual)	B. Reina Cost (Costo Reina)	C. Pequeña Cost (Costo Pequeña)	D. Reina cost/kg (Reina costo/kg)	E. Pequeña cost/kg (Pequeña costo/kg)
	A	B=0.3688*A	C=0.4594*A	D=B/4583.7	E=C/5709.6
RECEIVING CENTER					
Electricity ice maker (Electricidad maquina)	₡500,000	₡ 184,388	₡ 229,680	₡ 40.23	₡ 40.23
Electricity (Electricidad)	₡ 100,000	₡ 36,878	₡ 45,936	₡ 8.04	₡ 8.04
Water (Agua)	₡ 40,000	₡ 14,751	₡ 18,374	₡ 3.22	₡ 3.22
Boots (Botas)	₡ 2,500	₡ 921	₡ 1,148	₡ 0.20	₡ 0.20
Gloves (Guantes)	₡ 17,400	₡ 6,417	₡ 7993	₡ 1.40	₡ 1.40
Scale (Romana)	₡ 12,500	₡ 4,610	₡ 5,742	₡ 1.01	₡ 1.01
Thermometer (Termometro)	₡ 2,084	₡ 768	₡ 957	₡ 0.17	₡ 0.17
Registry (Registro)	₡ 8,000	₡ 2,950	₡ 3,675	₡ 0.64	₡ 0.64
Receipt book (Facturel)	₡ 15,000	₡ 5,532	₡ 6,890	₡ 1.21	₡ 1.21
Cleaning supplies (productos de limpieza)	₡ 39,150	₡ 14,438	₡ 17,984	₡ 3.15	₡ 3.15
Big Containers (Recipientes grandes)	₡ 16,667	₡ 6,146	₡ 7,656	₡ 1.34	₡ 1.34
Small Containers (Recipientes pequeños)	₡ 6,000	₡ 2,213	₡ 2,756	₡ 0.48	₡ 0.48
Crates (Canastas)	₡ 11,667	₡ 4,302	₡ 5,359	₡ 0.94	₡ 0.94
Battery 1 (Batería 1)	₡ 417	₡ 154	₡ 191	₡ 0.03	₡ 0.03
Battery 2 (Batería 2)	₡ 4,800	₡ 1,770	₡ 2,205	₡ 0.39	₡ 0.39
Additional ice (Hielo Adicional)	₡ 160,000	₡ 59,004	₡ 73,497	₡ 12.87	₡ 12.87
License (Permiso) INCOPESCA	₡ 4,000	₡ 1,475	₡ 1,837	₡ 0.32	₡ 0.32
License (Permiso) SENASA	₡ 4,625	₡ 1,706	₡ 2,125	₡ 0.37	₡ 0.37
Salary: Don Chino + wife (Salario Don Chino+esposa)	₡ 365,400	₡ 134,751	₡ 167,850	₡ 29.40	₡ 29.40
Salary:helper (Salario ayudante)	₡ 280,000	₡ 103,257	₡ 128,620	₡ 22.53	₡ 22.53
Salary:paperwork (Salario papeles)	₡ 80,000	₡ 29,502	₡ 36,749	₡ 6.44	₡ 6.44
Salary:accountant (Salario contadora)	₡ 20,834	₡ 7,683	₡ 9,570	₡ 1.68	₡ 1.68
Taxes (Impuestos)	₡ 25,000	₡ 9,219	₡ 11,484	₡ 2.01	₡ 2.01
Ice for transportation (hielo para tansportacion)	-₡ 130,240	- ₡ 119,483	-₡ 59,827	- ₡ 10.48	- ₡ 10.48
INCOME ice (ingreso hielo)	-₡ 324,000	- ₡ 48,029	-₡ 148,832	- ₡ 26.07	- ₡ 26.07
TRANSPORTATION					
Salary: driver (Salario chofer)	₡ 240,000	₡ 88,506	₡ 110,246	₡ 19.31	₡ 19.31
Salary: helpers (Salario ayudantes)	₡ 360,000	₡ 132,759	₡ 165,369	₡ 28.96	₡ 28.96
Fuel (Combustible)	₡ 400,000	₡ 147,510	₡ 183,744	₡ 32.18	₡ 32.18
License (Permiso) INCOPESCA	₡ 4,000	₡ 1,475	₡ 1,837	₡ 0.32	₡ 0.32
License (Permiso) SENASA	₡ 4,625	₡ 1,706	₡ 2,125	₡ 0.37	₡ 0.37
Ice (Hielo)	₡ 130,240	₡ 48,029	₡ 59,827	₡ 10.38	₡ 10.38
TOTAL	₡ 2,400,665	₡ 885,365	₡ 1,102,865	₡ 193	₡ 193

Appendix C3 – Receiving Center Results



Appendix D – Receiving Center Interview

1. How many fishers do you receive fish from? (list: license number, boat # - matricula)
¿De cuántos pescadores recibe pescado? ¿Puede compartir la lista actualizada?

2 Do they have a fishing license?
¿Sabe si tienen una licencia de pescar?

3. How many of those work independently?
¿Cuántos de estos pescan solos? (handliners alone, transmalleros in groups)

4. Do you know of fishers who work on someone else's boat?
¿Hay pescadores que trabajan en bote/panga de otras personas?

5. How many times a day do you receive fish?
¿Cuántas veces por día recibe pescado?

6. What methods do you use to determine the way the fish was caught?
¿Cómo determina la manera en la cual el pescado fue capturado?

7. How much do you pay per pound of fish? (average, min, and max) Is there any difference if the fish is caught responsibly?
¿Cuánto paga por kilo de pescado? (promedio, mínimo y máximo; por pesca responsable y regular) ¿Hay alguna diferencia en el precio por pesca responsable?

	Reina	Pequeña	Macarela	Jurel	Anguila	Chatarra
Min						
Avg						
Max						

8. How may kilograms of each of these types of fish do you usually get per day?
¿Cuantos kilos de pescado recibe cada día?

	Reina	Pequeña	Macarela	Jurel	Anguila	Chatarra
Min						
Avg						
Max						

9. Do you provide benefits or incentives to your fishers? Which ones?
¿Ofrece usted algún tipo de beneficio o incentivo a sus pescadores? ¿Cuáles?

10. Do fishers ever owe you money?
¿Ofrece algunas veces financiamiento a los pescadores?

11. If yes, do you charge interest?
¿Cobra interés si es así? (monthly payments, exactly the same amount?

12. How do you decide how much of their debt to take every day?
¿Cómo decide qué cantidad de la deuda debe ser pagada cada día/mes? ¿Tiene un monto o porcentaje constante? ¿Cuotas? ¿Tiene un registro?

13. Are there any other sources of income for the receiving center? (Grants, etc)
¿El centro de acopio tiene alguna otra fuente de ingresos que no hemos mencionado? (asistencia, subsidios, etc.)

15. How much of the fish is usually going to waste?
¿Qué porcentaje del pescado es rechazado?

16. What is your opinion of Veda?
¿Qué opina sobre la Veda?

17. Is the center functioning during Veda?
¿Su centro de acopio opera durante la Veda?

18. If not, do you have another source of income during these months?
¿Si no, como se mantiene durante esos meses?

19. How much of your fish goes to Total Seafood on a typical day?
¿Cuánto de su pescado va a Total Seafood cada día?

20. How do the prices you charge differ between different catching methods? How much?
¿Cobra precios diferentes basándose en los diferentes métodos de pesca? ¿Cuánto es la diferencia?

	Reina	**Pequeña**	**Macarela**	**Jurel**	**Anguila**	**Chatarra**
Min						
Avg						
Max						

21. How are fish transported from your center to the processing plants?
¿Cuál es su modo de transporte a las plantas de procesamiento?

22. How many hours does transportation to San Jose take?
¿Cuántas horas dura el transporte a San José?

23. How many kgs of ice do you use to transport the fish? (total or per kg)
¿Cuantos kilos the hielo usa durante el transportación? (Como por cada kilo de pescado)

24. What is the process of loading the truck? Do you use different containers?
¿Cuál es el proceso de poner el pescado en el camión? ¿Usa recipientes diferentes?

22. Could we have access to your most recent inventory list?
¿Mantiene algún tipo de control de inventario?

23. How many employees do you have**?**
¿Cuántos empleados tiene? (ayudante, himself + wife, registrar girl)

24. What are your total monthly expenses?
¿Cuánto gasta Ud. mensualmente? (start filling spreadsheet)

Appendix E – Cost Analysis Assumptions

FISHERS – Handliers

- There are typically two handliners fishing on the same boat, and all the costs are split between the two of them
- A handliner fishes 20 days per month, 10 days for Corvina Reina and 10 for Corvina Pequeña
- In a given day, two handliners bring an average of 4 Reinas of 5kg each or 11 Pequeñas of 1.2 kg each
- Each time they go out to fish, they use 1.5 gallons of fuel
- The fishers have licenses, so the fuel is discounted and costs ₡2200 per gallon
- Each time they goes out to fish, they buy one crate of ice for ₡1800
- The fishers borrowed money for equipment such as the boat or motor. Thus the boat and motor are not included in the expenses, but the loan is. Every time they bring product, they pay for the ice and the fuel, as well as 25% of what is left to cover for this loan.

FISHERS – Netters

- There are typically two netters fishing on the same boat, and the boat is owned by a third person
- Each time the boat brings fish, the cost for ice and fuel is kept from the income, therefore this cost is split between all 3
- What is left of the income after paying for ice and fuel is split as follows: 50% owner, 25% each netter
- The netters pay for their licenses. Of its 50% share, the owner covers for all other costs
- The netters fish 15 days per month, 10 days for Corvina Reina and 5 for Corvina Pequeña
- In a given day, two netters bring an average of 5 Reinas of 5kg each or 11 Pequenas of 1.2 kg each
- Each time they go out to fish, they use 4.5 gallons of fuel
- The fishers have licenses, so the fuel is discounted and costs ₡2200 per gallon
- Each time they goes out to fish, they buy one crate of ice for ₡1800
- The equipment such as the boat or motor was bought by the owner, so there is no loan to be included in the costs

RECEIVING CENTER

- The employees are: 1 helper (ayudante), 1 person that helps with transportation, 1 driver, 1 person who fills paperwork, 1 accountant, plus the owner Don Chino and his wife Doña Marta
- Don Chino and Doña Marta do not have an official salary; together they work an average of 90 hours/week and their salary is evaluated in terms of the helper's salary (see calculations below)
- The person who fills paperwork comes in 8 times a month and is paid ₡10,000 each time
- The driver makes 8 trips per month, and is paid ₡30,000 each trip
- To load the truck, the main helper and the transportation helper both contribute, and are paid ₡15,000 each, per trip.
- To unload the truck, only one of the two helpers works and it also paid ₡15,000 each trip

- The Receiving Center buys and sells the fuel for the same price, so this is not included in any calculations
- The Receiving Center sells 6 crates (240kg) of ice per day (half of what the ice machine makes), at ₡1,800 / crate
- 75% of the water is used in the ice making machine; this is important in ice calculations (see at the end of the document)
- Because of lack of ice in March (a good fishing month), there were 8 additional purchases of ice (see ice calculations)
- The cost of the ice used in transportation is separated; to see how this cost is calculated see ice calculations
- The amount of kilograms of fish in a month (based on March) is as follows:

Reina	Pequeña	Berrugate	Macarela	Chatarra	Jurel	Anguila	Volador	TOTAL
4583.7 kg	**5709.6 kg**	216.7 kg	364.8 kg	57.5 kg	97.2 kg	600 kg	800 kg	**12,429.5kg**

- For indirect costs fractions, weight percentages were used instead of income percentages, because of ease of calculation, as follows: Reina is 36.88% and Pequeña is 45.94%
- The overhead for each type of fish is ₡400 for Corvina Reina and Corvina Pequeña and ₡300 for the rest
- A month has 4.35 weeks

PROCESSING PLANT

- 1kg of Corvina Reina yields 0.30kg of loin (lomo), 0.45kg of filet (filete)
- 1 kg of Corvina Pequeña yields
- To calculate the supermarket price of the original kg of fish, all these are taken into account, not just filet, as follows:

$$Price\ of\ 1\ kg = 0.20\ P_{head} + 0.45\ P_{filet} + 0.30\ P_{loin} + 0.05\ P_{waste}$$

$$Price\ of\ 1\ kg = 0.20 * 0 + 0.45 * 15800 + 0.30\ * 19100 + 0.05 * 0 = ₡\ 12{,}840$$

Appendix F – Processing Plant Interview

1. What methods do you use to treat the fish?
   ¿Cuáles métodos usa para tratar el pescado?

2. For each of them, what materials are used?
   Por cada método, ¿qué materiales son usados?
   (spreadsheet)

3. How much do they cost? How often do you buy them?
   Por cada material, ¿cuánto cuesta? ¿Con qué frecuencia los compra?
   (spreadsheet)

4. How are fish transported from your center to the supermarkets?
   ¿Cómo se transporta el pescado a AutoMercado?

5. How much is spent on transportation?
   ¿Cuánto paga por dicho transporte?

6. What are your total monthly expenses?
   ¿Cuánto son sus gastos mensuales en total?

7. How many employees do you have?
   ¿Cuántos empleados tiene?

8. What are their salaries?
   ¿Cuáles son sus salarios?

9. Could we have access to your most recent inventory list?
   ¿Podemos tener acceso a su lista de inventario más reciente?

10. What actions do you take to promote sustainability?
    ¿Qué acciones Ud. toma para promover la sostenibilidad?

11. Do you know about the different ways to catch fish? Do you know which ones are responsable?
    ¿Ud. conoce las varias maneras de atrapar pez? Sabe cuáles de ellas son responsables?

12. What factors go into your decisión to buy fish?
    ¿Cuáles son los criterios que Ud. usa para decidir qué tipo de pescado Ud. compra? (atrapado responsablemente o no)

13. Do you pay more for responsibly caught fish?
    ¿**Ud. paga más por el pescado atrapado responsablemente?**

14. How much do you pay for each type of fish?
    ¿Ud. cuánto paga por cada tipo de pescado?

	Reina	Pequeña	Macarela	Jurel	Anguila	Chatarra	Other
Min							
Avg							
Max							

15. How many kgs of each type of fish do you normally buy? (Each time or monthly)
    ¿Cuantos kilos de cada tipo de pescado compra? (cada día o cada mes)

	Reina	Pequeña	Macarela	Jurel	Anguila	Chatarra	Other
Min							
Avg							
Max							

Appendix G – Current Consumer Survey

SECCIÓN I **Aspectos generales**

1. Edad _____

2. Residencia _____

3. Género

Femenino (1) ☐ Masculino (2) ☐

4. ¿Cuál es su nivel de estudios?

(1) Ninguno ☐
(2) Primaria ☐
(3) Secundaria ☐
(4) Estudios Técnicos ☐
(5) Estudios Universitarios ☐
(6) Posgrado ☐

SECCIÓN II **Aspectos Ambientales**

5. ¿Conoce usted alguna especie marina en vías de extinción?

(1) Si ☐ ¿Cuál (es)?
(2) No ☐

6. ¿Cuál (es) de estas técnicas o elementos de pesca considera usted nocivo (s) para el medio ambiente?

(1) Redes y mallas ☐
(2) Anzuelo y nylon ☐
(3) Palangre (múltiples anzuelos) ☐
(4) Dinamita y veneno ☐
(5) Arpón ☐
(6) Pesca de arrastre ☐
(7) No sabe ☐
(8) Otro ☐

7. ¿Qué entiende usted por pesca responsable?

8. ¿Sabe usted de alguna iniciativa o experiencia relacionada con el tema de pesca responsable que se esté desarrollando actualmente en Colombia?

(1) Si ☐ ¿Cuál (es)?
(2) No ☐

SECCIÓN II **Hábitos y preferencias del consumidor**

9. ¿Con qué frecuencia usted consume pescado?

(1) Una vez a la semana ☐
(2) Más de una vez a la semana ☐
(3) Una vez al mes ☐
(4) Más de una vez al mes ☐
(5) Una vez al año ☐
(6) No consume pescado ☐

10. Normalmente**,** ¿Cómo consume ese pescado?

(1) Enlatado ☐

(2) Filete
(3) Entero
(4) Sushi
(5) Otro

11. ¿En dónde consume ese pescado?

(1) Casa
(2) Restaurante
(3) Otro ¿En dónde?

12. ¿Dónde compra pescado?

(1) Feria
(2) Pescaderías
(3) Supermercados
(4) Otro

13. ¿Cuáles son los factores que tiene en cuenta cuando compra o consume pescado?

(1) Calidad
(2) Confianza
(3) Precio
(4) Porque se usan formas de captura responsables
(4) Otro

14. En donde compra o consume pescado, ¿le informan sobre el origen o la proveniencia del mismo?

Si (1) ☐ No (2) ☐

15. ¿Sabe usted si alguno de estos pescados es capturado mediante técnicas de pesca responsable?

Si (1) ☐ No (2) ☐

16. ¿Del siguiente listado de peces, usted cuáles compra o consume?

Nombre Común simple **	**SI (1)**	**NO (2)**
ANGUILA		
ATUN		
BAGRE		
BARRACUDA		
BASSA/PANGASIO		
BERRUGATE		
CABRILLA		
CONGRIO		
CORVINA		
DORADO		
JUREL		
LENGUADO		
LORO		
MACARELA		
MARLIN		
MERO		
PARGO		
PEZ ESPADA		
PEZ VELA		
RAYA		
ROBALO		
RONCADOR		
TIBURON		
WAHOO		

SALMON
TILAPIA
TRUCHA
OTRO
¿Cuáles?

17. ¿Cuál es su pescado favorito?

_____

18. Si usted sabe que su pescado favorito está en vía de extinción, ¿estaría dispuesto a no comprarlo?

Si (1) ☐ No (2) ☐

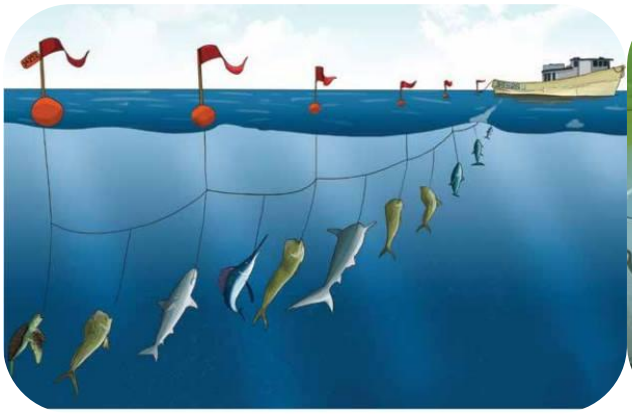
19. ¿Estaría usted dispuesto a pagar más por el pescado, si sabe que este es obtenido cumpliendo con criterios de pesca responsable?

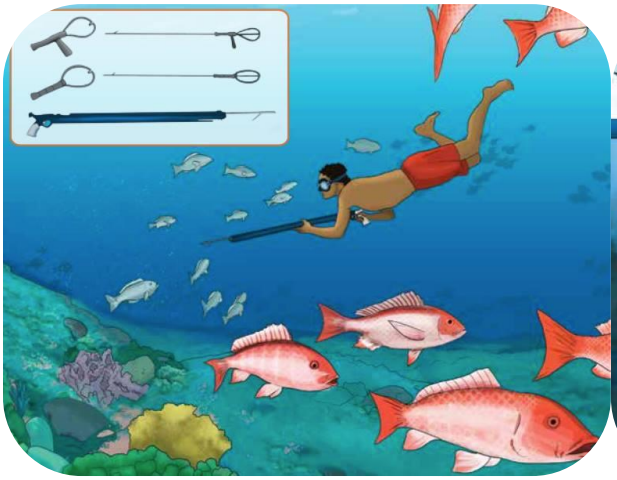
Si (1) ☐ No (2) ☐

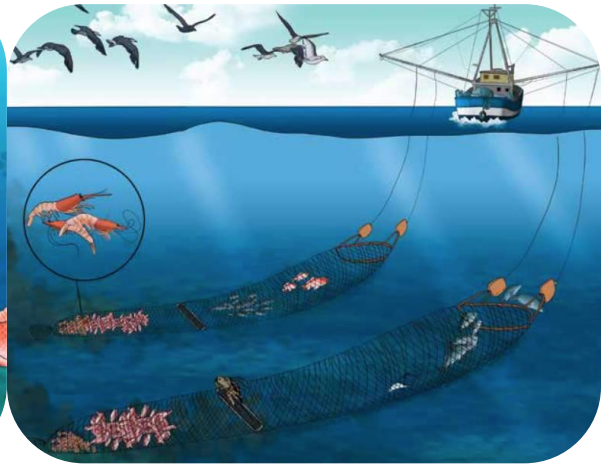
20. En una escala de 1 a 5 (en donde 1 es el puntaje más bajo y 5 el más alto) ¿qué tan importantes son para usted los siguientes elementos, cuando compra o consume pescado?

Conocer la talla del pescado
Conocer la forma de captura del pescado
Conocer en dónde fue capturado el pescado
Conocer si es de agua dulce o salada
Conocer si proviene de pesca artesanal o industrial

Appendix H – Images Used During Survey





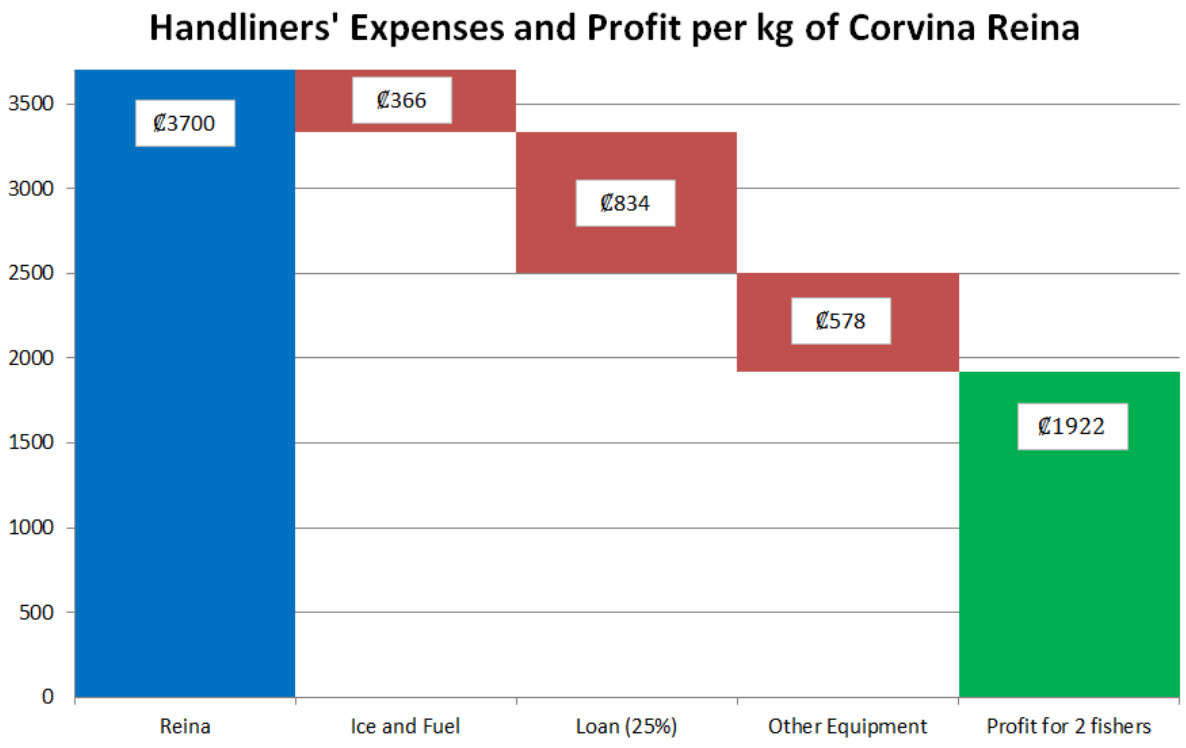


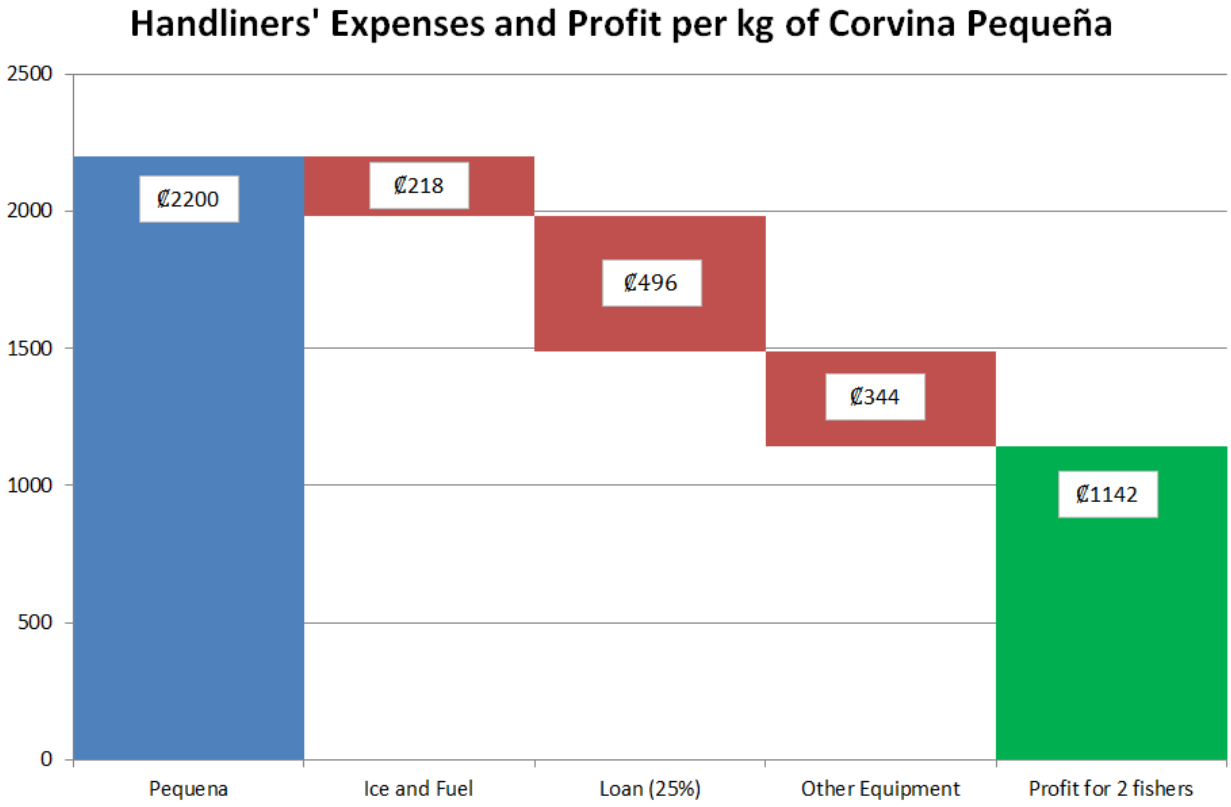
Appendix I – Fishers' Costs and Analysis

HANDLINER

Item (Artículo)	Cost (Costo)	Quantity (Cantidad)	Total Cost (Costo total)	Lifespan (Duracion de uso)	Monthly Cost (Costo mensual)
Handline (Cuerda)	₡ 5,000	2	₡10,000	2 months / meses	₡ 5,000
Bait (Carnada)	₡ 6,000	5	₡ 30,000	1 week / semana	₡ 135,000
Hooks (Anzuelos)	₡ 500	10	₡ 50,000	2 months / meses	₡ 2,500
Paddle (Rebos)	₡ 9,000	1	₡ 90,000	10 years / años	₡ 75
Fuel (Combustible)	₡ 2,200	30	₡ 66,000	1 month / mes	₡ 66,000
Licenses (Permisos)	₡ 23,000	2	₡ 46,000	1 year / año	₡ 3,834
Lamp (Lámpara)	₡ 4,000	4	₡ 16,000	1 year / año	₡ 1,334
Battery (Batería)	₡ 60,000	1	₡ 60,000	2 years / años	₡ 2,500
Battery recharge (Batería recarga)	₡ 1,000	1	₡ 10,000	2 days / días	₡ 10,000
Knife (Chuchillo)	₡ 1,500	1	₡ 15,000	1 year / año	₡ 125
Ice bin (Nevera)	₡ 80,000	1	₡ 80,000	10 years / años	₡ 667
Ice (Hielo)	₡ 1,800	1	₡ 18,000	1 day / día	₡ 36,000

Item (Artículo)	A. Monthly Cost (Costo mensual)	B. Reina cost (Costo Reina)	C. Pequeña cost (Costo Pequeña)	D. Reina cost / kg (Reina Costo/kg)	E. Pequeña cost / kg (Pequeña costo/kg)
	A	**B=0.7181*A**	**C=0.2818*A**	**D=B/200**	**E=C/132**
Handline (Cuerda)	₡ 5,000	₡ 3,591.00	₡ 1,409.00	₡ 17.96	₡ 10.67
Bait (Carnada)	₡ 135,000	₡ 96,957.00	₡ 38,043.00	₡ 484.79	₡ 288.20
Hooks (Anzuelos)	₡ 2,500	₡ 1,795.50	₡ 704.50	₡ 8.98	₡ 5.34
Paddle (Rebos)	₡ 75	₡ 53.87	₡ 21.14	₡ 0.27	₡ 0.16
Fuel (Combustible)	₡ 66,000	₡ 47,401.20	₡ 18,598.80	₡ 237.00	₡ 140.90
Licenses (Permisos)	₡ 3,834	₡ 2,753.10	₡ 1080.23	₡ 13.77	₡ 8.18
Lamp (Lámpara)	₡ 1,334	₡ 957.60	₡ 375.73	₡ 4.79	₡ 2.85
Battery (Batería)	₡ 2,500	₡ 1,795.50	₡ 704.50	₡ 8.98	₡ 5.34
Battery recharge (Batería recarga)	₡ 10,000	₡ 7,182.00	₡ 2,818.00	₡ 35.91	₡ 21.35
Knife (Chuchillo)	₡ 125	₡ 89.78	₡ 35.23	₡ 0.45	₡ 0.27
Ice bin (Nevera)	₡ 667	₡ 478.80	₡ 187.87	₡ 2.39	₡ 1.43
Ice (Hielo)	₡ 36,000	₡25,855.20	₡ 10,144.8	₡129.28	₡ 76.85
Total:	₡263,035	₡ 188,885	₡ 74,150	₡ 944.56	₡561.54


Handliners' Expenses and Profit per kg of Corvina Reina
3500
3000
2500
2000
1500
1000
500
0
₡3700
₡366
₡834
₡578
₡1922
Reina
Ice and Fuel
Loan (25%)
Other Equipment
Profit for 2 fishers

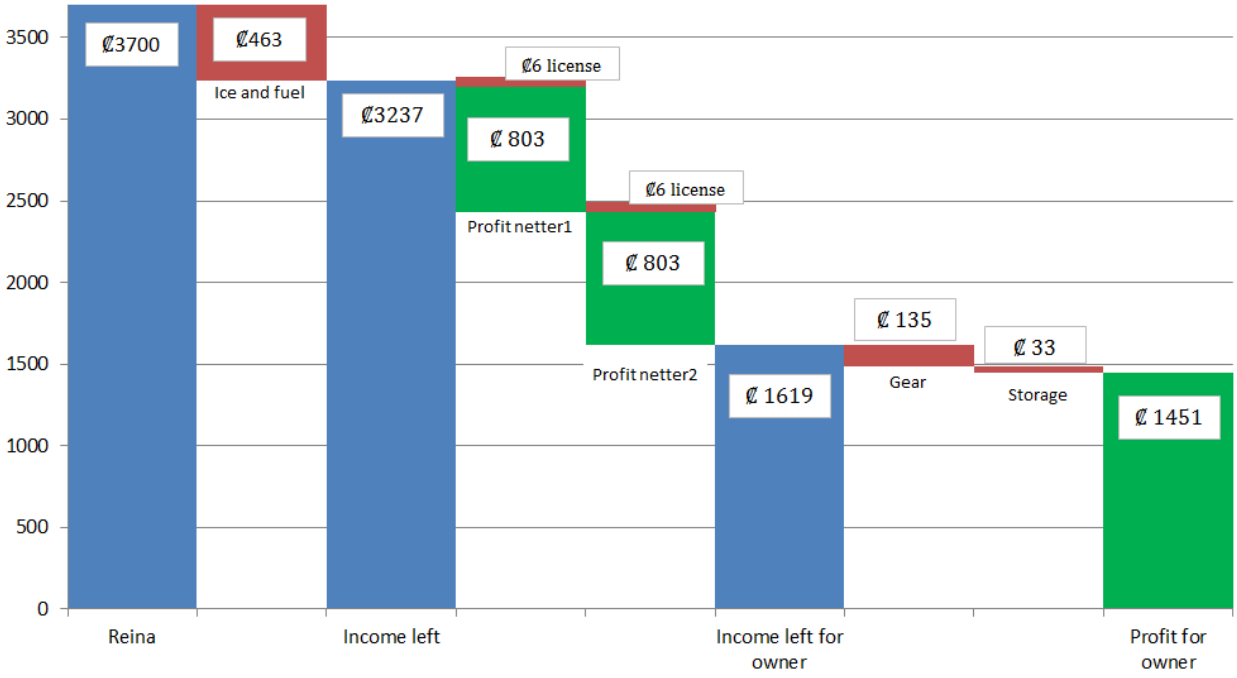

Handliners' Expenses and Profit per kg of Corvina Pequeña
2500
2000
1500
1000
500
0
₡2200
₡218
₡496
₡344
₡1142
Pequena
Ice and Fuel
Loan (25%)
Other Equipment
Profit for 2 fishers

NETTER

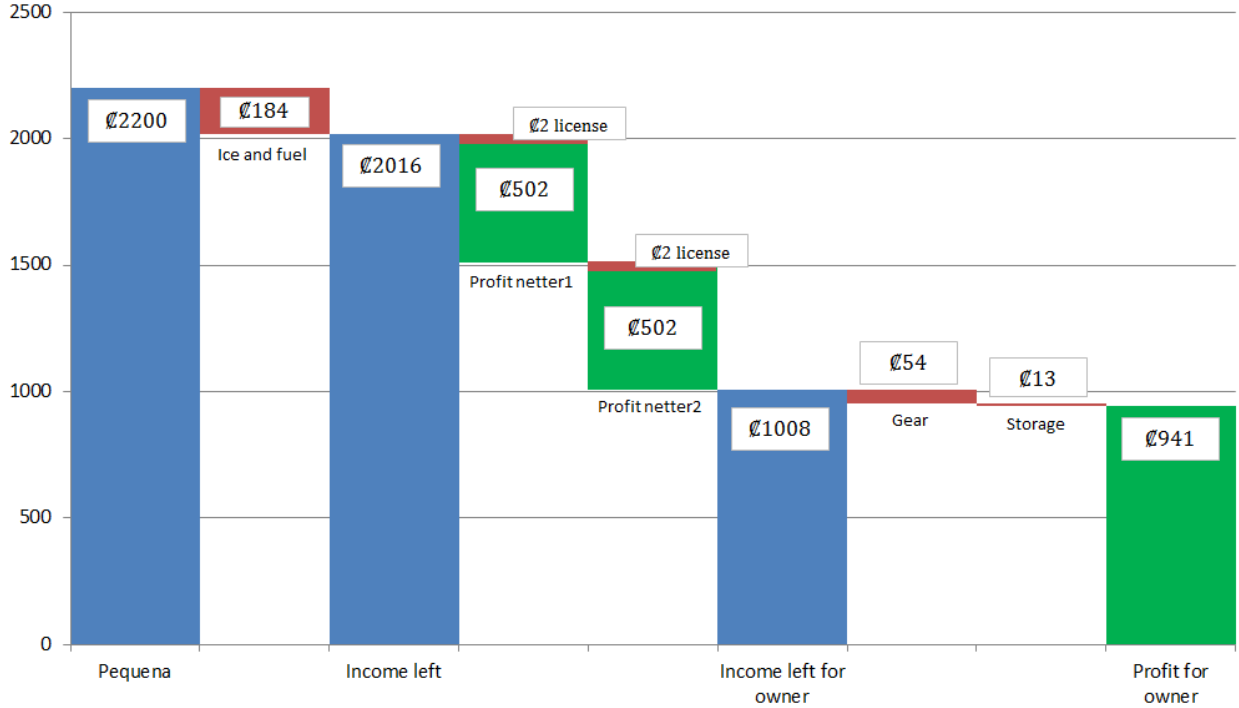
Item (Artículo)	Cost (Costo)	Quantity (Cantidad)	Total Cost (Costo total)	Lifespan (Duracion de uso)	Monthly Cost (Costo mensual)
Boat (Bote)	₡1,200,000	1	₡1,200,000	20 years / años	₡ 5,000
Motor (Motor)	₡2,160,000	1	₡2,160,000	20 years / años	₡ 9,000
Net and equipment (Trasmallo)	₡4,000,000	1	₡4,000,000	11 years / años	₡ 30,303
Ice bin (Nevera)	₡300,000	1	₡300,000	3 years / años	₡ 8,334
Gloves (Guantes)	₡ 500	2	₡ 1,000	1 year / año	₡ 83
Fuel (Combustible)	₡ 2,200	67.5	₡ 148,500	1 month / mes	₡ 148,500
Licenses (Permisos)	₡ 13,000	2	₡ 26,000	1 year / año	₡ 2,166
Lamp (Lámpara)	₡ 70,000	1	₡ 70,000	2 years / años	₡ 2,917
Battery (Batería)	₡ 60,000	1	₡ 60,000	2 years / años	₡ 2,500
Knife (Chuchillo)	₡ 2,000	2	₡ 4,000	3 months / meses	₡ 1333
Ice (Hielo)	₡ 1,800	1	₡ 1,800	1 day / día	₡ 27,000
Cleaning supplies (Cloro)	₡ 1,000	1	₡ 1,000	4 days / días	₡ 4,000
TOTAL					**₡ 241,136**

Item (Artículo)	A. Monthly Cost (Costo mensual)	B. Reina cost (Costo Reina)	C. Pequeña cost (Costo Pequeña)	D. Reina cost / kg (Reina Costo/kg)	E. Pequeña cost / kg (Pequeña costo/kg)
	A	**B=0.66*A**	**C=0.34*A**	**D=B/250**	**E=C/324**
Boat (Bote)	₡ 5,000	₡ 3,300	₡ 1,700	₡ 13.20	₡ 5.25
Motor (Motor)	₡ 9,000	₡ 5,940	₡ 3,060	₡ 23.76	₡ 9.44
Net and equipment (Trasmallo)	₡ 30,303	₡ 20,000	₡ 10,303	₡ 80.00	₡ 31.80
Ice bin (Nevera)	₡ 8,334	₡ 5,500	₡ 2834	₡ 22.00	₡ 8.74
Gloves (Guantes)	₡ 83	₡ 55	₡ 28	₡ 0.22	₡ 0.09
Fuel (Combustible)	₡ 148,500	₡ 98,010	₡ 50,490	₡ 392.04	₡ 155.83
Licenses (Permisos)	₡ 2,166	₡ 1,430	₡ 736	₡ 5.72	₡ 2.27
Lamp (Lámpara)	₡ 2,917	₡ 1,925	₡ 992	₡ 7.70	₡ 3.06
Battery (Batería)	₡ 2,500	₡ 1,650	₡ 850	₡ 6.60	₡ 2.62
Knife (Chuchillo)	₡ 1333	₡ 880	₡ 453	₡ 3.52	₡ 1.40
Ice (Hielo)	₡ 27,000	₡ 17,820	₡ 9,180	₡ 71.28	₡ 28.33
Cleaning supplies (Cloro)	₡ 4,000	₡ 2,640	₡ 1,360	₡ 10.56	₡ 4.20
TOTAL	**₡ 241,136**			**₡ 637**	**₡ 253**

Netters' Expenses and Profit per kg of Corvina Reina



Netters' Expenses and Profit per kg of Corvina Pequeña



Appendix J – Updated Consumer Survey

SECCIÓN I **Aspectos generales**

1. Edad 18-30_____ 31-45_____ 46-60_____ >60_____

2. Género

Femenino (1) ☐ Masculino (2) ☐

3. ¿Cuál es su nivel de estudios?

(1) Ninguno ☐
(2) Primaria ☐
(3) Secundaria ☐
(4) Estudios Técnicos ☐
(5) Estudios Universitarios ☐
(6) Posgrado ☐

SECCIÓN II **Aspectos Ambientales**

4. ¿Conoce usted alguna especie marina en vías de extinción?

(1) Si ☐ ¿Cuál (es)?
(2) No ☐

5. Si usted sabe que su pescado favorito está en vía de extinción, ¿estaría dispuesto a no comprarlo?

Si (1) ☐ No (2) ☐

6. ¿Cuál (es) de estas técnicas o elementos de pesca considera usted nocivo (s) para el medio ambiente?

(1) Redes y Trasmallos ☐
(2) Cuerda de Mano ☐
(3) Palangre ☐
(4) Dinamita y veneno ☐
(5) Arpón ☐
(6) Arrastre ☐
(7) No sabe ☐

6. ¿Qué entiende usted por pesca responsable?

(1) Toma lo que necesita ☐
(2) Usa técnicas responsable ☐
(3) Pesca al veces / lugares apropiado ☐
(4) Permite peces a reproducir / No toma peces juveniles ☐
(5) No sabe ☐

7. ¿Sabe usted de alguna iniciativa o experiencia relacionada con el tema de pesca responsable que se esté desarrollando actualmente en Colombia?

(1) Si ☐ ¿Cuál (es)?
(2) No ☐

8. ¿Con qué frecuencia usted consume pescado?

(1) Una vez a la semana ☐
(2) Más de una vez a la semana ☐
(3) Una vez al mes ☐
(4) Más de una vez al mes ☐
(5) Una vez al año ☐
(6) No consume pescado ☐

9. ¿Dónde compra pescado?

(1) Feria ☐
(2) Pescaderías ☐
(3) AutoMercado ☐
(4) Más por Menos ☐
(5) Walmart ☐
(6) Otro ☐

10. ¿Cuáles son los factores que tiene en cuenta cuando compra o consume pescado?

(1) Confianza ☐
(2) Captura Responsable ☐
(3) Precio ☐
(4) Calidad ☐
(5) Otro ☐

11. En donde compra o consume pescado, ¿le informan…

SI es capturado responsable (1) ☐ (2) Sobre el origen ☐

12. ¿Cuántos estaría usted dispuesto a pagar más por un pescado obtenido responsablemente?

0% ☐ 1-5% ☐ 6-15% ☐ 16- 30% ☐ >31% ☐

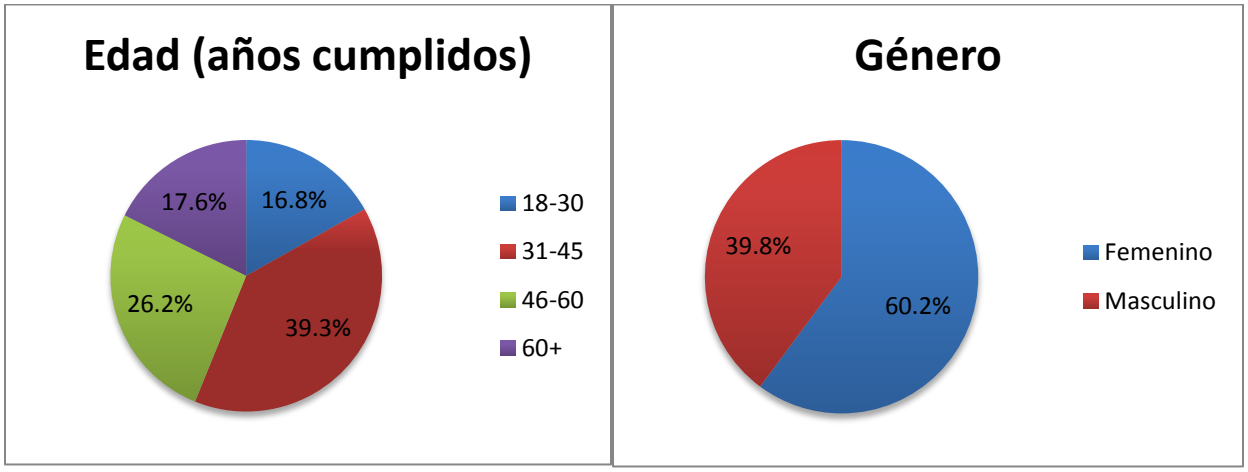
13¿Si tuviera toda esta información cuando compra pescado, cual le importaría?

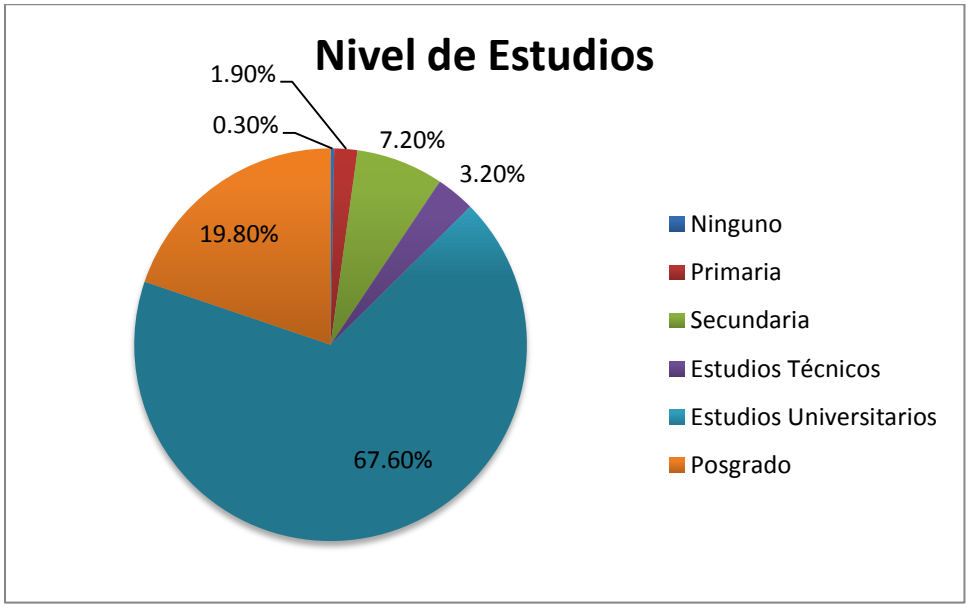
Conocer la talla del pescado ☐
Conocer la forma de captura del pescado ☐
Conocer en dónde fue capturado el pescado ☐
Conocer su grado de vulnerabilidad / amenaza ☐
Conocer si proviene de pesca artesanal o industrial ☐

Appendix K – Deliverable for AutoMercado

Demografía

384 encuestas

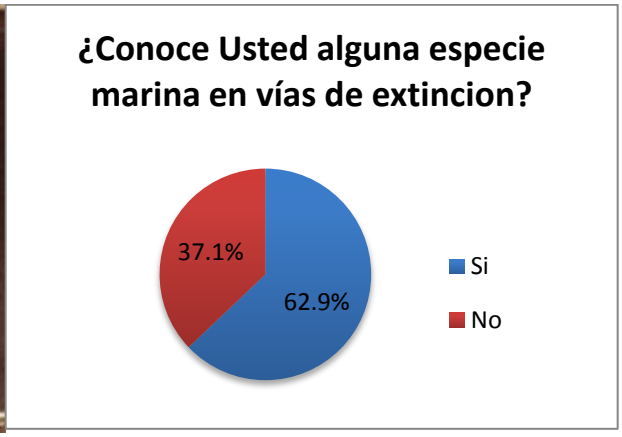




El rótulo de pesca responsable

Estado Actual

- El rótulo es muy pequeño y mucha gente no lo ve
- El rótulo dice que especies no se venden, pero no porqué
    - 37% de los encuestados no conoce especies marinas en vías de extinción
- Hay información importante disponible en los formularios de trazabilidad pero no se dice
    - 81% de los encuestados no sabe que el pescado que compran es capturado responsablemente
    - 60% no quieren saber si el pescado que compran logró su madurez sexual



Recomendaciones

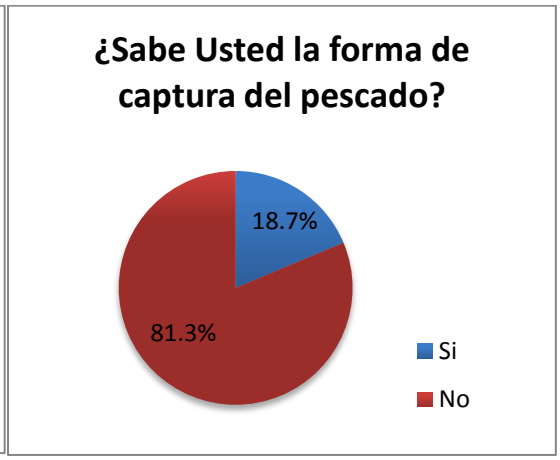
- Hacer un rótulo más grande y más visual, que mencione
    - AutoMercado vende producto de pesca responsable
- Mencionar por qué no se venden estos tipos de pescado
    - en vías de extinción: tiburón, Marlin, espada (con fotos)
    - captura incidental: lenguado, loro (con fotos)
    - individuos jóvenes (con una foto del ciclo de vida)

Diseño potencial

La etiqueta

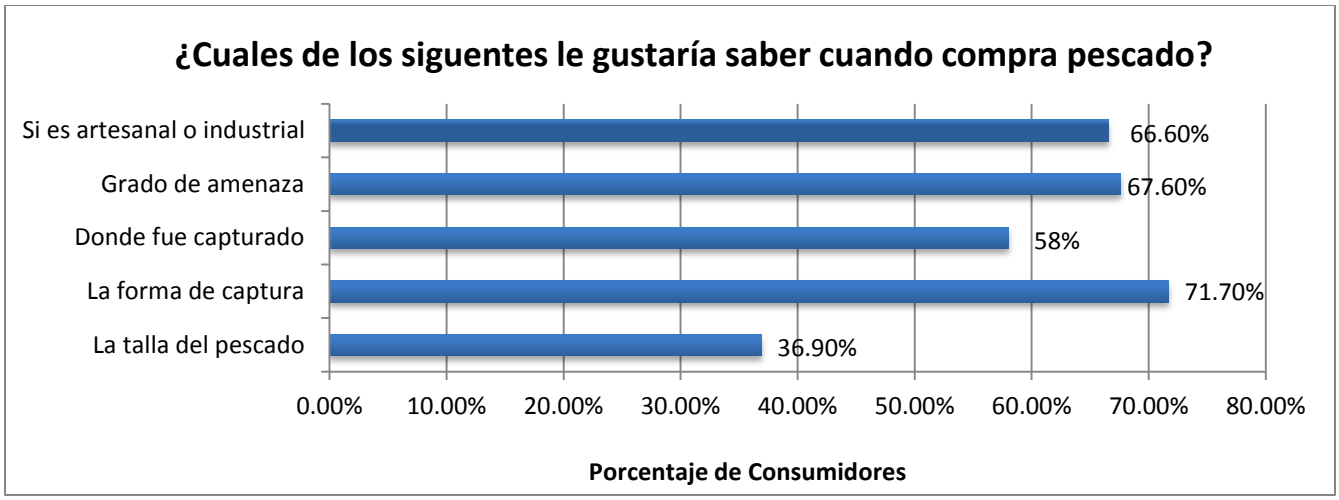
Estado Actual

- La etiqueta muestra el origen en formato textual (Costa Rica), pero el texto es muy pequeño y la gente no lo ve
- Más de 70% de los consumidores dicen que le gustarían saber más información cuando compran pescado:
    - forma de captura
    - grado de vulnerabilidad/amenaza
    - si el pescado proviene de pesca artesanal o industrial



Recomendaciones

- Hacer un una etiqueta más grande y más visual
    - Poner la bandera del país de origen y el origen más detallado por debajo (ejemplo: Golfo de Nicoya)
    - Usar un código de colores para mostrar el nivel de amenaza
        - se puede poner un póster con la leyenda / explicación de los colores
        - se puede poner un color (rojo) en el rótulo para tiburón, Marlin, y vela
- Mencionar que el producto proviene de pesca artesanal (o lo que corresponda)
- Poner una descripción del método de captura y por qué no afecta el medio ambiente



Diseño potencial

Artes de Pesca

Estado Actual

- 50% de los encuestados cree que el trasmallo es nocivo para el medio ambiente y captura todo sin seleccionar
    - esto indica que la gente no sabe cómo el trasmallo funciona
    - es necesario educar sobre la importancia del tamaño de la abertura

Recomendaciones

- Poner un puesto con muestras de red de trasmallo
    - un pedazo con aberturas pequeñas, y uno con aberturas grandes
- Poner imágenes con algunos variantes de red para mostrar cuál es nocivo y por qué
- Si es posible, poner pescados de plástico pegados en la red, para mostrar que las aberturas pequeñas capturan a los juveniles y no los deja reproducirse

Diseño potencial

Appendix L – Deliverable for MarViva

See next page for the full brochure delivered to MarViva.

Analyzing and Improving the Responsible Fishing Market in Costa Rica

Cost Analysis and Survey Recommendations

Veronica Coyle, Ruxandra Duca, Courtney Jones, Kevin Roopcharan

4/30/2015

FISHERS INCOME AND EXPENSES

HANDLINER (PESCADOR CON CUERDA DE MANO)

ASSUMPTIONS:

- There are typically two handliners fishing on the same boat, and all the costs are split between the two of them
- A handliner fishes 20 days per month, 10 days for Corvina Reina and 10 for Corvina Pequeña
- In a given day, two handliners bring an average of 4 Reinas of 5kg each or 11 Pequeñas of 1.2 kg each
- Each time they go out to fish, they use 1.5 gallons of fuel
- The fishers have licenses, so the fuel is discounted and costs ₡2200 per gallon
- Each time they goes out to fish, they buy one crate of ice for ₡1800
- The fishers borrowed money for equipment such as the boat or motor. Thus the boat and motor are not included in the expenses, but the loan is. Every time they bring product, they pay for the ice and the fuel, as well as 25% of what is left to cover for this loan.

EXPENSES:

Item (Artículo)	Cost (Costo)	Quantity (Cantidad)	Total Cost (Costo total)	Lifespan (Duracion de uso)	Monthly Cost (Costo mensual)
Handline (Cuerda)	₡ 5,000	2	₡10,000	2 months / meses	₡ 5,000
Bait (Carnada)	₡ 6,000	5	₡ 30,000	1 week / semana	₡ 135,000
Hooks (Anzuelos)	₡ 500	10	₡ 50,000	2 months / meses	₡ 2,500
Paddle (Rebos)	₡ 9,000	1	₡ 90,000	10 years / anos	₡ 75
Fuel (Combustible)	₡ 2,200	30	₡ 66,000	1 month / mes	₡ 66,000
Licenses (Permisos)	₡ 23,000	2	₡ 46,000	1 year / ano	₡ 3,834
Lamp (Lámpara)	₡ 4,000	4	₡ 16,000	1 year / ano	₡ 1,334
Battery (Batería)	₡ 60,000	1	₡ 60,000	2 years / anos	₡ 2,500
Battery recharge (Batería recarga)	₡ 1,000	1	₡ 10,000	2 days / días	₡ 10,000
Knife (Chuchillo)	₡ 1,500	1	₡ 15,000	1 year / ano	₡ 125
Ice bin (Nevera)	₡ 80,000	1	₡ 80,000	10 years / anos	₡ 667
Ice (Hielo)	₡ 1,800	1	₡ 18,000	1 day / día	₡ 36,000

INCOME:

Corvina Reina: $\frac{₡3700}{kg} * \frac{5\ kg}{Reina} * \frac{4\ Reinas}{day} * \frac{10\ days}{month} = ₡740{,}000/month$

Corvina Pequeña: $\frac{₡2200}{kg} * \frac{1.2\ kg}{Pequena} * \frac{11\ Pequena}{day} * \frac{10\ days}{month} = ₡290{,}400/month$

Total: ₡ 1,030,400

NET PROFIT:

Ice and fuel cost for a month: ₡ 36,000 + ₡ 66,000 = ₡ 102,000
Income left after paying for ice and fuel: ₡1,030,400 – ₡ 99,000 = ₡ 928,400
Debt: 25% * ₡ 928,400 = ₡ 232,100
All other costs: ₡ 161,036
Profit for two fishers: ₡ 928,400 – ₡ 232,100 – ₡ 161,036 = ₡ 535,264
Net Profit for a handliner in a month: ₡ 535,264 / 2 = **₡ 267,632**

Per kilogram averages:

$$\%income\ from\ Reina = \frac{income\ from\ Reina}{total\ income} = \frac{₡740{,}000}{₡1{,}030{,}400} = 0.7181 = 71.81\ \%$$

$$\%income\ from\ Pequeña = \frac{income\ from\ Pequeña}{total\ income} = \frac{₡290{,}400}{₡1{,}030{,}400} = 0.2818 = 28.19\ \%$$

- Corvina Reina brings in 71.8% of the income, therefore it has to cover for 71.8% of the expenses.
- Similarly, Corvina Pequeña has to cover for the rest of 28.9% of the expenses.
- To obtain costs per kilogram, first we find the fraction of monthly costs to be paid by Reina and the fraction to be paid by Pequeña. Then, we divide each fraction by the total number of kilograms brought in a month: 200kg for Reina and 132kg for Pequeña. The result is the cost to be covered from one kilogram of each type of fish

Item (Artículo)	A. Monthly Cost (Costo mensual)	B. Reina cost (Costo Reina)	C. Pequeña cost (Costo Pequeña)	D. Reina cost / kg (Reina Costo/kg)	E. Pequeña cost / kg (Pequeña costo/kg)
	A	B=0.7181*A	C=0.2818*A	D=B/200	E=C/132
Handline (Cuerda)	₡ 5,000	₡ 3,591.00	₡ 1,409.00	₡ 17.96	₡ 10.67
Bait (Carnada)	₡ 135,000	₡ 96,957.00	₡ 38,043.00	₡ 484.79	₡ 288.20
Hooks (Anzuelos)	₡ 2,500	₡ 1,795.50	₡ 704.50	₡ 8.98	₡ 5.34
Paddle (Rebos)	₡ 75	₡ 53.87	₡ 21.14	₡ 0.27	₡ 0.16
Fuel (Combustible)	₡ 66,000	₡ 47,401.20	₡ 18,598.80	₡ 237.00	₡ 140.90
Licenses (Permisos)	₡ 3,834	₡ 2,753.10	₡ 1080.23	₡ 13.77	₡ 8.18
Lamp (Lámpara)	₡ 1,334	₡ 957.60	₡ 375.73	₡ 4.79	₡ 2.85
Battery (Batería)	₡ 2,500	₡ 1,795.50	₡ 704.50	₡ 8.98	₡ 5.34
Battery recharge (Batería recarga)	₡ 10,000	₡ 7,182.00	₡ 2,818.00	₡ 35.91	₡ 21.35
Knife (Chuchillo)	₡ 125	₡ 89.78	₡ 35.23	₡ 0.45	₡ 0.27
Ice bin (Nevera)	₡ 667	₡ 478.80	₡ 187.87	₡ 2.39	₡ 1.43
Ice (Hielo)	₡ 36,000	₡25,855.20	₡ 10,144.8	₡129.28	₡ 76.85
Total:	₡263,035	₡ 188,885	₡ 74,150	₡ 944.56	₡561.54

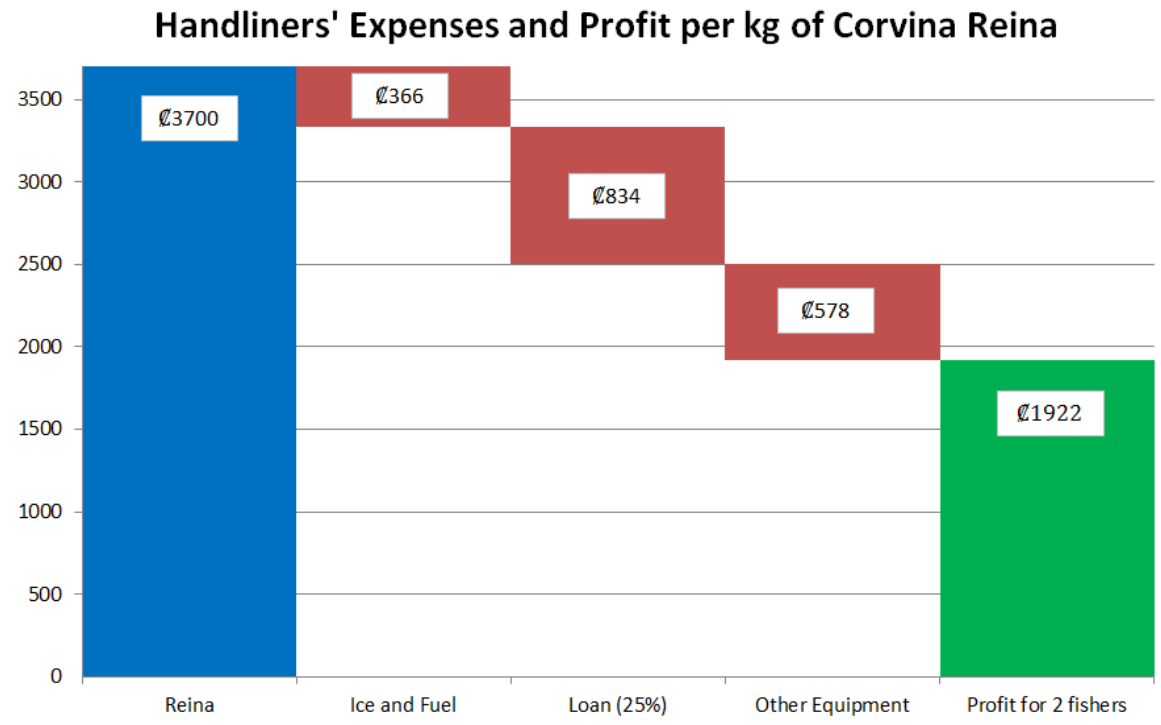
Assuming the two fishers bring in 200 kg of Reina and 132 kg of Pequeña, it is possible to make an estimate cost/kg:

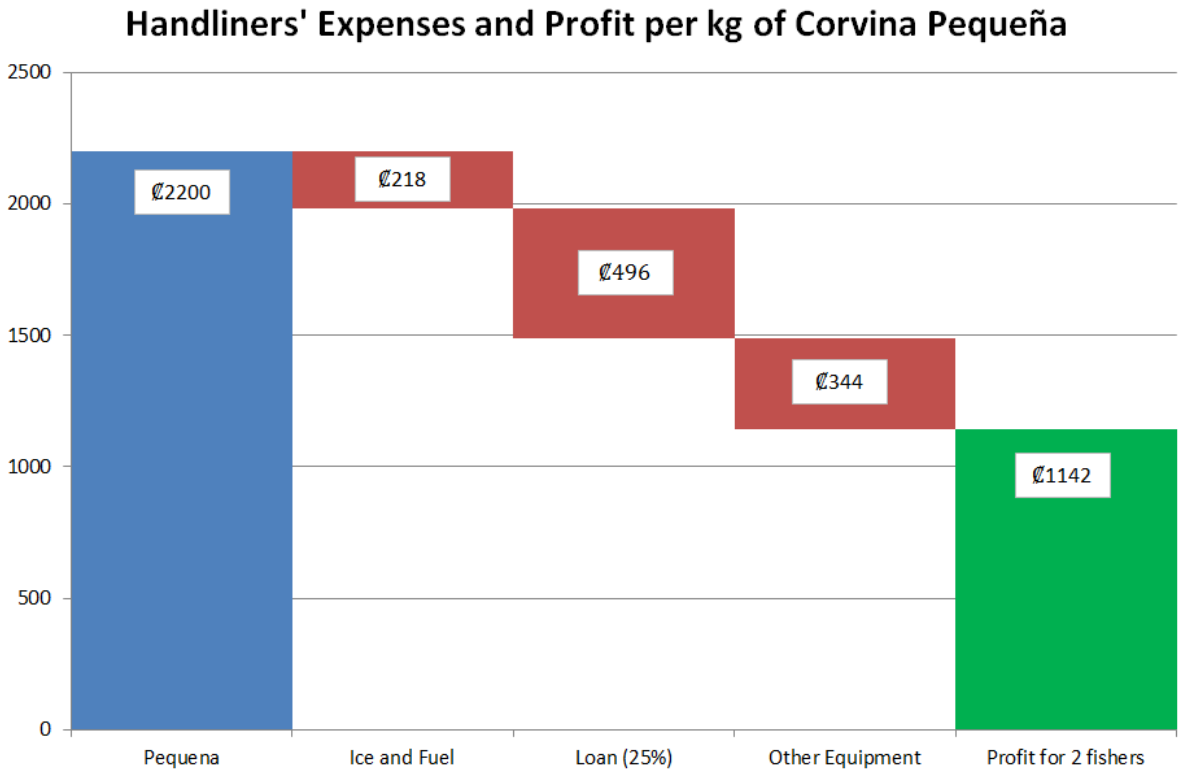
$$\frac{Monthly\ Expenses}{kf\ of\ fish\ caght\ in\ a\ month} = \frac{₡\ 263{,}035}{332\ kg} = ₡\ 792\ /kg\ of\ fish$$

Conclusions for a Handliner:

The cost that one kg of fish has to cover is ₡560 for Reina and ₡950 for Pequeña with an average of ₡792/kg of fish

Average monthly profit (based on numbers from March, which was a good month): ₡267,700 or $500


Handliners' Expenses and Profit per kg of Corvina Reina
3500
3000
2500
2000
1500
1000
500
0
₡3700
₡366
₡834
₡578
₡1922
Reina
Ice and Fuel
Loan (25%)
Other Equipment
Profit for 2 fishers


Handliners' Expenses and Profit per kg of Corvina Pequeña
2500
2000
1500
1000
500
0
₡2200
₡218
₡496
₡344
₡1142
Pequena
Ice and Fuel
Loan (25%)
Other Equipment
Profit for 2 fishers

NETTER (TRASMALLERO)

ASSUMPTIONS:

- There are typically two netters fishing on the same boat, and the boat is owned by a third person
- Each time the boat brings fish, the cost for ice and fuel is kept from the income, thus this cost is split between all 3
- What is left of the income after paying for ice and fuel is split as follows: 50% owner, 25% each netter
- The netters pay for their licenses. Of its 50% share, the owner covers for all other costs
- The netters fish 15 days per month, 10 days for Corvina Reina and 5 for Corvina Pequeña
- In a given day, two netters bring an average of 5 Reinas of 5kg each or 11 Pequeñas of 1.2 kg each
- Each time they go out to fish, they use 4.5 gallons of fuel
- The fishers have licenses, so the fuel is discounted and costs ₡2200 per gallon
- Each time they goes out to fish, they buy one crate of ice for ₡1800
- The equipment such as the boat or motor was bought by the owner, so there is no loan to be included in the costs

EXPENSES:

Item (Artículo)	Cost (Costo)	Quantity (Cantidad)	Total Cost (Costo total)	Lifespan (Duracion de uso)	Monthly Cost (Costo mensual)
Boat (Bote)	₡1,200,000	1	₡1,200,000	20 years / años	₡ 5,000
Motor (Motor)	₡2,160,000	1	₡2,160,000	20 years / años	₡ 9,000
Net and equipment (Trasmallo)	₡4,000,000	1	₡4,000,000	11 years / años	₡ 30,303
Ice bin (Nevera)	₡300,000	1	₡300,000	3 years / años	₡ 8,334
Gloves (Guantes)	₡ 500	2	₡ 1,000	1 year / año	₡ 83
Fuel (Combustible)	₡ 2,200	67.5	₡ 148,500	1 month / mes	₡ 148,500
Licenses (Permisos)	₡ 13,000	2	₡ 26,000	1 year / año	₡ 2,166
Lamp (Lámpara)	₡ 70,000	1	₡ 70,000	2 years / años	₡ 2,917
Battery (Batería)	₡ 60,000	1	₡ 60,000	2 years / años	₡ 2,500
Knife (Chuchillo)	₡ 2,000	2	₡ 4,000	3 months / meses	₡ 1333
Ice (Hielo)	₡ 1,800	1	₡ 1,800	1 day / día	₡ 27,000
Cleaning supplies (Cloro)	₡ 1,000	1	₡ 1,000	4 days / días	₡ 4,000
TOTAL					**₡ 241,136**

INCOME:

Corvina Reina: $\frac{₡3700}{kg} * \frac{5\ kg}{Reina} * \frac{5\ Reinas}{day} * \frac{10\ days}{month} = ₡925{,}000/month$

Corvina Pequeña: $\frac{₡2200}{kg} * \frac{1.2\ kg}{Pequena} * \frac{18\ Pequena}{day} * \frac{5\ days}{month} = ₡475{,}200/month$

Total: ₡ 1,400,200

NET PROFIT:

Ice and Fuel: ₡ 27,000 + ₡ 148,500 = ₡ 175,500

Income left after paying for ice and fuel: ₡ 1,400,200 – ₡ 175,500 = ₡ 1,224,700

Licenses: ₡ 2,166 / 2 = ₡ 1,083 each

Monthly Profit for a netter working on someone else's boat: 25%*₡1,224,700-₡1,083=**₡305,092 ($565)**

Income left for owner: 50% * ₡ 1,224,600 = ₡ 612,300

Other expenses: ₡ 241,136 – ₡ 175,500 - ₡ 2,166 = ₡ 63,470

Net Profit for a boat owner after all other costs ₡ 612,300 - ₡ 63,470 = **₡ 548,830 ($1,016)**

Note: the fishers who provided this data has 4 boats, therefore his profit is 4 times bigger

Per kilogram averages:

$$\%income\ from\ Reina = \frac{income\ from\ Reina}{total\ income} = \frac{₡925{,}000}{₡1{,}400{,}200} = 0.6606 = 66\ \%$$

$$\%income\ from\ Pequeña = \frac{income\ from\ Pequeña}{total\ income} = \frac{₡47{,}520}{₡1{,}400{,}200} = 0.3394 = 34\%\ \%$$

- Corvina Reina brings in 66% of the income, therefore it has to cover for 71.8% of the expenses.
- Similarly, Corvina Pequeña has to cover for the rest of 34% of the expenses.
- To obtain costs per kilogram, first we find the fraction of monthly costs to be paid by Reina and the fraction to be paid by Pequeña. Then, we divide each fraction by the total number of kilograms brought in a month: 250kg for Reina and 324kg for Pequeña. The result is the cost to be covered from one kilogram of each type of fish

Item (Artículo)	A. Monthly Cost (Costo mensual)	B. Reina cost (Costo Reina)	C. Pequeña cost (Costo Pequeña)	D. Reina cost / kg (Reina Costo/kg)	E. Pequeña cost / kg (Pequeña costo/kg)
	A	**B=0.66*A**	**C=0.34*A**	**D=B/250**	**E=C/324**
Boat (Bote)	₡ 5,000	₡ 3,300	₡ 1,700	₡ 13.20	₡ 5.25
Motor (Motor)	₡ 9,000	₡ 5,940	₡ 3,060	₡ 23.76	₡ 9.44
Net and equipment (Trasmallo)	₡ 30,303	₡ 20,000	₡ 10,303	₡ 80.00	₡ 31.80
Ice bin (Nevera)	₡ 8,334	₡ 5,500	₡ 2834	₡ 22.00	₡ 8.74
Gloves (Guantes)	₡ 83	₡ 55	₡ 28	₡ 0.22	₡ 0.09
Fuel (Combustible)	₡ 148,500	₡ 98,010	₡ 50,490	₡ 392.04	₡ 155.83
Licenses (Permisos)	₡ 2,166	₡ 1,430	₡ 736	₡ 5.72	₡ 2.27
Lamp (Lámpara)	₡ 2,917	₡ 1,925	₡ 992	₡ 7.70	₡ 3.06
Battery (Batería)	₡ 2,500	₡ 1,650	₡ 850	₡ 6.60	₡ 2.62
Knife (Chuchillo)	₡ 1333	₡ 880	₡ 453	₡ 3.52	₡ 1.40
Ice (Hielo)	₡ 27,000	₡ 17,820	₡ 9,180	₡ 71.28	₡ 28.33
Cleaning supplies (Cloro)	₡ 4,000	₡ 2,640	₡ 1,360	₡ 10.56	₡ 4.20
TOTAL	**₡ 241,136**			**₡ 637**	**₡ 253**

Assuming that a boat brings in 250 kg of Reina and 324 kg of Pequeña, it is possible to estimate cost/kg:

$$\frac{Monthly\ Expenses}{kf\ of\ fish\ caght\ in\ a\ month} = \frac{₡\ 241{,}136}{547\ kg} = ₡\ 420\ /kg\ of\ fish$$

Conclusions for nettes:

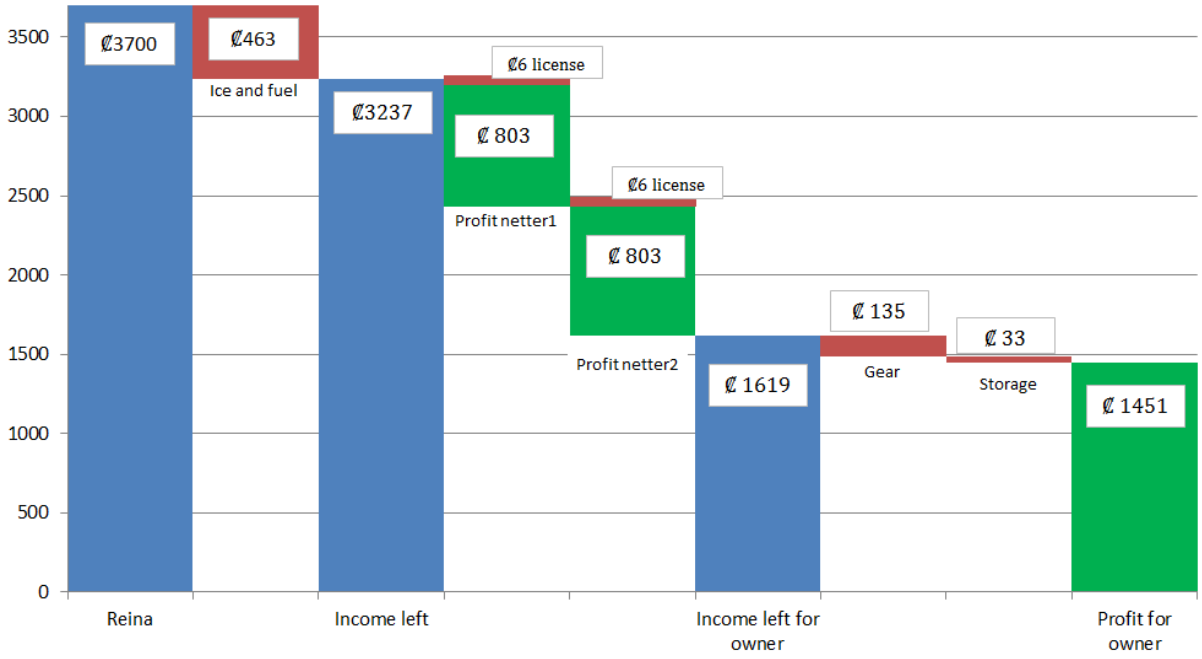
The cost that 1 kg of fish has to cover is ₡253 for Reina and ₡637 for Pequeña with an average of ₡420/kg of fish

Average monthly profit for a fisher working with net (trasmallo) on someone else's boat (based on numbers from March, which was a good month): **₡ 305,092 ($565)**

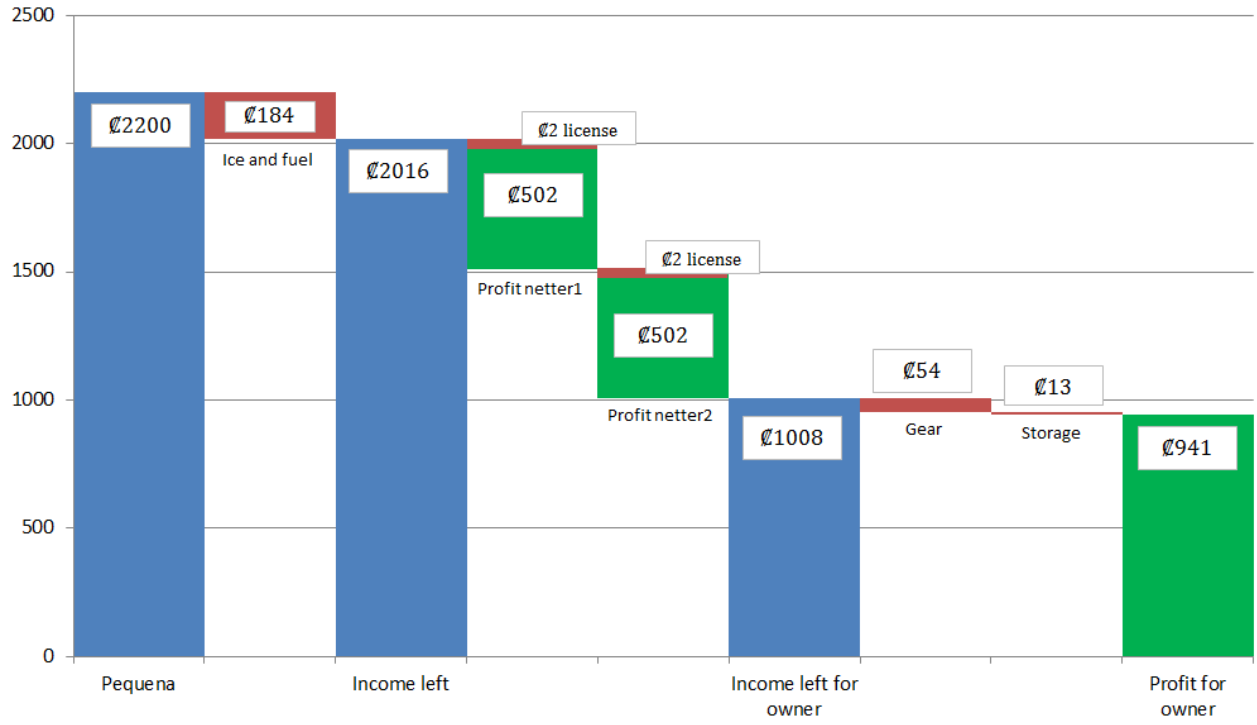
Average monthly profit for a boat owner that complies with all assumptions above: ₡ 548,830 ($1,016)

Note: the owner we interviewed has 4 boats, therefore his monthly profit is ₡ 2,195,320 ($4,064)

Netters' Expenses and Profit per kg of Corvina Reina



Netters' Expenses and Profit per kg of Corvina Pequeña



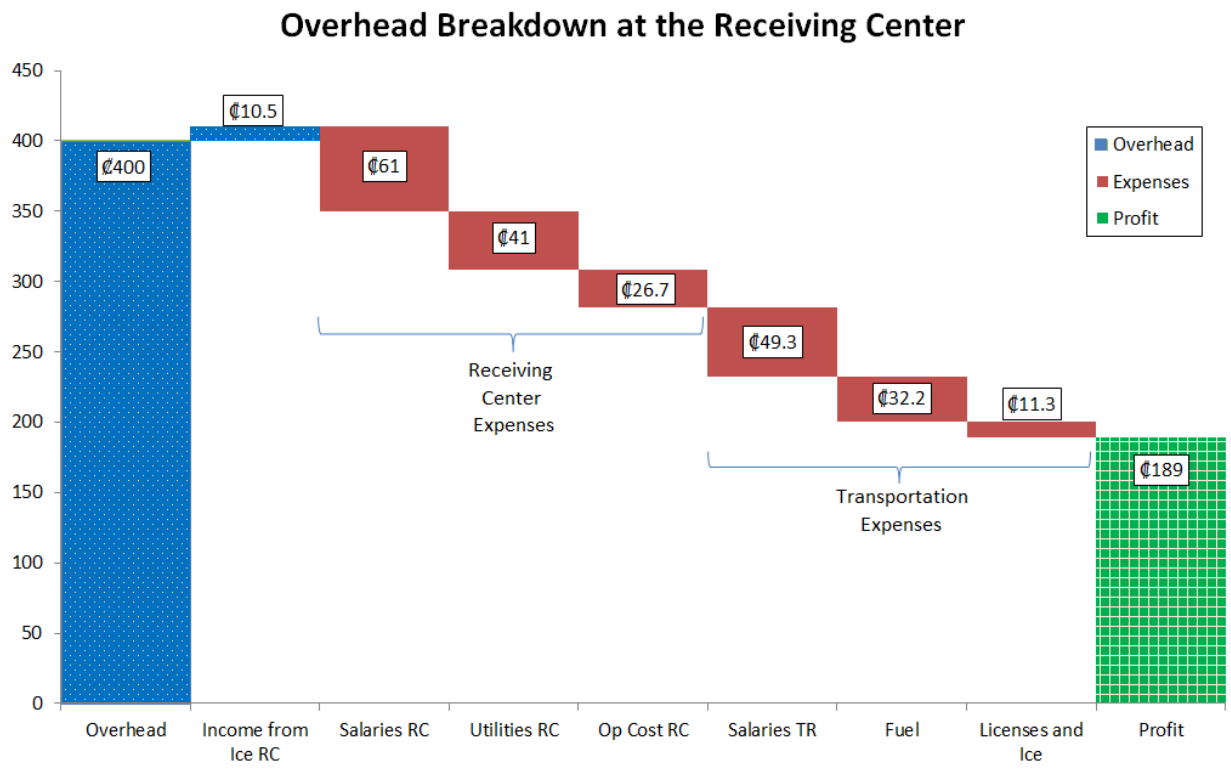
RECEIVING CENTER: INCOME AND EXPENSES

ASSUMPTIONS:

- The employees are: 1 helper (ayudante), 1 person that helps with transportation, 1 driver, 1 person who fills paperwork, 1 accountant, plus the owner Don Chino and his wife Doña Marta
- Don Chino and Doña Marta do not have an official salary; together they work an average of 90 hours/week and their salary is evaluated in terms of the helper's salary (see calculations below)
- The person who fills paperwork comes in 8 times a month and is paid ₡10,000 each time
- The driver makes 8 trips per month, and is paid ₡30,000 each trip
- To load the truck, the main helper and the transportation helper both contribute, and are paid ₡15,000 each, per trip.
- To unload the truck, only one of the two helpers works and it also paid ₡15,000 each trip
- The Receiving Center buys and sells the fuel for the same price, so this is not included in any calculations
- The Receiving Center sells 6 crates (240kg) of ice per day (half of what the ice machine makes), at ₡1,800 / crate
- 75% of the water is used in the ice making machine; this is important in ice calculations (see at the end of the document)
- Because of lack of ice in March (a good fishing month), there were 8 additional purchases of ice (see ice calculations)
- The cost of the ice used in transportation is separated; to see how this cost is calculated see ice calculations
- The amount of kilograms of fish in a month (based on March) is as follows:

Reina	Pequeña	Berrugate	Macarela	Chatarra	Jurel	Anguila	Volador	TOTAL
4583.7 kg	**5709.6 kg**	216.7 kg	364.8 kg	57.5 kg	97.2 kg	600 kg	800 kg	**12,429.5 kg**

- For indirect costs fractions, weight percentages were used instead of income percentages, because of ease of calculation, as follows: Reina is 36.88% and Pequeña is 45.94%
- The overhead for each type of fish is ₡400 for Corvina Reina and Corvina Pequeña and ₡300 for the rest
- A month has 4.35 weeks



EXPENSES:

Item (Artículo)	Cost (Costo)	Quantity (Cantidad)	Total Cost (Costo total)	Lifespan (Duracion de uso)	Monthly Cost (Costo mensual)
RECEIVING CENTER					
Electricity ice maker (Electricidad maquina)	₡ 500,000	1	₡500,000	1 month / mes	₡500,000
Electricity (Electricidad)	₡ 100,000	1	₡ 100,000	1 month / mes	₡ 100,000
Water (Agua)	₡ 40,000	1	₡ 40,000	1 month / mes	₡ 40,000
Boots (Botas)	₡ 7,500	2	₡ 15,000	6 months / meses	₡ 2,500
Gloves (Guantes)	₡ 4,000	1	₡ 4,000	1 week / semana	₡ 17,400
Scale (Romana)	₡ 300,000	1	₡ 300,000	2 years / años	₡ 12,500
Thermometer (Termometro)	₡ 25,000	1	₡ 25,000	1 year / año	₡ 2,084
Registry (Registro)	₡ 4,000	12	₡ 48,000	6 months / meses	₡ 8,000
Receipt book (Facturel)	₡ 1,000	1	₡ 1,000	2 days / días	₡ 15,000
Cleaning supplies (productos de limpieza)	₡ 3,000	3	₡ 9,000	1 week / semana	₡ 39,150
Big Containers (Recipientes grandes)	₡ 1,000,000	1	₡ 1,000,000	5 years / años	₡ 16,667
Small Containers (Recipientes pequeños)	₡ 60,000	6	₡ 360,000	5 years / años	₡ 6,000
Crates (Canastas)	₡ 7,000	20	₡ 140,000	1 year / año	₡ 11,667
Battery 1 (Batería 1)	₡ 5,000	2	₡ 10,000	2 years / años	₡ 417
Battery 2 (Batería 2)	₡ 12,000	2	₡ 24,000	5 months / meses	₡ 4,800
Additional ice (Hielo Adicional)	₡ 20,000	8	₡ 160,000	1 month / mes	₡ 160,000
License (Permiso) INCOPESCA	₡ 48,000	1	₡ 48,000	1 year / año	₡ 4,000
License (Permiso) SENASA	₡ 55,500	1	₡ 55,500	1 year / año	₡ 4,625
Salary: Don Chino + wife (Salario Don Chino+esposa)	₡ 84,000	1	₡ 84,000	1 week / semana	₡ 365,400
Salary:helper (Salario ayudante)	₡ 140,000	1	₡ 140,000	15 days / días	₡ 280,000
Salary:paperwork (Salario papeles)	₡ 10,000	8	₡ 80,000	1 month / mes	₡ 80,000
Salary:accountant (Salario contadora)	₡ 250,000	1	₡ 250,000	1 year / año	₡ 20,834
Taxes (Impuestos)	₡ 300,000	1	₡ 300,000	1 year / año	₡ 25,000
Ice for transportation (hielo para tansportacion)	-₡ 130,240	1	-₡ 130,240	1 month / mes	-₡ 130,240
INCOME ice (ingreso hielo)	- ₡ 1,800	180	-₡ 324,000	1 month / mes	-₡ 324,000
TOTAL					₡ 1,261,800
TRANSPORTATION					
Salary: driver (Salario chofer)	₡ 30,000	8	₡ 240,000	1 month / mes	₡ 240,000
Salary: helpers (Salario ayudantes)	₡ 15,000	24	₡ 360,000	1 month / mes	₡ 360,000
Fuel (Combustible)	₡ 50,000	8	₡ 400,000	1 month / mes	₡ 400,000
License (Permiso) INCOPESCA	₡ 48,000	1	₡ 48,000	1 year / año	₡ 4,000
License (Permiso) SENASA	₡ 55,500	1	₡ 55,500	1 year / año	₡ 4,625
Ice (Hielo)	₡ 130,240	1	₡ 130,240	1 month / mes	₡ 130,240
TOTAL					₡ 1,138,865

OVERHEAD:

Reina	Pequeña	Berrugate	Macarela	Chatarra	Jurel	Anguila	Volador	TOTAL
4583.7 kg	**5709.6 kg**	216.7 kg	364.8 kg	57.5 kg	97.2 kg	600 kg	800 kg	**12,429.5 k**

Corvina Reina: $4583.7\ kg * \frac{₡400}{kg} = ₡1{,}833{,}480\ /month$

Corvina Pequeña: $5709.\ kg * \frac{₡400}{kg} = ₡\ 2{,}283{,}840\ /month$

Others: $(216.7 + 364.8 + 57.5 + 97.2 + 600 + 800)kg * \frac{₡300}{kg} = ₡640{,}860\ /month$

Total: ₡ 4,758,180

NET PROFIT:

Net Profit for RECEIVING CENTER: ₡ 4,758,180 - ₡ 1,261,800 - ₡ 1,138,865 = **₡ 2,357,515 = $ 4400**

Per kilogram averages:

$$\%kg\ of\ Reina = \frac{kg\ of\ Reina}{total\ kg} = \frac{4583.7}{12429.5} = 0.3688 = 36.88\ \%$$

$$\%kg\ of\ Pequeña = \frac{kg\ of\ Pequeña}{total\ kg} = \frac{5709.6}{12429.5} = 0.459418 = 45.94\ \%$$

- Corvina Reina brings in 36.88% of the kg of fish, therefore it has to cover for 36.88% of the expenses.
- Similarly, Corvina Pequeña has to cover for 36.88% of the expenses.
- To obtain costs per kilogram, first we find the fraction of monthly costs to be paid by Reina and the fraction to be paid by Pequeña. Then, we divide each fraction by the total number of kilograms brought in a month: 4583.7kg for Reina and 5709.6kg for Pequeña. The result is the cost to be covered from one kilogram of each type of fish

Item (Artículo)	A. Monthly Cost (Costo mensual)	B. Reina Cost (Costo Reina)	C. Pequeña Cost (Costo Pequeña)	D. Reina cost/kg (Reina costo/kg)	E. Pequeña cost/kg (Pequeña costo/kg)
	A	B=0.3688*A	C=0.4594*A	D=B/4583.7	E=C/5709.6
RECEIVING CENTER					
Electricity ice maker (Electricidad maquina)	₡500,000	₡ 184,388	₡ 229,680	₡ 40.23	₡ 40.23
Electricity (Electricidad)	₡ 100,000	₡ 36,878	₡ 45,936	₡ 8.04	₡ 8.04
Water (Agua)	₡ 40,000	₡ 14,751	₡ 18,374	₡ 3.22	₡ 3.22
Boots (Botas)	₡ 2,500	₡ 921	₡ 1,148	₡ 0.20	₡ 0.20
Gloves (Guantes)	₡ 17,400	₡ 6,417	₡ 7993	₡ 1.40	₡ 1.40
Scale (Romana)	₡ 12,500	₡ 4,610	₡ 5,742	₡ 1.01	₡ 1.01
Thermometer (Termometro)	₡ 2,084	₡ 768	₡ 957	₡ 0.17	₡ 0.17
Registry (Registro)	₡ 8,000	₡ 2,950	₡ 3,675	₡ 0.64	₡ 0.64
Receipt book (Facturel)	₡ 15,000	₡ 5,532	₡ 6,890	₡ 1.21	₡ 1.21
Cleaning supplies (productos de limpieza)	₡ 39,150	₡ 14,438	₡ 17,984	₡ 3.15	₡ 3.15
Big Containers (Recipientes grandes)	₡ 16,667	₡ 6,146	₡ 7,656	₡ 1.34	₡ 1.34
Small Containers (Recipientes pequeños)	₡ 6,000	₡ 2,213	₡ 2,756	₡ 0.48	₡ 0.48
Crates (Canastas)	₡ 11,667	₡ 4,302	₡ 5,359	₡ 0.94	₡ 0.94
Battery 1 (Batería 1)	₡ 417	₡ 154	₡ 191	₡ 0.03	₡ 0.03
Battery 2 (Batería 2)	₡ 4,800	₡ 1,770	₡ 2,205	₡ 0.39	₡ 0.39
Additional ice (Hielo Adicional)	₡ 160,000	₡ 59,004	₡ 73,497	₡ 12.87	₡ 12.87
License (Permiso) INCOPESCA	₡ 4,000	₡ 1,475	₡ 1,837	₡ 0.32	₡ 0.32
License (Permiso) SENASA	₡ 4,625	₡ 1,706	₡ 2,125	₡ 0.37	₡ 0.37
Salary: Don Chino + wife (Salario Don Chino+esposa)	₡ 365,400	₡ 134,751	₡ 167,850	₡ 29.40	₡ 29.40
Salary:helper (Salario ayudante)	₡ 280,000	₡ 103,257	₡ 128,620	₡ 22.53	₡ 22.53
Salary:paperwork (Salario papeles)	₡ 80,000	₡ 29,502	₡ 36,749	₡ 6.44	₡ 6.44
Salary:accountant (Salario contadora)	₡ 20,834	₡ 7,683	₡ 9,570	₡ 1.68	₡ 1.68
Taxes (Impuestos)	₡ 25,000	₡ 9,219	₡ 11,484	₡ 2.01	₡ 2.01
Ice for transportation (hielo para tansportacion)	-₡ 130,240	- ₡ 119,483	-₡ 59,827	- ₡ 10.48	- ₡ 10.48
INCOME ice (ingreso hielo)	-₡ 324,000	- ₡ 48,029	-₡ 148,832	- ₡ 26.07	- ₡ 26.07
TRANSPORTATION					
Salary: driver (Salario chofer)	₡ 240,000	₡ 88,506	₡ 110,246	₡ 19.31	₡ 19.31
Salary: helpers (Salario ayudantes)	₡ 360,000	₡ 132,759	₡ 165,369	₡ 28.96	₡ 28.96
Fuel (Combustible)	₡ 400,000	₡ 147,510	₡ 183,744	₡ 32.18	₡ 32.18
License (Permiso) INCOPESCA	₡ 4,000	₡ 1,475	₡ 1,837	₡ 0.32	₡ 0.32
License (Permiso) SENASA	₡ 4,625	₡ 1,706	₡ 2,125	₡ 0.37	₡ 0.37
Ice (Hielo)	₡ 130,240	₡ 48,029	₡ 59,827	₡ 10.38	₡ 10.38
TOTAL	₡ 2,400,665	₡ 885,365	₡ 1,102,865	₡ 193	₡ 193

Therefore, for the receiving center, the cost that one kilogram of fish is: ₡ 193 / kg

Average monthly profit (based on numbers from March, which was a good month): **₡ 2,357,515 = $ 4400**

Ice Calculations – at the Receiving Center

KG IN:

- machine: $\frac{480kg}{day} * \frac{30\ days}{month} = 14400\ kg$
- bought: $\frac{150kg}{time} * \frac{8\ times}{month} = 1200\ kg$

Total in: 15600 kg / month

KG OUT:

- transportation: $\frac{40kg}{crate} * \frac{11\ crates}{time} * \frac{8\ times}{month} = 3520\ kg$
- fishers: $\frac{240kg}{day} * \frac{30\ days}{month} = 7200\ kg$

Total out: 10720 kg / month

KG LEFT FOR STORAGE:

- 15600 in – 10720 out = 4880 kg / month

COST FOR ICE:

Ice machine:

- electricity: $\frac{₡500000}{14400kg} = ₡34.722\ /kg$
- water: $75\% * \frac{₡40000}{14400kg} = ₡2.083\ /kg$

Total machine: $34.722 + 2.083 = \sim ₡\ 37$ /kg

Bought:

- $\frac{₡20000}{150kg} = \sim ₡134\ /kg$

INCOME FROM ICE:

$$\frac{7200kg\ /month}{40kg\ /crate} = 180\ crates/month$$

$$\frac{180\ crates}{month} * \frac{₡1800}{crate} = ₡324000\ per\ month$$

Sells at 1800 colones per crate / 40kg in a crate = 45 colones/kg

PROCESSING PLANT INCOME AND EXPENSES

ASSUMPTIONS:

- 1kg of Corvina Reina yields 0.30kg of loin (lomo), 0.45kg of filet (filete)
- 1 kg of Corvina Pequeña yields
- To calculate the supermarket price of the original kg of fish, all these are taken into account, not just filet, as follows:

$$Price\ of\ 1\ kg = 0.20\ P_{head} + 0.45\ P_{filet} + 0.30\ P_{loin} + 0.05\ P_{waste}$$

$$Price\ of\ 1\ kg = 0.20 * 0 + 0.45 * 15800 + 0.30\ * 19100 + 0.05 * 0 = ₡\ 12{,}840$$

*** MISSING INFORMATION***

EXPENSES:

Item (Artículo)	Cost (Costo)	Quantity (Cantidad)	Total Cost (Costo total)	Lifespan (Duracion de uso)	Monthly Cost (Costo mensual)
Uniforms (Uniformes)	₡300,000	1	₡300,000	1 year / año	₡ 25,000
Gloves (Guantes)	₡ 180,000	1	₡ 180,000	1 month / mes	₡ 180,000
Boots (Botas)	₡ 150,000	1	₡ 150,000	1 year / año	₡ 12,500
Polisher (Chaira)	₡ 30,000	1	₡ 30,000	1 year / año	₡ 2,500
Pliers (Alicates)	₡ 10,000	1	₡ 10,000	1 year / año	₡ 834
Brush (Descamador)	₡ 10,000	1	₡ 10,000	1 year / año	₡ 834
Cutting Board (Tabla de corte)	₡ 60,000	3	₡ 180,000	1 year / año	₡ 15,000
Ice shovels (Palas)	₡ 60,000	1	₡ 60,000	1 year / año	₡ 5,000
Knives (Cuchillos)	₡ 25,000	10	₡ 250,000	1 year / año	₡ 20,834
Office supplies (Material de oficina)	₡70,000	1	₡70,000	1 week / semana	₡ 304,500
Disinfection and Cleaning Supplies (Productos de desinfeccion y limpieza)	₡ 150,000	1	₡ 150,000	1 month / mes	₡ 150,000
Scale Maintenance (Mantenimiento romana)	₡ 30,000	1	₡ 30,000	1 month / mes	₡ 30,000
Vacuum Bags (Bolsas de vacio)	₡ 1,000,000	1	₡ 1,000,000	1 month / mes	₡ 1,000,000
Carton Packaging (Material de empaque de carton)	₡ 50,000	1	₡ 50,000	1 month / mes	₡ 50,000
Vacuum machine maintenance (Mantenimiento maquina de hielo)	₡ 160,000	2	₡ 320,000	1 year / año	₡ 26,667
Water filer (Filtro de agua)	₡ 360,000	1	₡ 360,000	1 year / año	₡ 30,000
Electricity (Electricidad)	₡ 1,350,000	1	₡ 1,350,000	1 month / mes	₡ 1,350,000
Wate disposal fees (Precio para el desecho)	₡ 25,000	1	₡ 25,000	1 month / mes	₡ 25,000
Salaries (Salarios)	₡1,450,000	1	₡1,450,000	1 week / semana	₡ 6,307,500
Salary: Vet (Salario regente)	₡ 300,000	1	₡ 300,000	1 month / mes	₡ 300,000
Salary: Accountant (Salario Contador)	₡ 230,000	1	₡ 230,000	1 month / mes	₡ 230,000
The 13th salary (El tercero salario)	₡ 5,000,000	1	₡ 5,000,000	1 year / año	₡ 416,667
Checkbook (Talonario de cheques)	₡ 6,000	10	₡ 60,000	1 year / año	₡ 5,000
Water containers (Contenedores de agua)	₡ 540,000	1	₡ 540,000	4 years / años	₡ 11,250
Water lab exam (Examen de laboratorio para el agua)	₡ 65,000	1	₡ 65,000	1 month / mes	₡ 65,000
Taxes (Impuestos)	₡ 3,500,000	1	₡ 3,500,000	1 month / mes	₡ 3,500,000
Rent (Alquilo)	₡ 3,000,000	1	₡ 3,000,000	1 month / mes	₡ 3,000,000
Insurance (Seguro)	₡ 600,000	1	₡ 600,000	1 month / mes	₡ 600,000
Fuel for trucks (Combustible para los camiones)	₡ 23,000	1	₡ 23,000	1 week / semana	₡ 100,050
Fuel for company car (Combustible para el carro)	₡ 30,000	1	₡ 30,000	1 week / semana	₡ 130,500
Transportation Maintenance (Mantenimiento transporte)	₡ 750,000	4	₡ 3,000,000	1 year / año	₡ 250,000
Ice machine cleaning cost (Limpieza para la maquina de hielo)	₡ 50,000	1	₡ 50,000	2 years / años	₡ 2,084
TOTAL					₡ 18,146,720

SURVEY RECOMMENDATIONS

- Number of AutoMercado customer surveyed: 384
- Locations: Plaza Mayor, Escazú, Guachipelin, Plaza del Sol, Heredia, Santa Ana, Trés Ríos, Moravia

Changes:

- Eliminate Questions 9 & 10
    - Provide information about how and where the respondents consume fish
    - Responses varied little
    - Results did not prove useful for our analysis

- Eliminate Questions 15 & 16
    - Asks what fish respondent consumers and their favorite
    - Results did not prove useful for our analysis
    - Size of the list of species was intimidating to the respondent and lowered enthusiasm for survey
    - Removal of the question eliminates the need for a 3rd page

- Modify Question 6
    - Open-ended question asking what respondents understood by the phrase “responsible fishing”
    - Some respondents gave responses that said very little
    - Suggest that the survey have a list of potential answers to check off if the respondent answers them

- Modify Question 11
    - Asks where consumers buys fish
    - Most respondents said supermarket since they were currently at the supermarket
    - Should include various supermarket chains

- Combine Questions 13 & 14
    - Asks about awareness of origin and method of capture of the product
    - Combining the questions helps to decrease the length of the survey

- Relocate Question 17
    - Asks about willingness to stop buying endangered fish
    - In its current place, 17 influences the following question (willingness to pay) by making the respondent believe that they are referring to paying more for an endangered species
    - Should move after question 4 (asks about awareness of endangered species)

- Reword Question 12

    - Asks what factors consumer considers when buying fish (quality, trust, price, and because they used responsible forms of capture)
    - Many respondents just chose the first option (quality) possibly because they did not want to listen to the other options
    - Also the last option (because they used responsible forms of capture) was intimidatingly long
    - Change options to “trust”, “responsible catch”, “price”, and “quality”
- Reword Questions 18 & 19
    - Asks if consumers would be willing to pay more for responsibly-caught fish, and if so, how much
    - Questions should be combined
    - Highest option was 20% more, but many consumers said they would pay even more than 20%
    - Options should be “0%”, “1-5%”, “6-15%”, “16-30%”, and “31%+”

- Reword Question 20
    - Asks consumers to rank five factors in terms of their importance to purchasing decisions
    - A lot of variation between how respondents interpreted the question
    - Instead should ask, “Which of the following would you like to be provided on the label?”

- Expand Question 5
    - Asks about consumer’s knowledge of fishing methods
    - Unsure if the respondents answered correctly because of the images, or because they actually knew the method
    - Should distribute question with a control and test group
        - Control group should not be given images → must identify dangerous methods by name
        - Test group should be given images and names