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Seafood is off the Chain! How do we integrate Blockchain Technology for Seafood Traceability?

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Business Plan

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Executive Summary

The seafood supply chain is largely opaque, which allows for overfishing, organized crime, and even human rights abuses. Illegally caught fish enter the supply chain at various points, and important data about the fish (e.g. species, provenance, catch method, etc…) can be lost or fabricated. Although some third-party auditors offer to trace an actor's supply chain, these services are expensive and the data are siloed away, leaving only the third-party's guarantee. One option for seafood traceability lies in blockchain technology, which marries a network of computers to an immutable, add-only ledger of transactions. In a supply chain managed by digital ledger technology, the potential for transparency is far greater than in the status quo. However, because the global seafood supply chain is so fragmented, and adoption of blockchain technology requires stakeholder buy-in at all levels of the supply chain, there exists no reliable roadmap for implementation. This Capstone Research Project will use a start-up company – DockChain – as a proxy to examine how to incentivize actors in the seafood supply chain to adopt blockchain technology.

DockChain is a blockchain-enabled restaurant distributor and direct-to-consumer seafood subscription service. Dockchain aims to use blockchain in order to connect local seafood consumers with San Diegan fishermen through the use of a distributed application, and QR codes. This application will allow seafood consumers to scan a QR code to access a story showing all relevant key data elements and critical tracking events, such as the identity of the harvester, and where the seafood had been processed and filleted. The business will have three phases of development in which it will focus on particular markets for adoption. The primary fish that DockChain will purvey will be opah, because of its potential as to grow in popularity. Although opah will be the primary fish the company deals, DockChain will be eager to distribute other fish as well.

The Seafood Supply Chain

The global seafood supply chain (SSC) is largely opaque, which allows for overfishing, organized crime, fraud, and even human rights abuses [Mutaqin, 2018]. Fish can be caught illegally by fishermen being held against their will in the middle of the ocean, landed and processed in facilities with inadequate labor conditions, only to travel around the world before arriving on a consumer's plate. Though many Regional Fishery Management Organizations (RFMOs) require catch documentation, the international SSC is plagued by three primary problems:

1.) Its scale and fragmentation,
2.) The abundance of data, and
3.) The siloization of data.

Scale and Fragmentation

The international seafood industry was estimated to have an annual valuation of $153 billion USD in 2017, with an estimated annual growth rate of 4% [Holland, 2019]. The seafood industry is both culturally and economically important, and varies according to geography, target species, and available materials or technology. As a result of the multitude of different types of commercial fishing operations, the global SSC is large, complex, and comprises actors who range from small fishermen to billion-dollar corporations. Theoretically the only two essential links of the SSC are the harvester and the consumer, but the sheer scale of the industry necessitates middlemen such as processors and distributors.

Further complicating the industry are geopolitical and economic variables; about 85% of seafood is sourced from developing countries, so any imbalances in scale are magnified by political, cultural, and economic variables [FAO, 2016]. For example, the US Department of Justice found evidence that three companies – Bumble Bee Foods, StarKist, and Chicken of the Sea – had been illegally fixing the price of canned tuna from 2010 to 2013 in order to maintain an artificially high price [Hiltzik, 2019]. Not only did this impact the consumers who were forced to pay inflated prices, but this scandal has affected the tuna industry as a whole; market analytics firm found that sales of canned tuna dropped 4% between 2013 and 2018 [Devenyns, 2018] The actions of a handful of executives of three companies – two of which are American, and one which had been founded in America but purchased by a Thai company – have thus damaged the reputation and impacted the livelihoods of tuna fishermen around the world.

An Abundance of Data

Every single fish, or asset, in the SSC intrinsically carries a host of valuable information. This information comes in the form of key data elements (KDEs). These KDEs include all relevant data about an asset from the point-of-harvest, such as species name, time and location of catch, or identity of the harvester. It also encompasses all ensuing critical-tracking events (CTEs), or points in the supply chain that an asset experiences a transformation or manipulation that requires a record for traceability purposes. These KDEs all have different discrete values to different SSC actors, so not all KDEs will move the entire length of the supply chain alongside an associated asset. The USDA, through the 2002 and 2008 Farm Bills, requires that all fish sold in grocery stores display two KDEs: the country-of-origin, and whether it was farmed or wild-caught [Zisser, 2012]

These two KDEs, however, are inadequate in telling the entire provenance of a fish. KDEs are clues in determining an asset's quality, legality, and safety. For example, knowing whether a tuna had been harvested by long-line or purse-seine reveals the time and attention any one asset received at the point-of-harvest, and can thus be used as a heuristic for determining the quality of the flesh, and whether a tuna in question would be better for sashimi or for canning. Harvest data (time, date, location, etc…) and harvester data (identity, certifications, etc…) can reveal whether a fish had been caught illegally, or by SSC actors that fish irresponsibly or unethically. A detailed ledger of KDEs and CTEs can reveal chain of custody (CoC) abuses, or adulteration with additives or chemicals.

Capturing these KDEs is possible, but reliably conveying them through the SSC can be problematic. There are no universal standards in KDEs, and KDEs may have different values to different SSC actors. Even KDEs such as species can be lost or fabricated along the SSC; a 2012 study by Oceana found that 59% of tuna and 87% of red snapper in grocery stores and restaurants were mislabeled [Warner, 2013]. Although there are a few initiatives to standardize KDEs across the SSC, the most successful seems to be the Global Dialogue on Seafood Traceability, which officially launched in March of 2020 [GDST, 2016].

Data Siloization

The scale and fragmentation of the SSC, when coupled with the abundance of information, almost inevitably results in "data siloization," or the pooling of data at given nodes in the supply chain [Leape, 2020]. Data siloization occurs in almost all supply chains, and can be caused by a variety of infrastructural, political, or economic factors [Wilder-James, 2016]. In the seafood sector, the disparity in scale between SSC actors results in an asymmetry of information, which may benefit certain supply chain actors more than others, and ultimately results in economic inefficiency.

These data silos are responsible for the loss of KDEs and CTEs in the SSC, and they can occur accidentally or intentionally. While it's obvious why one would omit a KDE such as "fished by trafficked laborers," it's equally plausible that the KDE has no discrete value to a given supply chain actor, which results in that KDE being unavailable to downstream actors. When evidence of fraudulence in the SSC is ultimately found, these data silos become impediments to the task of identifying and excluding bad actors. Furthermore, in the age of Big Data, SSC actors can monetize their aggregated data, which can mean filtering, processing, or compiling data and market analytics to sell to other businesses. When firms can capitalize off associated data, any ideals of SSC transparency become liabilities in the interest of business.

Even private organizations that have sought to resolve this issue of seafood traceability can be guilty of acting as data silos. Organizations such as the Marine Stewardship Council (MSC) and third-party companies that specialize in supply chain auditing offer some peace of mind for downstream SSC actors – for a price. Two problems can result from this: 1.) supply chain auditors are being paid by fisheries that they are auditing, which means that the fishermen in these fisheries are incentivized to choose the most lenient auditors [Christian, 2013], and 2.) the certification process does not necessitate traceability.

Although the term "traceability" carries several definitions and connotations, for the purposes of this business plan, "traceability" shall be defined as a system in which all assets or traceable resource units (TRUs) in a supply chain can have their provenance, KDEs, and CTEs recorded, and that recorded data may be accessed and audited in real-time transactions. The assessments performed by third-party auditors are post-hoc and can only potentially identify fraudulence after it has occurred, rather than prevent it.

Blockchain for Seafood Traceability

What is a Blockchain?

One potential answer for seafood traceability lies in blockchain technology. A blockchain is a decentralized network of computers in which every transaction is verified in a process called "consensus protocol." [Cook, 2018] Although blockchain technology was originally pioneered to "mine" the cryptocurrency Bitcoin, recent innovations have allowed for many more applications, notably in supply chain traceability. Specifically, the second-generation cryptocurrency Ethereum introduced a digital, immutable, add-only ledger distributed to all nodes in the blockchain network, which has the potential to increase trust in the supply chain immeasurably. In theory, it would allow any supply chain actor to validate the KDEs entered by the prior actor, and any inconsistencies

would be flagged via consensus protocol. Repeat offenders could be identified and excluded from the supply chain, which would disincentivize practices such as IUU fishing and labor violations. Although the USDA only requires that 2 KDEs move through the supply chain to the consumer, the only constraint to the number of KDEs hosted on a blockchain would be the processing capacity of the platform.

Unlike supply chain auditors, which maintain information privately and are therefore opaque data silos, the digital ledger can be publicly accessed and can only be corrupted if enough blocks on the chain (i.e. computers in the network) validate its corruption. Blockchain technology offers accessibility through its various permission systems, accuracy through consensus protocol and trust because the digital ledger is immutable and physically spread across every computer in the network.

Blockchain Permissions

In theory, a completely transparent system would be one in which all actors know all information. Businesses, however, sometimes rely on information asymmetry in order to be profitable. As a result, there are three types of blockchain networks, with differing levels of transparency.

Public blockchains are accessible to everyone, and there exist no restrictions on who may participate or in what function they may participate. These blockchains are entirely decentralized, and because they are the most transparent, they are also the most resistant to corruption or tampering. Examples of public blockchains include the Bitcoin and Ethereum networks, which delegate the duties of a treasury and mint to all users on the network. Because all users may participate in the mining of the cryptocurrencies Bitcoin and Ethereum, any information asymmetry would result in uncontrolled inflation for the currency, so complete transparency is requisite.

Private, or permissioned, blockchains contain restrictions on who may access, as well as what functions any user may have (i.e. completing transactions, writing smart contracts, verifying data). Unlike public blockchains, permissioned networks are centralized and whichever entity controls the permissions to the blockchain effectively controls all the information on the blockchain. As a result, permissioned blockchains are more like centralized databases than public blockchains.

Consortium, or federated, blockchains are essentially an amalgam of private and public blockchains, in which the blockchain is controlled by a group rather than a single actor. These blockchains allow businesses to maintain some information privately but offer a greater degree of transparency than purely private blockchains do.

Does Blockchain Technology Add Value?

The SSC is notorious for thin profit margins, and if supply chain actors will adopt blockchain technology for the purpose of seafood traceability, then it will have to financially benefit them in the end. Since blockchain technology requires full participation by the entire supply chain, then it not only needs to create enough value to outweigh the cost of the technology, but it must create value for every single member of the supply chain as well. A few ways in which blockchain technology may add value are outlined below.

Currency

Obviously, blockchain's intended application was as a currency, and there are many cryptocurrencies in addition to Bitcoin and Ethereum. These cryptocurrencies can be bought and sold on a cryptocurrency market that operates very similarly to the New York Stock Exchange, however they are notably volatile; the market cap for cryptocurrencies reached a record-high $689 billion on January 1st, 2018, and tumbled to $230 billion before April of the same year [Trading View, 2019]. Though there have been attempts at introducing cryptocurrency into the SSC, the market for cryptocurrencies has proven too volatile for these endeavors to realize any success. Fishcoin, a company with an eponymous cryptocurrency, attempted to use the cryptocurrency in order to incentivize responsible fishing practices. However, the company's initial coin offering (ICO) in late 2018, failed to drive up the value of each token, and thus no amount of Fishcoins could provide any fisherman enough incentive to change his habits [Fishcoin. 2018].

While Fishcoin's failed ICO can certainly be attributed to a market bubble of over-valued cryptocurrencies with dubious added value, another reason is general uncertainty and lack of understanding with respect to the potential for cryptocurrency. This trepidation, however, may be waning still. China, for example, was one of the most ardently bearish on cryptocurrency – going so far as to ban any trading of cryptocurrencies in 2017 – but is currently committed to digitizing the Yuan via blockchain technology [Zmudzinski, 2019].

Asset Management

Blockchain also offers a public database with an inherent system of checks-and-balances through consensus protocol and granular traceability. The shipping company Maersk touted the superiority of blockchain-based management systems when it co-launched TradeLens with IBM in 2018 [Mearian, 2018]. Whereas the efficiency in Maersk's supply chain – as well as the supply chains of the 100+ shipping companies that joined TradeLens as participants – had previously been bottlenecked by practices such as paper record-keeping, obsolescent technologies, and interoperability issues, TradeLens enabled all participants to have real-time granular traceability of any asset in any of their supply chains. TradeLens, which is based on IBM's Hyperledger network,

serves as a testament to the shared success of collaboration via blockchain technology, in that it has increased efficiency in transactions, increased trust between supply chain actors, and increased asset management for any of the millions of assets being transported at any given time.

Traceability

In addition to the potential for value to come from cryptocurrency or increased efficiency and asset management, assurance may also be leveraged to gain a premium from consumers. Assurance of a product's legal and ethical provenance, or social responsibility may be used as a marketing tool in order to sell a product for a higher price or draw in socially conscious consumers. As previously discussed, current certification systems do not offer traceability that includes the potential for real-time auditing of the SSC, however lessons may be learned from the market success of some of these certifications. The MSC serves as probably one of the most recognizable certifications for seafood, and it serves as a testament to the financial benefit of consumers perceiving a fishery as sustainable [Christian, 2013].

The MSC, founded in 1997, allows its logo to be used on products coming from fisheries that third-party auditors have certified as sustainable. The MSC estimates that most fishery certifications cost between $15,000 and $120,000, depending on the size and complexity of the fishery. Although this money goes to the third-party auditors performing the certifications, the fisheries must then pay more money to the MSC as licensing fees – based on the volume of seafood in that fishery – in order to advertise their certification to consumers. Whereas licensing of the MSC logo made up only 6% of the its total budget in 2006, licensing fees made up 73% of the organization's total budget in 2018, illustrating that businesses are willing to pay money in order to be perceived as sustainable by consumers [MSC, 2020]. In fact, These licensing fees are more appropriately treated as investments; following the MSC's certification of the Pacific US albacore tuna fishery in 2007, fishermen saw the price for the tuna they landed rise 32% [Christian, 2013]. Obviously, there is value in being perceived as sustainable by consumers, and blockchain technology offers fisheries – and the businesses that utilize those fisheries – the opportunity to demonstrate to consumers that they're sustainable in a more transparent and traceable way than the MSC currently requires.

COVID-19

COVID-19 has disrupted the SSC. Each SSC actor has been forced to reestablish their value propositions to remain viable in a time of economic uncertainty. In the US, most seafood is consumed in restaurants [Datassential, 2020]. The three hardest hit states, New York, Nevada, and Hawaii, respectively experienced 19.5%, 23.1%, and 23.2% of each state's restaurants closing either temporarily or permanently between March and April. When these restaurants closed, the processors and seafood distributors who provided food to these restaurants were left without

buyers. Although actors in SSCs around the world have suffered due to COVID-19, the SSC actors who have seemed to be most resilient come from shorter supply chains with a high degree of transparency [Cook, 2020].

Although these business models can't be scaled to the international level, blockchain – coupled with other technologies – could allow larger, more complex SSCs to have the granular control of products that benefits shorter SSCs. Using smart contracts and application programing interfaces (APIs), buyers and sellers could be matched more efficiently. The inherent immutability of the digital ledger would prevent bad actors from exploiting disruption caused by a crisis such as COVID-19. The importance of blockchain in maintaining supply chains has even been asserted by the US Department of Homeland Security, as their published guidelines for identifying essential and critical workers in the food sector specifically names blockchain managers [Krebs, 2020].

Landscape Analysis

Competitive Analysis

Although blockchain technology is relatively new, there have already been a handful of early adopters. An unpublished study of blockchain in the fisheries sector found ten blockchain-based pilots that have launched since 2016 [Boulais, 2020]. Three of these early adopters have been selected as representative of blockchain enabled competitors to DockChain. These three early adopters, Raw Seafoods, Kvarøy Arctic, and the Sustainable Shrimp Partnership (SSP) have been chosen specifically because they were active immediately prior to any economic disruption by COVID-19. Furthermore, three more companies that specialize in either the restaurant-supported fishery (RSF) or community-supported fishery (CSF) models have been selected for comparison.

Discussion of Competitors

Raw Seafoods, the SSP, and Kvarøy Arctic have all used blockchain in order to increase consumer confidence in their product as well as to differentiate their product from competitors. For example, Raw Seafoods' scallops are harvested in the North Atlantic scallop fishery, which has been MSC-certified since 2013 [MSC, 2020]. Because all the scallops sourced from this fishery are subject to the same stringent guidelines, the use of blockchain to tell the story of the seafood – from point-of-harvest to point-of-consumption – is a way to both convey those stringent guidelines to the consumer and personalize the product. While Kvarøy has found success in using blockchain to communicate their unique feeds, netting, and practices, the SSP has found that blockchain is ideal for separating itself from unscrupulous shrimp aquaculturists; while other, less responsible farms may advertise sustainability, they would not be able to use a blockchain to confirm their claim. Not

only can blockchain convey more information to the consumer than traditional labels may, but the assurance – through security of validation – offered by blockchain is far more reliable than unsubstantiated claims by a given company.

While blockchain has proven successful for these three companies, it is important to note that they are all facilitated by the IBM Food Trust, which offers blockchain-as-a-service (BaaS). The IBM Food Trust is a permissioned blockchain, which means that functionally all the information delivered to consumer is curated by one company. While participants may experience other benefits of blockchain, such as granular asset management, the problem of "black box" certification still exists.

Amongst companies that specialize in the RSF and CSF business models, none offers granular traceability. One company, Dock to Dish, has experimented with satellite tracking of their deliveries, however it is not currently being implemented. Regarding advertising sustainability, all companies chosen advertise the sustainability of their products on their websites, but Dock to Dish and Real Good Fish offer far more resources and information regarding the fishermen they source from and the catch methods used.

The three businesses that lack blockchain have some amount of wholesales, however COVID-19 has affected Dock to Dish and Real Good Fish. Kitchen Catch's sales to Imperfect Foods are uniquely insulated from the effects of COVID-19. On the other hand, Dock to Dish has had to recommit to a CSF model because of the high rate of restaurant closures in its primary sales base, with 41% of Manhattan restaurants closing [Datassential, 2020]. On the other hand, Imperfect Foods specializes in direct-to-consumer (D2C) sales, so restaurant closures have only seemed to improve business. Kitchen Catch, independent of any sales to Imperfect Foods, has seen D2C sales triple since COVID-19 [Fisher, 2020].

While these three companies have managed to use the locality of their ingredients and their short supply chains to overcome any difficulties caused by COVID-19, blockchain would allow them to deliver to customers a higher level of transparency for their seafood products.

DockChain

DockChain is a startup company based in San Diego that aims to transform the seafood supply chain using blockchain technology. Whereas BaaS can add extraneous costs to the already burdened SSC, DockChain has added blockchain services to the role of seafood distributor. Specifically, the company will provide three primary services, which are all blockchain-enabled:

1.) Seafood Traceability Application

2.) Wholesale Distribution

3.) Direct-to-Consumer (D2C) Box Distribution

Seafood Traceability Application

DockChain's eponymous Seafood Traceability application will be designed for iOS and Android and will have different user interfaces for SSC actors (i.e. harvesters, distributors, restaurants) and seafood consumers. The seafood traceability application will charge no cost for either fishermen, restaurants, or consumers, as the traceability application is integral to the operation and mission of the business.

This Traceability application will have multiple interfaces depending on the user. Necessary functions of each user interface (UI) are listed below:

1.) **Harvester UI** – this interface will be simply designed will solely be used by harvesters for KDE entry. This UI will also need to be able to connect to the device's camera, in order to scan the physical barcodes for each fish. Harvesters, when joining, will be encouraged to share some information of themselves that will be visible to seafood consumers. Early versions of the DockChain application will require manual data entry, but later versions will allow for the interconnectivity with onboard sensors and internet of things (IoT) technology.

2.) **CTE UI** – This interface will be for recording CTEs that occur during the asset's journey along the SSC. Users for this interface include DockChain employees, restaurant employees, or fish mongers. All users on this interface will be required to share some information about themselves for downstream supply chain actors. It will also be sparsely designed and contain fields for data entry. This UI will need to be able to access the device's camera for scanning barcodes. As with the Harvester UI, early iterations of the CTE UI will require manual entry, but IoT capability will be possible as the company grows and as technology gets cheaper.

3.) **Story UI (Traceability Tracker)** – This interface would be accessed by a consumer when they scan the QR code provided by DockChain. This interface would be simply designed but visually appealing. It will allow seafood consumers to see all the KDEs, and CTEs on their meal's SSC, as well as some information about each SSC actor. This story will be temporally and spatially descriptive allowing users to see how fresh their seafood is.

4.) **D2C UI –** This interface would also be for consumers, but it is essentially a small online marketplace in which consumers may choose one of two to four subscriptions (varying in size and frequency). It will also need to be visually appealing.

Wholesale Distribution

DockChain's primary source of revenue will come from wholesale distribution using a supply-driven business model. DockChain will sell fish futures to restaurants in the San Diego area

using the DockChain application. These fish futures are contracts guaranteeing the restaurant a whole fish (less guts and gills), of a select number of species subject to the seasons and the weather, caught within 48 hours of arrival of the restaurant. Futures would be for variable weights, and the price of $8.00 per pound will be nonnegotiable. The fish to fulfill these contracts would be purchased from local San Diego fishermen who have joined the DockChain platform by DockChain representatives, also using smart contracts. The data for all fish bought through the DockChain platform would be logged and recorded on the blockchain from the point-of-harvest to the point-of-consumption.

Unlike other fish distribution companies, DockChain will also provide napkins to restaurants. These napkins will be small, navy blue cocktail napkins with a QR code printed on each that is digitally linked to a particular DockChain fish product. Each fish product delivered by DockChain would be accompanied with a set of these napkins (approximately 1 napkin per 4 ounces filet weight). Restaurant customers, when ordering DockChain products at a partnered restaurant will be able to scan the QR code on their phone in order to access the Traceability Tracker on the Dockchain application.

Direct-to-Consumer(D2C) Box Distribution

The D2C component of the business will follow a Subscription-as-a-Service (SaaS) supply-driven business model. Local San Diego consumers may order fish boxes with different subscription frequencies and quantities. For surpluses of non-target species, mystery boxes and meal kits will be offered. A selection of local fish species will be offered, along with recipes and instructions for preparation.

These fish boxes will be available for pickup at a central cold-storage location. Customers may also select a delivery option via the website, which would automatically enlist a delivery driver from a peer-economy application (e.g. Uber Eats) to deliver the seafood box at a time requested by the customer. Individual consumer subscriptions would be logged on the blockchain through smart contracts accessed via the DockChain application.

Unlike the fish sold in the wholesale component of the business, DockChain will need to spend more time and resources in processing the seafood.

Markets

DockChain will have three target markets: harvesters, restaurants, and consumers.

Harvesters

The company will seek out local San Diego fishermen – including Hawaiian longline fishermen that regularly land in San Diego – as partners. These partners will have no added financial cost in joining DockChain's platform, but there may be unquantified time costs in order to join. Fishermen will be required to enter data about their catch into a new, digital, medium, which may seem redundant. Necessary steps such as tagging, weighing, or scanning will require fishermen to change their habits. An estimation of time costs will depend on the target species, the catch method, and the available dedicated technology.

In the case of opah, DockChain's primary seafood product, Hawaiian longline vessels are ideal partners for the technology, due to the high value of each asset and the dedicated care each asset receives at harvest. Captains of long-line vessels are currently already required by the West Pacific Fishery Management Plan (FMP) and the National Marine Fisheries Service (NMFS) to maintain an accurate logbook with KDEs such as species, catch method, date, time, and location of harvest [50 C.F.R. § 300.20 – 29]. This means that the fishermen must already devote a portion of their time to gathering the data, and the raw numbers can simply be entered into the fishermen's interface on the DockChain app. A fisherman who's not technologically competent could be expected to reenter all necessary information for one opah approximately one minute. The task of printing and scanning labels to be associated with each set of KDEs will take an additional minute and can easily be done after the fish is bled, gilled and gutted, but before it's hulled and iced. For a fishing trip in which sixty opah are caught, all additional steps that DockChain would require of a fisherman (data entry into the DockChain application, and scanning and digitally associating each barcode with a particular dataset, and then uploading that data prior to asset transfer) would require approximately two manhours of labor, and with practice could be more efficiently integrated into work operations on the vessel to require even less time.

Although harvesters will incur time costs in joining the DockChain application, benefits would be financial. Fishermen would receive a premium of approximately $0.15 per pound for the task of entering KDEs into the DockChain application. Assuming again that a fisherman caught seventy opah in one trip, then the two manhours of labor translates to a landing premium of $900.00 (assuming an average weight of 100 pounds per opah).

Restaurants

DockChain will seek out restaurants that specialize in either seafood or local, fresh cuisine. The ideal restaurant partners will serve their seafood entrees at approximately $30.00 per plate, which will allow DockChain to offer competitive prices with other food costs on the menu.

Restaurants that have fish counters, and boutique fishmongers will be offered special considerations in order to potentially develop DockChain's D2C market.

Restaurants will also have unquantifiable time costs in participating in DockChain's SSC, but their onboarding costs will be limited to an onboarding session. Restaurants will need to adopt strict CoC guidelines in order to ensure DockChain's products (both the fish and napkins) remain unadulterated, and assets can always be clearly traced to the QR codes associated. These onboarding sessions would require an hour lesson with all restaurant employees who are required to handle food products. During this lesson, the employees will learn about DockChain's products (seafood and napkins) and the CoC requirements for those products. Employees will receive a quiz on these requirements at the end of the hour.

If restaurants can abide by DockChain's requirement to the adherence of CoC standards, then they will be rewarded with a reliable seafood distributor offering competitive prices, and the opportunity to market that the locality and legality of the seafood ingredients were validated by blockchain technology

Consumers

DockChain's target consumers are those that want fresh, healthy, local, and sustainably caught seafood. Data analytics firm IRI found that 78% of consumers consider a product's sustainable sourcing to be an importance factor in its purchase [Hughes, 2019].

Demographically, DockChain will target Millennials (those born between 1980 and 2000), whose spending make up approximate 30% of total economic sales [Accenture, 2015] and are the demographic that allocate the most money of all demographics for food away from home [Kuhns, 2017]. Millennials are less resistant to internet technologies than preceding generations, but unlike Generation Z, have more disposable income. Although the willingness-to-pay for sustainable products has steadily increased over time amongst all age groups, Millennials are the generation that is most willing-to-pay, as almost 75% of those surveyed responded that they would be willing to pay more for sustainable products [Nielsen, 2015]. As a group, Millennials are more distrustful of business. One consulting firm, Deloitte, found that more than 1 in 4 Millennials do not trust businesses as sources of reliable information [Deloitte, 2019]. This is corroborated by data analytics firm, Nielsen holdings, who found that 51% of Millennials will check the product packaging to confirm its sustainability before making a purchase.

These millennials, who are distrustful of corporate interests, and make purchases based on social consciousness are the ideal DockChain customer. Compared to other age groups Millennials are experientialists, with 40% responding that they seek out the experiential aspects of eating and

drinking, and seeking out novelty, but tempered with socially responsibility [Datassential, 2018]. Millennials are the perfect consumer for DockChain's products in local restaurants.

Business Development Plan

In order to become a solvent company, DockChain will operate in three stages with the goal of expansion. DockChain will have three initial phases of operation and growth:

Phase I: Bulletin Board (~3 months)

Phase II: Wholesale Distribution (~1 year)

Phase III: D2C Development (>1 year)

Phase I: Bulletin Board (~3 Months)

Services Offered

DockChain will offer fishermen access to DockChain's domain name to allow them to market their catch for D2C sales. None of DockChain's planned services will be operational during this period; it will solely be used as a bulletin board for local fishermen.

The DockChain application will be in development during this time, but not active.

Marketing

In order to market DockChain's online bulletin board service to fishermen, a business development representative (BDR) will reach out to fishermen to gain users for this free service. Marketing during this time will involve the BDR regularly visiting and forming relationships with local fishermen by visiting the San Diego's Tuna Harbor Dockside Market regularly and actively introducing themselves to local harvesters.

This BDR will also need to market opah to restaurants. This will require the upfront purchase of a whole opah, and the BDR will need to process it into fillets for distribution at a selection of restaurants. This distribution will involve identifying clusters of restaurants and bringing both raw opah loins and a cooked sample product, amounting to approximately two half pound samples for distribution to each restaurant.

Cost Flows

DockChain will not earn any revenue during Phase I. All services will be provided for free and be categorized as Marketing expenses.

Operational Overview

Employees

There will only be two employees: one engineer with full-stack capability and fluency in Solidity and Go, and one BDR. During preliminary stages, no employee will be paid, and all employees will be working with the intention of earning a salary when the company is solvent. Associated costs, such as laptops, electronics, domain fees, utilities (electricity, internet, gas, etc…) will be the responsibility of the employees, but costs will be recorded and paid back at 0% interest when/if the company is viable.

Facility

There will be no facility in the first phase of operation. The engineer may develop the application wherever he sees fit, and the BDR will need to travel to meet fishermen and restaurant owners.

Assets

DockChain will have no company assets during this time.

Blockchain

There will be no blockchain capabilities during this time.

Next Steps

DockChain will transition from Phase I to Phase II when two conditions are met:

1.) The engineer has completed the DockChain application.
2.) The BDR has contracted 100 fish futures per month (25 whole fish futures per week).

Phase II: Wholesale Distribution (~1 Year)

Services Offered

During the second phase of operation, DockChain's only paid service will be wholesale distribution of whole fish (primarily opah) and napkins with QR codes, but the company will gradually expand stock as opportunities arise. This distribution will be handled by the BDR team, who will need to buy whole opah at a premium from local fishermen, print napkins with the

associated QR codes, and deliver the fish products to restaurants. All these CTEs, as well as the original KDEs logged by the harvester, will be logged on the DockChain application, which restaurant consumers will be able to access.

Marketing

DockChain will have a dedicated Marketing budget of $500.00/mo. The main purpose of this budget is to gain more restaurant partners to join the platform and buy opah futures. This may involve the BDR personally visiting local restaurants with free samples of raw and prepared opah products. Alternatively, this advertising may take the form of "seafood throwdowns" in which we invite both partner restaurants and non-partner restaurants to take part in a public cooking competition featuring opah as the main ingredient.

Cost Flows

In order to deliver value for both fishermen and restaurants, DockChain will need to purchase opah at approximately $1.40/pound (round weight) and sell the whole fish to restaurants at approximately $8.00/pound (filet weight). For an average, 100 pound opah, DockChain will be able to purchase the fish from the fisherman at approximately 15 cents more per pound than the San Diego average, translating to approximately $15.00 greater profit, per fish, selling to DockChain as opposed to another buyer. If a partnering fisherman can deliver 100 fish per month, then that price translates to $1,500 growth in sales per month for the fisherman. Buying the opah at a premium for the partnering fisherman will be integral in this stage, as DockChain must demonstrate a value for partnering fishermen to incentivize them to continue to work with the company. As a gesture of good will, each new fisherman partner will be gifted a label roll and bar code printer as a sign-on gift.

On the restaurant side, DockChain will offer a competitively priced, fresh fish product at approximately $8.00 per pound (filet weight) allowing a standard restaurant mark-up of 400%. A 100-pound opah would be sold to the restaurant for $280.00. Factoring in the cost of napkins (4 napkins totaling $0.06 cents per pound filet weight) and the cost of packaging (one biodegradable waxed-cardboard box totaling $7.96 per whole fish future), each fish transaction results in $134.06 profit for DockChain.

Operational Overview

Employees

During its second stage of operation, the business will add one business development representative. The two BDRs will split the weekly deliveries between themselves in order to devise the most efficient route, and each will be responsible for maintaining fifty restaurant accounts. Both

BDRs will earn an annual salary of $35,000.00, supplemented by 15% commission on each fish future they successfully manage. In the first month, each BDR is estimated to earn a commission of $750.00 for their fifty transactions.

The BDRs will each be expected to devote 50 hours each per week, totaling 100 manhours. BDRs will have the following collective duties with an estimated time frame for execution based on an expected 25 fish futures per week:

1.) Purchasing and packaging fish products. *(10 hours)*
2.) Printing napkins with the associated QR codes. *(3 hours)*
3.) Delivering the fish products and associated napkins to restaurants. *(40 hours)*
4.) Updating the DockChain traceability tool at the point-of-purchase and at the point-of-sale. *(1 hour)*
5.) Customer service for fishermen and restaurants. This may involve developing business and employee bios to populate the DockChain traceability app. *(20 hours)*
6.) Expanding the business by finding more restaurants to buy fish futures (at a rate of 5 new transactions per month) and contracting more restaurants and fishermen onto the platform. *(26 hours)*

On the other hand, the engineer's time will be dedicated to the refinement of the DockChain application, and management of the Amazon Hyperledger Blockchain. The engineer will earn an annual salary of $80,000.00 and be expected to devote 50 hours per week to maintaining the application and managing the Amazon AWS blockchain account.

All employees will also receive health insurance, estimated as being equal to employees' respective salaries.

Facility

Unlike Phase I, Phase II will necessitate an investment in an office. Price will be the greatest determinant for the office, and the office will lease a small ~700 sq.ft. office in an office park in Sorrento Valley. This office may be used for work, but it will not be public-facing, and it will be meant primarily for storage of packing materials and company assets. This facility may not be able to support the company's ice machine, in which case the BDRs will need to find a partnering restaurant in San Diego that will allow DockChain to house the ice there.

Assets

DockChain will purchase a used delivery van, with a minimum volume of 240 cu. ft. for approximately $16,000. Another $100.00 will be spent on Reflectix, polyisosocyanurate, extruded polystyrene, and spray foam in order to insulate the interior of the delivery van.

DockChain will invest in a commercial screen printer (paying extra for custom fabricated napkin palettes and food-safe dyes). This screen printer will cost approximately $10,000 (including palettes) and will require an air compressor that can supply 150 psi, which can be purchased for approximately $100.00.

DockChain will also purchase an ice machine, to supply 344 pounds of ice per day, for approximately $500.00.

Blockchain

During Phase II, DockChain will subscribe to Amazon AWS and pay for two peer nodes, with 500 GB storage, which will amount to approximately $1,400.00 per month. The engineer will manage and ensure the interoperability between the DockChain application and the Amazon blockchain. The use of BaaS is a necessary compromise during Phase II.

Next Steps

BDRs will have the goal of increasing the number of futures by five every month. If the BDRs can accomplish this task then DockChain will have fully recovered its entrance fees and generated enough profit to move on to the Phase III.

Phase III: D2C Seafood Subscriptions

Services Offered

DockChain will continue to provide deliveries of whole fresh fish, but during Phase III it will expand to be able to handle D2C sales. These fish boxes will be available in either 2 pound orders or 4 pound orders either weekly or biweekly. The minimum order – 2 pounds every other week – will be priced at $26.00 per pound (filet weight). These frozen filets will be delivered in waxed cardboard boxes, along with a business card with the food's associated QR code.

These fish boxes will be available for pick up from DockChain's facility, or from partnering refrigerated centers. Customers will also have the option of having the food delivered Uber Eats, in which case they would pay for the cost of delivery.

During Phase III, DockChain will also begin developing an inhouse blockchain platform. All D2C and wholesale transactions will be logged on the blockchain and completed through the use of smart contracts.

Marketing

During Phase III, DockChain will have a dedicated marketing budget of $1,000.00 per month. While previous marketing strategies such as free samples to new restaurants and seafood

throwdowns may still be employed. Once D2C subscriptions begin, then the company will begin paying for Facebook advertising targeted at Millennials, as well.

Cost Flows

For D2C operations, DockChain will continue paying $0.15 cents more per pound (round weight) for whole opah. Whole opah will be processed, filleted, frozen and shipped out in sizes of either 2 or 4 pounds weekly or biweekly. The customers will pay $26.00 per pound (filet weight). Assuming 100-pound opah, DockChain has the potential to earn $910.00 revenue on the weight of the filets, spending $33.54 on 17-18 boxes and 105 napkins. This results in a profit of $736.46 for each whole opah purchased.

Based on the available labor of one hourly employee working 35 hours per workweek, and the estimated number of opah that one employee could process and package in one week, then DockChain stands to earn approximately $18,000.00 in revenue of D2C sales from opah. This would all be in addition to the continuing wholesale fish distribution service.

Operational Overview

Employees

DockChain will have to expand substantially during Phase III. There will be a dedicated engineering team, with three engineers who will be responsible for the operation of the DockChain application and the development of DockChain's consortium blockchain platform. One of the engineers will be promoted to be Chief Technical Officer and earn an annual salary of $100,000, and the other two engineers will receive $80,000 every year.

There will still be only two BDRs, and they will receive a raise to a salary of $50,000.00, plus 15% commission on all completed transactions. The increase on salary will also be because the BDRs will need to handle customer service for early adopters of the DockChain application.

In addition to the engineering team and the business development team, there will be two delivery drivers each earning annual salaries of $40,000.00. They will take over the BDR's delivery routes, but the BDRs will still handle contracting futures.

Finally, DockChain will hire an hourly employee working in the kitchen who will work 35 hours per workweek to process and package 20 opah per month into packaged frozen filets.

Facility/Assets

In the third phase of operation, DockChain will invest in a dedicated facility for processing fish. This will require an investment of approximately $132,000 on a 4 acre tract of land in Santee. DockChain will hire a contract to manage the construction of a 1,000 sq.ft. processing facility,

estimated at $2.00 per sq.ft. based on the local prices. This will require adequate plumbing and drainage to meet HACCP requirements.

This processing facility will also be equipped with a 10' × 14' walk-in cooler and a 10' × 14' walk-in freezer, costing approximately $12,000.00 and $14,000.00 respectively. Another $14,000.00 will also be invested in a blast-freezer to ensure the best quality flesh is being delivered to seafood consumers. In addition to the refrigeration equipment, steel worktables, knives and cutting boards will be purchased.

The company will also invest in another delivery van (and insulation) to handle any transport between the point-of-purchase and the processing facility.

Blockchain

A consortium blockchain platform will be developed inhouse by the DockChain engineering team. The costs of this blockchain are estimated as being $150,000.00 spread over one year.

Next Steps

Once DockChain has developed it's D2C operations, it will need to begin considering potential means of exporting the business plan to other fisheries, and other cities.

Finances

Phase I

Entrance Costs - Phase 1					
Item	Unit	Qty.	Individual Cost	Total	Comments
Domain Name	1 year ownership of www.dockchain.me	1	$3.88	$3.88	GoDaddy or HostCheap
Total				$3.88	

Phase II

Entrance Costs - Phase 2					
Item	**Unit**	**Qty.**	**Individual Cost**	**Total**	**Comments**
Label Printer	Zebra ZD41022-D01000EZ Barcode Label Printer	2	$409.00	$411.00	Purchase from barcodes.com
Labels	Zebra Z-Select 4000D (2,100 label roll)	2	$19.60	$21.60	Purchase from barcodes.com
Napkin Printer	LP1 Screen Printer	1	$8,500.00	$8,500.00	Purchase from Aspesite
Napkin Palette	Custom for LP1	5	$300.00	$1,500.00	Purchase from Aspesite
Air compressor	Portable 150 psi air compressor	1	$99.00	$99.00	Purchase from Lowes
Ice Maker	344 lb stainless steel ice maker	1	$565.00	$565.00	Purchase from Restaurant Supply Store
Office Space	Broker Fee/First/Last Month Rent for 702 sq.ft. office space	3	$912.60	$2,737.80	Based on Lusk Business Park in Sorrento Valley
Business Licenses	Operating Agreement, EIN, Licenses	1	$199.00	$199.00	Done through LegalZoom
Delivery Van	Used 2015 Ford Transit 250 Van Low Roof w/Sliding	1	$16,033.00	$16,033.00	Based on Fair Purchase Price from Kelley Blue Book in La Jolla, CA
Reflectix	16" x 33.3' roll thermal bubble wrap	1	$16.25	$16.25	Purchase from Lowes
Polyisocyanurate	1" x 4' x 8' polyisocyanurate foam board	4	$16.23	$64.92	Purchase from Lowes
Extruded Polystyrene	.5" x 4' x 8' polystyrene foam board insulation	2	$7.82	$15.64	Purchase from Lowes
Great Stuff Spray Foam	16 oz. Insulating Foam	2	$3.78	$7.56	Purchase from Lowes
Total				**$30,170.77**	

Fish Product	Number whole fish purchased	Cost Per Pound	Ave. Round Weight	Filet Ratio	Cost per Fish at Landing	Total Cost at Landing	Total Weight at Landing	Total Filet Weight	Price of Filet	Total Revenue on Filets	Profit	Profit Per Fish
Opah	25	$1.40	100	0.35	$140.00	$3,500.00	2500	875	$8.00	$7,000.00	$3,351.61	$134.06

Associated Products	Price	Per Unit	Number used Per sale	Cost per sale
Napkins	$14.99	$0.015	3500	$52.47
Packaging (top)	$920.88	$3.84	25	$95.93
Packaging (bottom)	$989.52	$4.12	25	$103.08
			Total Associated Costs	$148.39

Labor Costs - Phase 2		
Employees	**Annual Salary**	**Monthly Salary**
Business Development	$35,000.00	$2,916.67
Business Development	$35,000.00	$2,916.67
Engineer	$80,000.00	$6,666.67
Total	**$150,000.00**	**$12,500.00**

Projected Cost-Flow Analysis - Phase 2

Year 1	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD Total
Target Quota of Opah Futures	100	105	110	115	120	125	130	135	140	145	150	155	1530
Costs and Revenue													
Revenue													
Fish Sales to Restaurants	$28,000.00	$29,400.00	$30,800.00	$32,200.00	$33,600.00	$35,000.00	$36,400.00	$37,800.00	$39,200.00	$40,600.00	$42,000.00	$43,400.00	$428,400.00
Fish Sales to Consumers	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Revenue	$28,000.00	$29,400.00	$30,800.00	$32,200.00	$33,600.00	$35,000.00	$36,400.00	$37,800.00	$39,200.00	$40,600.00	$42,000.00	$43,400.00	$428,400.00
Variable Costs													
Sales Commission	$1,500.00	$1,575.00	$1,650.00	$1,725.00	$1,800.00	$1,875.00	$1,950.00	$2,025.00	$2,100.00	$2,175.00	$2,250.00	$2,325.00	$22,950.00
Misc. Operating Costs	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$2,400.00
Utilities, Property Expenses	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$2,400.00
Product Costs	$12,189.14	$12,798.60	$13,408.05	$14,017.51	$14,626.97	$15,236.43	$15,845.88	$16,455.34	$17,064.80	$17,674.25	$18,283.71	$18,893.17	$186,493.85
Repairs and Maintenance	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$2,400.00
Packaging	$796.00	$835.80	$875.60	$915.40	$955.20	$995.00	$1,034.80	$1,074.60	$1,114.40	$1,154.20	$1,194.00	$1,233.00	$12,178.00
Utilities	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$2,400.00
Napkins	$209.86	$220.35	$230.85	$241.34	$52.47	$262.33	$272.82	$283.31	$293.80	$304.30	$314.79	$325.28	$3,011.50
Amazon AWS Blockchain Service	$1,389.60	$1,389.60	$1,389.60	$1,389.60	$1,389.60	$1,389.60	$1,389.60	$1,389.60	$1,389.60	$1,389.60	$1,389.60	$1,389.60	$16,675.20
Marketing	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$6,000.00
Sub-Total Variable Costs	$17,384.60	$16,229.75	$16,964.50	$17,699.25	$18,234.64	$19,168.76	$19,903.50	$20,638.25	$21,373.00	$22,107.75	$22,842.50	$23,576.45	$236,122.95
Fixed Costs													
Entrance Costs	$30,170.77	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$30,170.77
Employee Insurance	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$150,000.00
Labor	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$150,000.00
Office Rent	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$10,944.00
Permits and Licenses	$2,093.75	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,093.75
Business Insurance	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$1,281.00
Misc. Fixed Costs	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$2,400.00
Legalzoom Registered Agent	$249.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$249.00
Legalzoom Subscription	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$480.00
Legalzoom Compliance Service	$280.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$280.00
Vehicle Depreciation	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$2,404.92
Sub-Total Fixed Costs	$58,483.27	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$71,889.52
Total Costs	$75,867.87	$17,448.50	$18,183.25	$18,918.00	$19,453.39	$20,387.51	$21,122.25	$21,857.00	$22,591.75	$23,326.50	$24,061.25	$24,795.20	$308,012.47
Total Profit	*-$47,867.87*	$11,951.50	$12,616.75	$13,282.00	$14,146.62	$14,612.49	$15,277.75	$15,943.00	$16,608.25	$17,273.50	$17,938.75	$18,604.80	$120,387.54

Phase III

Entrance Costs - Phase 3					
Item	**Unit**	**Qty.**	**Individual Cost**	**Total**	**Comments**
Chef Knife	Choice 10" White Chef Knife	2	$6.25	$12.50	Purchase from Restaurant Supply Store
Cleaver	8" Steel Cleaver	2	$8.40	$16.80	Purchase from Restaurant Supply Store
Paring Knife	Choice 4" White Straight Edge Paring Knife	2	$1.98	$3.96	Purchase from Restaurant Supply Store
Kitchen Shears	8 3/8" Multi-Function Kitchen Shears	2	$2.38	$4.76	Purchase from Restaurant Supply Store
Tables	Regency 24" x 48" Stainless Steel Work Table	3	$186.75	$560.25	Purchase from Restaurant Supply Store
Cutting Board	Choice 30" x 18" x 1 3/4" Wood Cutting Board	2	$43.61	$87.22	Purchase from Restaurant Supply Store
Walk-in Refrigerator	Nor-Lake KLB741014-C Kold Locker 10' x 14'	1	$11,148.00	$11,148.00	Purchase from Restaurant Supply Store
Walk-in Freezer	Nor-Lake KLF771014-C Kold Locker 10' x 14'	1	$13,978.00	$13,978.00	Purchase from Restaurant Supply Store
Blast Freezer	Alto-Shaam QC3-20 57" Countertop Blast Chiller	1	$14,008.00	$14,008.00	Purchase from Restaurant Supply Store
Land	4-Acre Lot in Santee	1	$132,000.00	$132,000.00	Found via Zillow
Processing Facility	1,000 sq.ft.	1	$200,000.00	$200,000.00	Developed by Contractor
HACCP Plan Development	Initial Plan Costs	1	$8,885.00	$8,885.00	Hire a consultant to develop plan
Delivery Van	Used 2015 Ford Transit 250 Van Low Roof w/Sliding	1	$16,033.00	$16,033.00	Based on Fair Purchase Price from Kelley Blue Book in La Jolla, CA
Reflectix	16" x 33.3' roll thermal bubble wrap	1	$16.25	$16.25	Purchase from Lowes
Polyisocyanurate	1" x 4' x 8' polyisocyanurate foam board	4	$16.23	$64.92	Purchase from Lowes
Extruded Polystyrene	.5" x 4' x 8' polystyrene foam board insulation	2	$7.82	$15.64	Purchase from Lowes
Great Stuff Spray Foam	16 oz. Insulating Foam	2	$3.78	$7.56	Purchase from Lowes
Total				**$396,841.86**	

Fish Product	Number whole fish purchased	Cost Per Pound	Ave. Round Weight	Filet Ratio	Cost per Fish at Landing	Total Cost at Landing	Total Weight at Landing	Total Filet Weight	Price of Filet	Total Revenue on Filets	Profit	Profit Per Fish
Opah	20	$1.40	100	0.35	$140.00	$2,800.00	2000	700	$26.00	$18,200.00	$14,729.16	$736.46

Associated Products	Price	Per Unit	Number used Per Sale	Cost Per Sale
Business Cards	$14.95	$0.015	2100	$31.40
Packaging	$1,096.20	$1.83	350	$639.45
			Total Associated Costs	$670.85

Labor Costs - Phase 3		
Employees	**Annual Salary**	**Monthly Salary**
Sales	$50,000.00	$4,166.67
Sales	$50,000.00	$4,166.67
Driver	$40,000.00	$3,333.33
Driver	$40,000.00	$3,333.33
Engineer	$100,000.00	$8,333.33
Engineer	$80,000.00	$6,666.67
Engineer	$80,000.00	$6,666.67
Total	**$440,000.00**	**$36,666.67**

Projected Cost-Flow Analysis - Phase 3

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD Total
Target Quota of Opah B2B	*160*	*160*	*160*	*160*	*160*	*160*	*160*	*160*	*160*	*160*	*160*	*160*	*1920*
Target Quota of Opah D2C	*20*	*20*	*20*	*20*	*20*	*20*	*20*	*20*	*20*	*20*	*20*	*20*	*240*
Costs and Revenue													
Revenue												Previous Profit	
Fish Sales to Restaurants	$44,800.00	$44,800.00	$44,800.00	$44,800.00	$44,800.00	$44,800.00	$44,800.00	$44,800.00	$44,800.00	$44,800.00	$44,800.00	$44,800.00	$537,600.00
Fish Sales to Consumers	$18,200.00	$18,200.00	$18,200.00	$18,200.00	$18,200.00	$18,200.00	$18,200.00	$18,200.00	$18,200.00	$18,200.00	$18,200.00	$18,200.00	$218,400.00
Total Revenue	$63,000.00	$63,000.00	$63,000.00	$63,000.00	$63,000.00	$63,000.00	$63,000.00	$63,000.00	$63,000.00	$63,000.00	$63,000.00	$63,000.00	$756,000.00
Variable Costs													
Hourly Labor	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$2,000.00	$24,000.00
Sales Commission	$1,600.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$800.00	$10,400.00
Misc. Operating Costs	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$2,400.00
Utilities, Property Expenses	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$2,400.00
B2B Product Costs	$22,400.00	$22,400.00	$22,400.00	$22,400.00	$22,400.00	$22,400.00	$22,400.00	$22,400.00	$22,400.00	$22,400.00	$22,400.00	$22,400.00	$268,800.00
D2C Product Costs	$700.00	$2,800.00	$2,800.00	$2,800.00	$2,800.00	$2,800.00	$2,800.00	$2,800.00	$2,800.00	$2,800.00	$2,800.00	$2,800.00	$31,500.00
Repairs and Maintenance	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$2,400.00
B2B Packaging	$2,561.60	$2,561.60	$2,561.60	$2,561.60	$2,561.60	$2,561.60	$2,561.60	$2,561.60	$2,561.60	$2,561.60	$2,561.60	$2,561.60	$30,739.20
D2C Packaging	$670.85	$670.85	$670.85	$670.85	$670.85	$670.85	$670.85	$670.85	$670.85	$670.85	$670.85	$670.85	$8,050.14
HACCP Certification	$466.50	$466.50	$466.50	$466.50	$466.50	$466.50	$466.50	$466.50	$466.50	$466.50	$466.50	$466.50	$5,598.00
Utilities	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$2,400.00
Napkins	$209.86	$220.35	$230.85	$241.34	$52.47	$262.33	$272.82	$283.31	$293.80	$304.30	$314.79	$325.28	$3,011.50
Blockchain Development	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$12,500.00	$150,000.00
Marketing	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$1,000.00	$12,000.00
Sub-Total Variable Costs	$44,908.81	$46,219.30	$46,229.80	$46,240.29	$46,051.41	$46,261.28	$46,271.77	$46,282.26	$46,292.75	$46,303.25	$46,313.74	$46,324.23	$553,698.84
Fixed Costs													
Entrance Costs	$396,841.86	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$396,841.86
Employee Insurance	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$440,000.00
Salary Labor	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$36,666.67	$440,000.00
Office Rent	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$912.00	$10,944.00
Permits and Licenses	$2,093.75	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2,093.75
Business Insurance	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$106.75	$1,281.00
Misc. Fixed Costs	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$200.00	$2,400.00
Legalzoom Registered Agent	$249.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$249.00
Legalzoom Subscription	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$480.00
Legalzoom Compliance Service	$280.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$280.00
Vehicle Depreciation	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$200.41	$2,404.92
Sub-Total Fixed Costs	$473,487.69	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$1,218.75	$486,893.94
Total Costs	$518,396.50	$47,438.05	$47,448.55	$47,459.04	$47,270.16	$47,480.03	$47,490.52	$47,501.01	$47,511.50	$47,522.00	$47,532.49	$47,542.98	$1,040,592.78
Total Profit	*-$455,396.50*	$15,561.96	$15,551.46	$15,540.97	$15,729.84	$15,519.98	$15,509.49	$15,499.00	$15,488.51	$15,478.01	$15,467.52	$15,457.03	-$284,592.78

Glossary

API   Application Programming Interface
BaaS   Blockchain-as-a-Service
BDR   Business Development Representative
CoC   Chain of Custody
CSF   Community-Supported Fishery
CTE   Critical Tracking Event
D2C   Direct-to-Consumer
FMP   Fishery Management Plan
ICO   Initial Coin Offering
IoT   Internet of Things
KDE   Key Data Element
MSC   Marine Stewardship Council
NMFS   National Marine Fisheries Service
RFMO   Regional Fishery Management Program
RSF   Restaurant Supported Fishery
SSC   Seafood Supply Chain
SSP   The Sustainable Shrimp Partnership
TRU   Traceable Resource Unit
UI   User Interface

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