BUSINESS PLANNING FOR KELP FARMING

Sea Grant
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1 Introduction and Background

INTRODUCTION

Business planning for the kelp industry in the United States

As the kelp industry in the United States has evolved, several key barriers to its development and expansion have been identified. In January 2020, the National Seaweed Hub conducted a comprehensive national needs assessment of various seaweed stakeholders (including prospective farmers, current farmers, permitting regulators, food safety/public health regulators, nursery operators, researchers, processors, culinary professionals, NGOs, and others) to identify challenges, determine needs, and find opportunities in the emerging domestic seaweed aquaculture industry. The stakeholders identified ***economic information*** such as economic analyses, financial tools, and marketing as a key requirement for the continued development of the industry (Seaweed Hub Needs Assessment, 2020). Although several guidebooks (Flavin et al., 2013, and Redmond et al., 2014) and other technical support (Pereira & Yarish, 2008) have been developed related to the production aspects of seaweeds, these do not provide comprehensive economic and financial information or tools necessary to support this growing national industry.

As noted in a 2016 World Bank report, "Good business planning is key to successful expansion of the seaweed aquaculture industry if we are to meet growing global demand for biomass, protein, organic chemicals and the many other products derived from seaweeds." (Bjerregaard et al., 2016). What is widely considered a good business plan includes a flexible financial model that can accommodate changes in both costs and market prices as the industry matures and better information becomes available. A good business plan is a user-friendly tool that provides decision support to producers, industry participants, and investors in this dynamic and fast-growing market. The provision of business and financial information (including economies of scale, break-even production levels, etc.) flowing out of the business planning process will allow investors to evaluate the industry and lenders to better understand the industry, which will, in turn, facilitate access to capital for existing and prospective kelp farmers. Providing information on good business planning will be key to the successful expansion and sustainability of the kelp aquaculture industry in the United States.

This guidebook will help you develop a kelp aquaculture business plan that is comprehensive, flexible, and grounded. It is designed to provide you with operational and financial information to make rational decisions about kelp aquaculture investment. You will develop your plan through a combination of traditional business planning approaches and the more modern "Business Model Canvas" approach, which is useful for quickly communicating your unique ideas to a wide audience. (Here is a link to an overview of the Business Model Canvas approach **https://www.bmc.com/blogs/business-model-canvas/)**. This guidebook is also linked to a flexible financial model (worksheet), which will allow you to see the dollars-and-cents impacts of your plans as they evolve. Potential investors and kelp farmers are advised to modify the data and economic and financial projections based on their own locations and economic situations. Along with the integrated financial model, this guidebook can help you decide which kelp cultivation systems (stand-alone on-land nursery, stand-alone ocean grow-out site, or integrated nursery-grow-out) might be best for you with the resources and assets that are available to you. It will help you develop your financial and economic feasibility study and investment plan. This manual does not, however, provide detailed biological information on how to grow kelp. References on the biological aspects of kelp aquaculture are provided.

This guide presents components of kelp cultivation systems in a table format. These components include investment requirements and sample cost and return budgets for kelp nursery and farm stages and integrated nursery/farm systems.

The sections of this guidebook include general descriptions of kelp production requirements and methods but not an in-depth discussion of what you will encounter when you begin farming kelp. There are many sources of information to help you learn the "how-to" of kelp farming and marketing. The best course is to start by contacting your state's Sea Grant program or Cooperative Extension Service, a marine research university or laboratory, a state agency, or a private firm (a listing of these follows). Depending on the state, these organizations can give you literature, names of kelp farmers and marketing businesses you can visit, as well as technical support and recommendations. Based on the anticipated scale of the operation, nurseries and farms may also consider hiring consultants. A list of support organizations by state is in the Annex to this document.

The information provided in this guidebook (as of September 2023) is meant to serve as background for prospective kelp farmers to use in developing plans to establish their operations. Anyone developing a plan should get the most recent information available about markets, regulatory, and industry conditions applicable and appropriate for their operation.

WHY A BUSINESS PLAN?

"Plans are worthless, but planning is everything." Dwight D. Eisenhower

This guidebook leads you through the process of preparing a written kelp aquaculture business plan. When you have completed the exercises in this book, including developing a detailed financial model for your business ideas, you will have a solid sense of whether kelp aquaculture business is a good move for you. That is the value of business planning. Before spending any money, you need to think through all the aspects that can be planned for in preparation for the unexpected.

You should work through all the sections of this guidebook. You will inevitably find, however, that you need to revisit prior sections based on what you have found in later sessions. That is to be expected, and that is the value of planning. Planning is an iterative process. As you work through your thoughts about marketing, operations, scale, scope, etc., you will find that the decisions you make in one category affect other categories.

If this sounds like a lot of work, that's because it is. Few people go into business because they like to plan, but the importance of planning cannot be overemphasized. By taking an objective look at your business, you can identify areas of weakness and strength, pinpoint needs you might otherwise overlook, spot opportunities early, and begin planning how you can best achieve your business goals. Your business plan also helps you see problems before they grow large and helps you identify their sources—thus suggesting ways to solve them. Your business plan will even help you avoid some problems altogether. The numerous facts and figures required for the plan take time to collect—but this will be time well spent. The process of planning may turn up opportunities you never dreamed of. Or, as is often the case, the planning process may show you that there's no way to make your idea work right now before you invest time and money into a venture destined to fail.

Seaweed farmer J.P. Velotti shows a line of kelp growing in Long Island Sound to a group of UConn students.

In addition, your business plan provides the information needed by others to evaluate your venture, especially if you will need to seek outside financing. A thorough business plan can quickly become a complete financing proposal that will meet the requirements of most lenders.

How to use this guidebook

You should use this guidebook as a workbook, actively answering the questions in your business plan document. Each section of the guidebook corresponds to a section of your business plan and contains some background information on the topic, along with worksheets to guide your thoughts. You don't need any special software for the plan itself, but you will need access to and knowledge of using a spreadsheet package (preferably Microsoft Excel) to work with the financial model.

You will need

- some means of taking notes and drafting your responses to the prompts in each chapter section of this guide.
- a separate notebook or app for keeping track of all the "to-do" items that come up while developing your plan.
- a computer with capabilities to run a spreadsheet program and save your work-in-progress files.
- uninterrupted time blocks to concentrate on this project.
- optionally, a white board and sticky notes for working in your Business Model Canvas.
- friends, partners, advisors to bounce ideas with and help you refine and justify your plans.

SEAWEED PRODUCTION IN THE UNITED STATES

There is a growing global interest in seaweeds, with a particular focus on their potential as a source of nutritious food to feed the growing human population and for the ecosystem services they provide, particularly in removing greenhouse gases (Parodi *et al*., 2018; Duarte *et al*., 2020). There is a growing consensus that wild resources will not be able to supply enough seaweeds to satisfy future demand despite the robust management strategies in many areas (Steen *et al*., 2016; Monagail *et al*., 2017; Lauzon-Guay *et al*., 2021). Increased cultivation of seaweed will be required to provide a consistent and traceable supply of biomass to industries that process seaweed for food or functional products. As demand for seaweed increases, culturing of seaweed (i.e., farming) will be important to supplement the wild resource extraction.

The seaweed aquaculture industry in the United States is at a nascent but critical stage of development, as domestic and international demand for seaweed and its derivatives expands rapidly. It is important to note that the industry in the United States is still developing and significantly differs among states. The U.S. portion of the global market for seaweed products is expected to double from approximately $200 million to $500 million by 2024 (Grand View Research, 2017). Other estimates (Ruggless 2018) project that U.S. consumption of seaweed products will increase by 7% annually in the near term. Despite favorable growing conditions on the East and West coasts, the U.S. imports more than 95% of the seaweed products consumed. The seaweed that is produced domestically has been derived primarily from wild harvest (Piconi et al., 2020) until recently. As of 2020, domestic edible seaweed production (both wild and cultivated) was estimated to be slightly less than 1 million pounds of wet harvest, with cultivated product accounting for approximately three-quarters of this supply (Piconi et al., 2020). Market forecasts updated in 2020 expect capacity to double over the next five years to more than four million pounds annually by 2025 (Piconi et al., 2020).

Kelps, *Saccharina spp*. (S. *latissima* (sugar kelp)) and S. *angustissima* (otherwise known as narrow-bladed or skinny kelp) are the most common seaweed species cultivated in the United States. FAO reports that in 2019, brown seaweeds accounted for 47.3 percent of world seaweed cultivation in terms of tonnage and 52 percent in terms of value. Global brown seaweed cultivation has concentrated on two cold-water genera: *Laminaria/Saccharina* (also known as kombu) and *Undaria* (also known as wakame). In 2019, the 12.3 million tons of *Laminaria/Saccharina* (primarily *Saccharina japonica*) cultivation (35.4 percent of all seaweeds) was supplied by China and South and North Korea. Most kelp species being farmed in the United States are not widely farmed on a global scale. However, sugar kelp and ribbon kelp are similar to the commercialized kombu and wakame species, respectively.

Kelps are principally cold water large brown seaweeds found in cold, temperate, and polar climates worldwide. These species are excellent candidates for aquaculture in the United States due to their rapid growth rates and high biomass yield and a unique winter growing season. Kelp is a healthy and nutritious source of fiber, vitamins, and essential minerals, including iron, calcium, potassium, iodine, and magnesium. A versatile product, it can be used dried, powdered, fresh, blanched, and frozen. Non-food uses of kelp include the utilization of alginate in the paper, textile, manufacturing, cosmetics, laboratory and biomedical industries, and as a nutritional supplement in animal feeds. Kelp has also been considered a source of biomass for the production of biofuel as an alternative energy source.

Over the last decade, kelp aquaculture has seen significant growth in the United States, with Alaska and Maine accounting for most of the domestic production. In Alaska, farmed aquatic plants production has risen from 18,190 pounds sold in 2017 to 556,750 pounds sold in 2022 (Alaska Department of Fish and Game, 2022). In Maine, landings of cultivated seaweeds have dramatically increased since reporting was made publicly available, from 14,500 lbs. in 2015 to nearly 1 million lbs. in 2022 (Maine Department of Marine Resources, 2022). The value of the landings has similarly been increasing, and more than quadrupled between the 2018 and 2019 seasons (Maine Department of Marine Resources, 2020). There are over 75 active commercial seaweed aquaculture operations on the East Coast (CT, RI, MA, NY, and ME) and the West Coast (AK, CA, OR, and WA), with at least 30 more in various stages of the planning/permitting process (Schreiber, 2016; Seaweed Hub, 2022).

Existing and prospective U.S. kelp farmers have an opportunity to capture increased domestic market share and provide sustainable coastal livelihoods and eventually generate export earnings as global population levels and demand continue to increase. Kelp aquaculture can be integrated with other ocean uses and livelihoods that vary with the season (i.e. shellfish farming, fishing) and those that may be able to spatially integrate kelp aquaculture (i.e., port and harbor entities, ocean education groups). The fast-growing nature of kelp makes this a unique farmed product, reaching market size in a single season. Kelp harvested in spring can be used to generate necessary cash flow and boost coastal economies immediately prior to the start of well-established seasonal fisheries. The value chain for domestic kelp is growing and diversifying to include processing facilities, value-added food producers and retail channels including restaurants, natural food stores and major grocery chains; however, the capacity of these outlets to accommodate a growing number of kelp farmers varies by state. With kelp and kelp-based products newly available on the market, the price range facing farmers and buyers can vary significantly and is often subject to economies of scale.

Participants in the National Seaweed Symposium examine samples of seaweeds grown in Maine during the Seaweed Showcase in Providence, R.I. in March 2020, which brought together more than 100 growers, researchers, regulators and others.

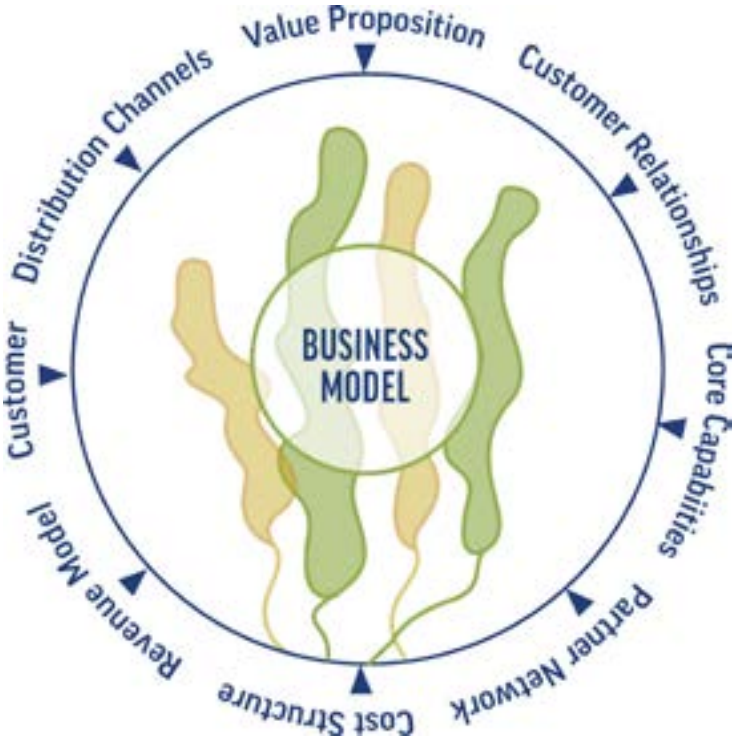
BUSINESS PLANNING

What is a business model?

Before you get into the nuts and bolts of developing a business plan, take a step back and think holistically about your business. What is it that you're planning to do? What are you selling? What are the important relationships that you need to cultivate with suppliers, customers, vendors, partners, and regulators? What are the key skills that you and your employees will need to make this venture successful? What kind of physical space do you need? The answers to these questions will be fleshed out in detail in your business plan, but many people find it helpful to think of these issues in all their interrelatedness as a **business model.**

A **business model** is a holistic way of thinking about your business in terms of the key relationships and processes it represents. In the world of kelp farming, there are a number of different approaches that any prospective farmer can take. Do you want to culture your own seed? Do you plan to harvest small quantities for personal delivery to high-end restaurants? Do you plan to go big or go small? Each of those business models and scales of operation requires a different set of relationships with customers, has a different cost structure, and has a different revenue model. As you work through the details of each section of your business plan, you should be thinking about how that flows into your business model.

Business planning is not a "one-and-done" exercise. As you move through the process, you will find, because of the relationships between the various aspects of your business model, that some elements of your plan will need to be rethought, revised, and re-estimated. That is to be expected, and that is the value of planning.



A **business model canvas** is a visual template that allows you to efficiently define and communicate your business ideas and plans. It is an excellent vehicle for brainstorming as you think through your ideas, and when complete, it is equally excellent for communicating your business plans to others. As you develop your business plan, you should update your canvas as you delve more deeply into each section of the plan.

It contains nine areas of focus, and the layout represents the relationships between those areas. At the center is your **value proposition**, the overall vision of your business, and why your customers will buy from you. On the left side are four areas related to the **internal operations** of the business, the drivers of your operating costs. On the right side are four areas related to the **external focus** of the business—your relationship with customers and the overall environment, the drivers of your revenue streams.

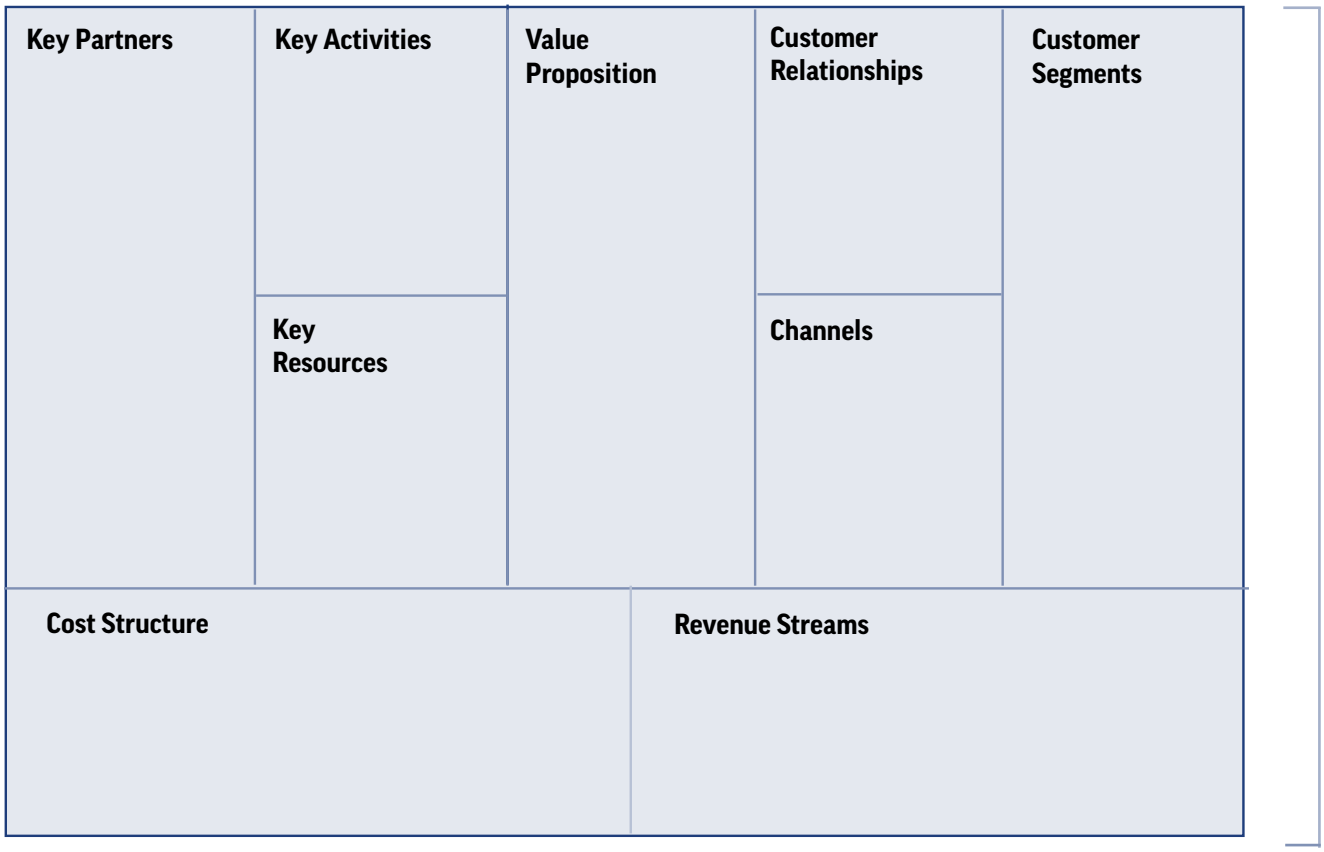
Nursery	Kelp Farm	Integrated Operation
Two production models ▸ Pump seawater to facility ▸ Contain and transmit seawater to facility ▸ Revnue Models ▸ Sell seed string to growers ▸ Give away seed string ▸ Keep for own use in an integrated system	**Two scales of production** ▸ Small and large ▸ Revenue Models ▸ Bulk sale at various price points ▸ Sale direct to consumers (low volume)	▸ Any combination ▸ Some or all of seed string production kept for own use ▸ Any scale of farming operation

Three business models for a kelp business

Vacuum Packed Blanched Kelp.

Photo credit: Melissa Good, Alaska Sea Grant

THE BUSINESS MODEL CANVAS



Nine Building Blocks of the Business Model Canvas

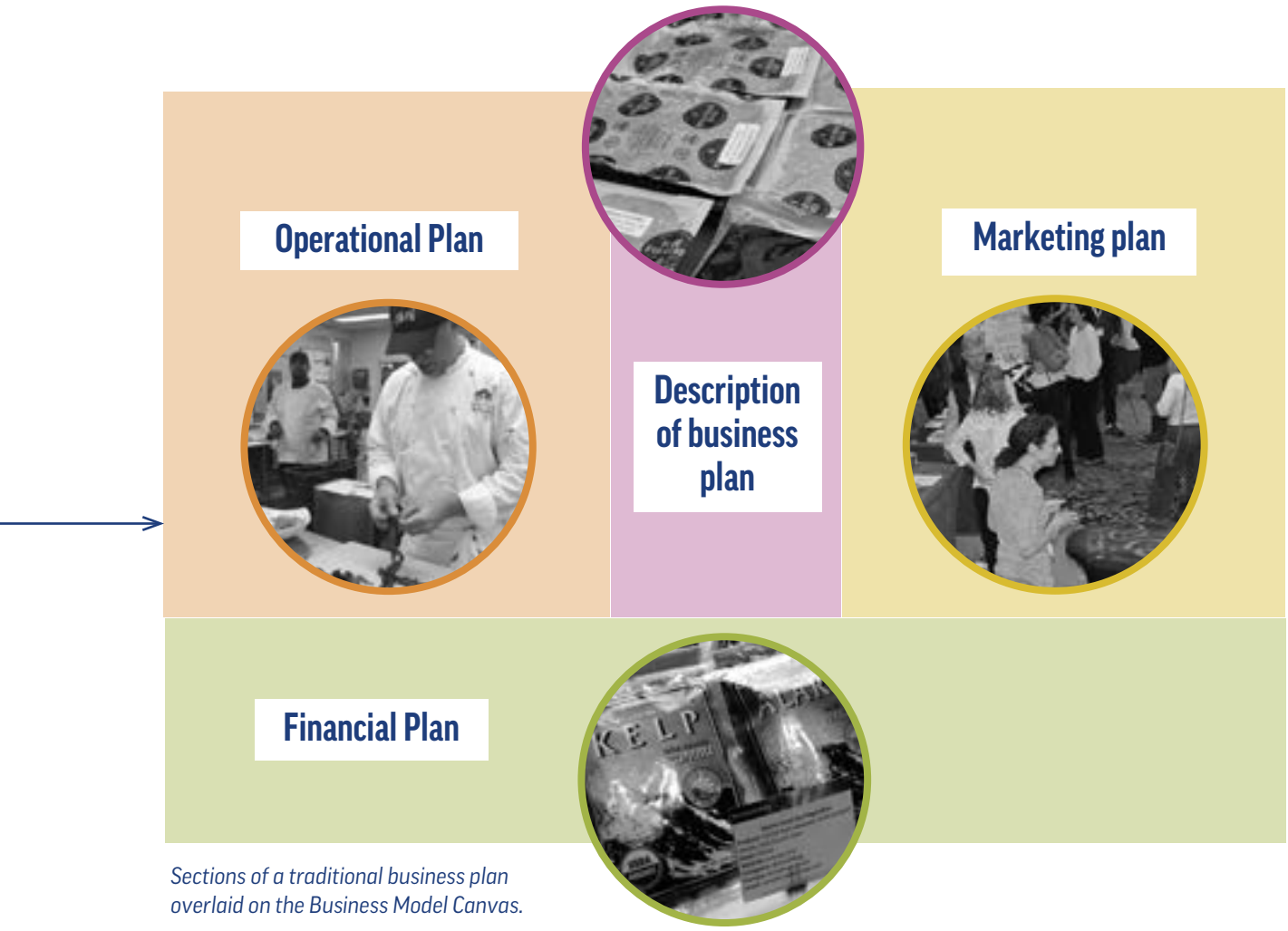
Value propositions: A company creates value, or benefits, for customers by solving a problem or satisfying a need. The value proposition is the reason that customers choose one option over another when deciding what to buy. Although certainly not an exhaustive list, customers may value: newness, performance, customization, design, brand, price, cost reduction, risk reduction, accessibility, and convenience.

Customer segments: Without customers, businesses cannot survive. Businesses must identify and understand their customers, and they can group these customers into segments with common characteristics.

Channels: Channels bring the value proposition to the customers through communication, distribution, and sales. Companies can reach their customer segments through a mix of channels, both direct (i.e., through sales force and web sales) and indirect (i.e., through own stores, partner stores, and wholesalers), to raise awareness, allow for purchase and delivery, provide customer support, and support other important functions of the business.

Customer relationships: Companies need to maintain relationships with their customers to acquire and retain customers and boost sales. Strong customer relationships can significantly impact overall customer experience. There are many categories of customer relationships including: personal assistance, self-service, automated service, user communities, and co-creation (building the product together with your customers).

Revenue streams: There are two types of revenue streams: revenues from one-time customers and revenues from ongoing payments. Revenue pricing mechanisms vary from fixed (i.e., predefined prices based on static



Sections of a traditional business plan overlaid on the Business Model Canvas.

variables) to dynamic (i.e., price changes based on market conditions). Revenue streams can be generated through asset sales (i.e., selling a physical product), usage fees, subscription fees, licensing, brokerage fees, advertising, and temporarily selling the use of a particular asset (i.e., lending, renting, or leasing).

Key resources: Any business needs resources—physical, financial, intellectual, and/or human—to function. These resources enable the company to provide its products or services to its customers.

Key activities: Key activities are the critical tasks that a company does to succeed and operate successfully. Different companies focus on different activities in categories such as production, problem-solving, and platform/network.

Key partnerships: Companies build partnerships to optimize their business, reduce risk, or gain resources. There are four main types of partnerships: strategic alliances between noncompetitors, coopetition—strategic alliances between competitors, joint ventures, and buyer-supplier relationships.

Cost structure: All businesses incur costs through operation, whether fixed or variable. They may also face economies of scale and scope. Companies consider their cost structures in two strategies—cost-driven, where all costs are reduced wherever possible, and value-driven, where the focus is on greater value creation. Cost structures will often consider fixed costs, variable costs, economies of scale, and economies of scope.

BUSINESS PLAN

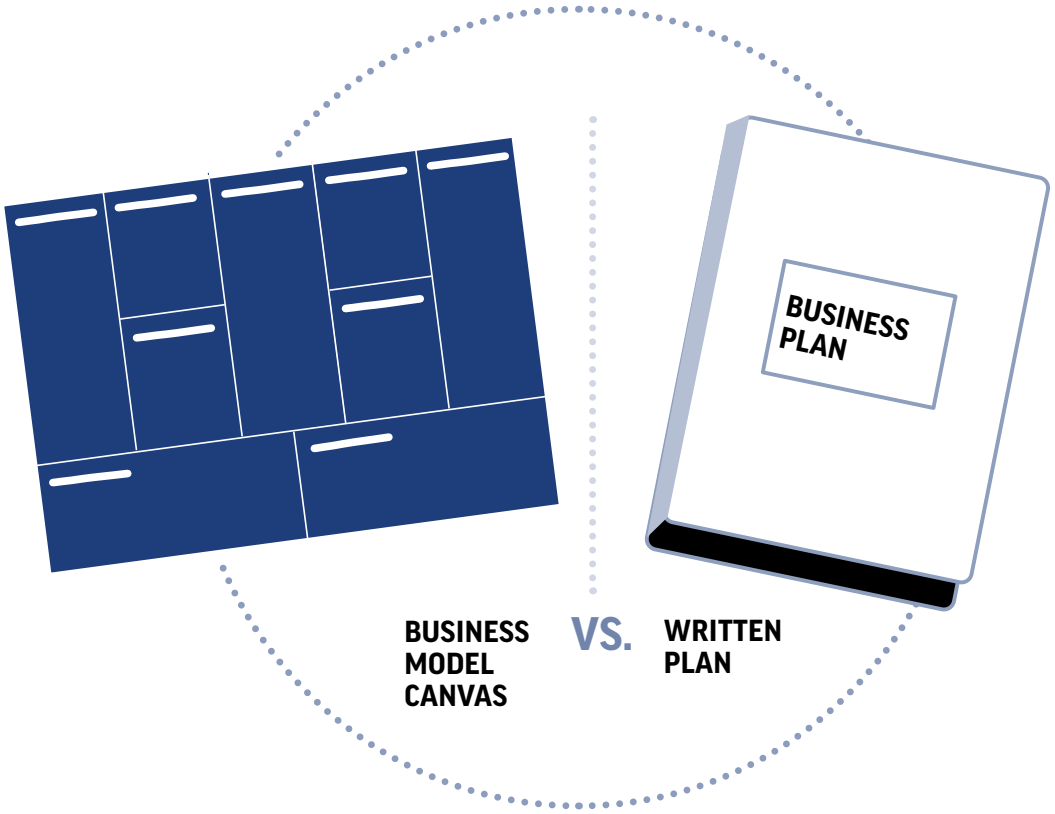
Workers at an Alaska facility process seaweed after harvest. Photo credit: Alaska Sea Grant

A business plan is the future of the business on paper, and a mechanism to test dreams against expected challenges and opportunities.

Although a Business Model Canvas is a simple graphical description of a business, each of the nine elements of the Canvas represents a full and detailed plan. A written **Business Plan** provides a structure for continual analysis and evaluation of the business over time. A business plan can help convince investors or lenders to finance your business and persuade partners or key employees to join your company. A business plan also serves as a roadmap guiding the launch and growth of your new kelp business. It must integrate the marketing, operational and financial aspects of the business.

Preparing a business plan is an opportunity to carefully think through every step of starting your business so you can prepare for success. This is your chance to discover any weaknesses in your business idea, identify opportunities you may not have considered, and plan how you will deal with challenges that are likely to arise. Be honest with yourself as you work through your business plan. Don't gloss over potential problems; instead, figure out solutions. A good business plan is clear and concise. A person outside of your industry should be able to understand it.

For many, the most important aspect of a formal written business plan is that it is generally required to secure bank financing or equity investment. While a business plan is not the same as a loan proposal, it constitutes a major portion of any business loan application. Avoid making unsubstantiated claims or sweeping statements. Investors, lenders, and others reading your plan will want to see realistic projections and expect your assumptions to be supported with facts. A stand-alone nursery, stand-alone farm, or integrated operation will be different and require a separate plan.



A business plan is the future of the business on paper, and a mechanism to test dreams against expected challenges and opportunities.

Before you move on

- You should begin the planning process by using a printout of the business model canvas worksheet to write down your responses. **Worksheet 1: Business Model Canvas**
- Begin keeping track of your open questions and items for follow up in a separate to-do list. The business planning process will undoubtedly generate more to-do items than you can possibly keep track of without a system.
- Start by writing down your initial thoughts for each section of the plan, using the description in section 3.1 of this guidebook as a starting point.
- As you work through each section of the written business plan, return to this canvas and update each section as appropriate.
- Be sure to consider the relationships between each section of the Canvas as your ideas take more detailed shape.
- If you are having difficulties getting started, try googling "completed business model canvas" and look at the images. You will see a wide variety.

2 Writing Your Business Plan

OUTLINE OF A BUSINESS PLAN

This guidebook suggests that you organize your business plan into seven broad sections:

1. Executive Summary

This section summarizes all the sections of the business plan. Often, it's the only part that a prospective investor or lender reads before deciding whether to read the rest of the plan, making it the most important part. It should convey your enthusiasm for your business idea and get readers excited about it. The Executive Summary is ***written last*** after you have completed the rest of the business plan. That way, you'll have thought through all the elements of your startup and be prepared to summarize them.

2

2. Description of the Business: Your Value Proposition

This section explains the basic components of your kelp business—where you are located, mission statement, goals, markets, legal structure, etc., and your value proposition. Why does this business exist? What value do you bring to yourself and your customers, investors, and community?

3. Products and Services

This section provides more information about the kelp products and services that your business will provide, including a description of your competitive advantages and prices.

4

4. Marketing plan: Your customer segments, relationships, and distribution channels

This section addresses your plan to get your product into the hands of the people who want it. The marketing plan provides details on your industry, the competitive landscape, your target market, who your customers are, how you will market your business to those customers and how you will get your product to them.

5. Operational plan: Your key activities, resources, and partners

This section explains the operation of your business. What permits do you need? How much time and effort will it take, and what kind of help will you need? What are the processes involved in operating this business? How will your business be structured and managed?

5

6. Financial plan: Your cost structure and revenue streams

As you develop each section of your business plan, you should be gathering information about cost elements. How much will each aspect of your marketing plan cost, and when will the cost be incurred? How much will each aspect of your operational plan cost, and when will those be incurred? As you answer those questions, you will be completing the inputs to a financial model, which, when complete, will give you a complete picture of the financial aspects of your business.

6

7. Planning for the future: Strategic analysis and risk assessment.

In this section of your business plan, which you complete after all other sections are in place, you engage in a "what if" analysis of the financial model and set up your plans to make sure you are aware of the external forces that could impact your business in the long run. What happens if prices fall? What happens if costs rise or fall? What happens if there is an influx of new competitors? What if you lose your crop to a weather event? It's impossible to predict the future, but you can look at how best to react to changes, so you aren't caught unprepared.

7

Before you move on

- As you begin thinking about business planning for kelp farming, take a few minutes and write down your initial answers to these questions:
- What are your goals and objectives for the aquaculture business?
- Will your operation be a separate nursery or farm operation or an integrated operation?
- What level of management intensity (extensive, semi-intensive, intensive) and/or degree of integration with other products will the enterprise have?
- Is there a market potential, management, or cost efficiency reason for a particular size business?
- What are the competitive forces affecting market performance?
- What experience do you have to manage the operation?
- Are you willing to provide the time and effort required to learn how to grow the kelp?
- Do you think that you will like the work and skills needed to produce the kelp?
- What skills and abilities will be needed to make the business successful?
- How will the business be organized?
  Sole proprietorship__ partnership___ corporation___ other____
- How much money can you survive on?
- How much money can you afford to invest?
- How will the business affect your family?
- How will the new business affect your present job?
- Will the kelp farming operation require hired labor? How many labor-hours will you need to plan for in each phase of your operation?
- How long do you expect for the business to become operational?
- How long do you expect for the business to become profitable?
- Are you in an area where the production facility can be leased or sold if you decide to cease operation?
- Do you know where to obtain information and technical assistance on kelp farming?

Chef Jeff Trombetta separates leaves of kelp before chopping.

DEVELOPING YOUR BUSINESS PLAN

The following sections of this guidebook discuss developing your formal, written business plan. You may need to revisit sections over again as you work on your document, particularly after you begin the financial plan and see clearly the cost and cash flow implications of your planning decisions.

Executive Summary

The Executive Summary should briefly explain each of the topics below.

1. **An overview of your business** idea (one or two sentences).
2. **A description of your product and/or service.** What problems are you solving for your target customers?
3. **Your goals for the business.** Where do you expect the business to be in one year, three years, five years?
4. **Your proposed target market.** Who are your ideal customers?
5. **Your competition and what differentiates your business.** Who are you up against, and what unique selling proposition will help you succeed?
6. **Your management team and their prior experience.** What do they bring to the table that will give your business a competitive edge?
7. **Financial outlook for the business.** If you're using the business plan for financing purposes, explain exactly how much money you want, how you will use it, and how that will make your business more profitable.

Limit your Executive Summary to one or two pages in total. After reading the Executive Summary, readers should have a basic understanding of your business, should be excited about its potential, and should be interested enough to read further.

Description of the Business—Your Value Proposition

This section of a business plan is where you start in your planning process, and you will return to this section again and again as you work out the details of your operating, marketing, and financial plans. By the time you have completed the entire planning process, this section—and the corresponding value proposition statement in your Business Model Canvas—will be a compelling "elevator pitch" that will allow you to line up the support you need to grow and thrive.

The business description section of your business plan should consist of a brief and compelling explanation of your business model and value proposition and should include answers to the following questions:

What business are you in? What are your products and/or services? Who are your customers?

What is the status of the business: A start-up? An expansion of a current business? A takeover of an existing business?

1. What's the business's form: sole proprietorship, partnership, or corporation?

2. What is your overall expectation for profits from this business?

3. Why do you think your business will succeed?

4. Is your business seasonal? For a seasonal business, such as kelp farming, be sure that you specify the expectations for in-season and off-season operations.

The process of developing a business plan requires several steps:

- **The inception of a business begins with an idea, which becomes a desire of the principal(s).**
- **The idea is converted into goals to be accomplished, both long- and short-term.**
- **Goals lead to the formation of a basic plan of action to be analyzed, producing various alternatives for accomplishing the goals.**
- **A decision is made for the best alternative depending on the particular circumstances facing the principal(s).**
- **Finally, the proposal for financing is written with an organized purpose and logical plan of action.**

In describing your business idea, aim for clarity and simplicity. A rule of thumb: if you can't describe your idea clearly and simply, you haven't thought it through.

A. Business mission statement

A mission statement is a brief explanation of your business's reason for being. It can be as short as a marketing tagline ("Magic Kelp will provide consumers with a safe and high-quality seafood product"). In general, it's best to keep your mission statement to one or two sentences.

B. Company values and vision

What ***values*** does your business live by? Honesty, integrity, fun, innovation, and community are values that might be important to your business philosophy. ***Vision*** refers to the long-term outlook for your business. What do you ultimately want it to become? For instance, your vision for your kelp business may be to sell to a national market.

C. Company goals

Knowing exactly what your business does and how it operates enables you to plan effectively for profits. This means

you must be able to clearly identify the goals of your business at the beginning of your planning. Long- and short-term goals set the direction by which the kelp farming business can become a reality. Long-term goals are accomplished over several business cycles, while short-term goals create a path to the attainment of long-term goals. Once the goals are clear, then you can start figuring out ways to make a profit. Deciding what your business is—and what it will be in five years—is the most important single decision you have to make. Your judgment of what the central activity is (or what the central activities are) is crucial. Your entire planning effort is based on your perception of what business you are in. So be sure to think this decision through.

Once goals have been established, a basic plan, including various alternatives, is developed. All alternatives should be evaluated using criteria developed from the goals. The analysis of the alternatives should be consistent for comparison ("apples to apples") and should be capable of producing one or two best plans. The types of alternatives are highly dependent on the nature of the aquaculture activity (i.e., location, scale, level of integration, technology). After identifying various alternatives, the next step in the analysis is to set criteria by which the alternatives can be compared. Because most goals are financially oriented, one set of criteria is financial statements (other criteria, such as production goals, should be considered). Pro forma financial statements include cash flow, income statement, balance sheet, and the statement of changes in financial position. Specific criteria can be adapted from these statements, such as internal rate of return, payback period, and financial ratios. These criteria can then be used by the farmer to select one or two best plans from the alternatives.

Target market

This will be covered in-depth in the Marketing Plan section. Here, briefly explain who your target customers are.

Industry

Describe your industry and what makes your business competitive: Is the industry growing, mature or stable? What is the industry outlook long-term and short-term? How will your business take advantage of projected industry changes and trends? What might happen to your competitors, and how will your business successfully compete?

Legal structure

- **Is your business a sole proprietorship, LLC, partnership, or corporation? Why did you choose this particular form of business?**
- **If there is more than one owner, explain how ownership is divided. If you have investors, explain the percentage of shares they own. This information is important to investors and lenders.**

There are many different forms of **organization and structure for a business,** each of which requires different types and levels of management. For some types of aquaculture businesses, a sole proprietorship or LLC structure may be sufficient, but in others, a corporate structure with a board of directors may be warranted. An aquaculture operation can also be part of a cooperative. The reasons to choose one type of business structure over another often involve the degree and extent of personal liability of the owners in the event of adverse financial or legal actions but also in terms of how the proceeds of the business are taxed. Thus, there are various advantages and disadvantages associated with the choice of the most appropriate business structure, and it is important to evaluate those choices periodically. Your accountant and attorney will be important resource partners for making that decision. As a business changes over time, it may be worthwhile to change the organization and structure of the business in response to changing conditions and the size of the business.

Before you move on

- Work through the **elevator pitch** to define your value proposition. Enter that statement in the corresponding section of your Business Model Canvas.
- Once you've clarified your value proposition and overall direction, draft a Description of the Business which addresses all the points above.
- Remember that this first draft will probably evolve as you work through the details in the rest of your plan.

Expert resources:

In addition to the kelp cultivation-specific contacts listed in the Annex to this document, guidance on different business structures can be obtained from the SCORE mentorship program or the Small Business Development Centers, both through the Small Business Administration. (www.SCORE.org) These business advisors may be able to provide guidance on where to start with paperwork and necessary employer tax filings and other business matters.

Sara Gonzalez, right, post-doctoral scholar at Woods Hole Oceanographic Institution, speaks with Lisa Scala, director of sales and marketing at Oceans Balance in Portland, ME, at the Sea Grant Seaweed Hub Symposium in April 2023.

Jude Mascarenhas, director of operations at the Sheraton Hartford South in Rocky Hill, CT, tries some of the rice pilaf and other dishes with chefs who gathered in the hotel kitchen to learn about kelp from chef Jeff Trombetta in December 2018.

PRODUCTS AND SERVICES

An agricultural commodity such as kelp can be thought of as an undifferentiated product. How, then, are you going to stand out from the competition? How are you going to turn a profit?

Differentiating your products and services from the competition starts with product knowledge. One of the most important aspects of business management is giving your markets reasons to buy your products—and one of the best reasons is that the benefits you offer meet the market's desires. People tend to buy what they want, not what you think they need.

Even if you mention your products and services only in passing in your business plan, you should go through the exercises below. They will help you better understand how to position your business—and can make a difference when an investor asks "what makes your venture special?"

The key question is not: "What are your products or services?" The question is:

What are you selling? You are growing kelp, but are you selling food for humans? Animal feed or fertilizers?

What are the benefits (as opposed to the features) of what you are selling? Why would somebody buy from you?

How do your products and/or services differ from competitive products and/or services? Customers buy benefits. Features make those benefits possible–the freshness of your product is a feature. The taste and the perception that these foods are fresh, natural, and healthy are benefits that customers (including wholesale) infer from the product line. Other growers offer other benefits–more convenient locations, proven reputation (habit is powerful), and long-term vendor relationships with wholesale markets.

Before you move on:

- Start by listing all of your company's core products and services. Note in which new ways the products or services might be able to be offered. Also, consider offering a service to a physical product or a physical product to a service. For example, you could offer recipes along with your kelp product, or seaweed samples to your educational services (if those are part of your business model).
- Who are the customers for each product? What are they willing to pay for these products and/or services?
- Do you have a new product idea? Contact your existing or potential customers to evaluate market interest in the product. See if there are other competitors offering those at this time.

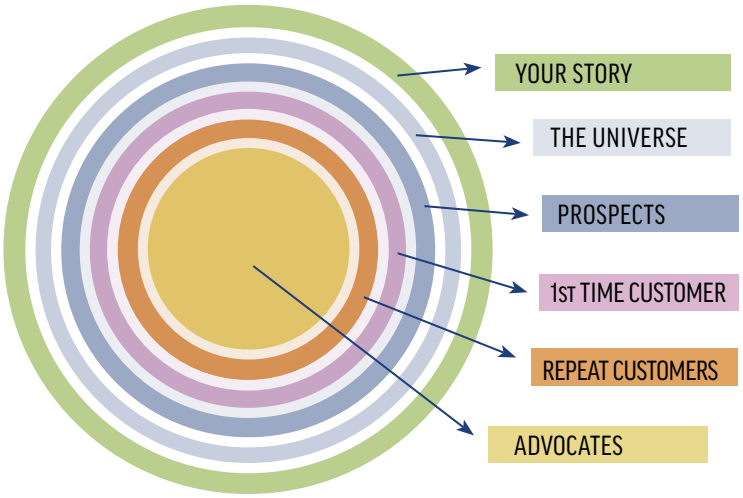
MARKETING PLAN – YOUR CUSTOMER RELATIONSHIPS, SEGMENTS, AND DISTRIBUTION CHANNELS

In this section of your business plan, you will develop a ***marketing strategy,*** a plan within a plan. Your business will thrive or fail according to how well you satisfy your market's perceptions, wants, and expectations. This means you must learn who your customers and prospects are, why they buy from you or someone else, and what you can do to get more customers.

Marketing is far more than "selling" or "advertising." It is an integrated set of activities that are all focused on the target—the committed, enthusiastic repeat customer who brings in more business for you. Everything in your business, whether it's a start-up, old or new, big or small, revolves around your customers and prospects (people you plan to have as customers). Your product or service has to be tailored to their perceptions of what is worth buying. You must be thoroughly knowledgeable about your market and the people who buy or will buy your service, product, or merchandise. You need a stream of customers who will buy your goods and services at a price that yields a profit over a sufficient period to keep your business healthy and growing. Ideally, you want your customers to be your advocates—to be your best salespeople.

Many businesses have found it helpful to envision a **"bullseye"** for their marketing plan. Each successive ring of the target entails a different set of activities with a different cost structure. As you begin developing your marketing plan, consider thinking through the concept on the right-hand side of this illustration as a starting point:

A larger version of this bullseye is available as worksheet #5 at the end of this document.



The market for kelp and seed

Please note that this guide and the associated financial models assume that you are marketing non-processed wet kelp.

Most seaweed farmed in the United States is used for human food products, but this makes up a small portion of the total edible seaweed market in the United States. The total domestic edible seaweed market is approximately 16 million pounds dry weight (Island Institute 2020). Imported products represent almost all the current domestic edible seaweed supply (more than 98%). As of 2023, the U.S.–farmed edible seaweed harvest is an estimated 1.5 million pounds, or the equivalent of almost 150,000 dry pounds (Island Institute 2020; National Seaweed Hub State of the States, 2023.). Alaska and Maine produce the largest volumes.

The current and prospective seaweed markets in the United States include (McKinley Research 2021, Seaweed Hub Market Outlet infographic, 2022)

1. Human consumption: This market category includes seaweeds sold in their fresh, frozen, dried, and value-added (processed) form to consumers or used as ingredients in other food products, such as consumer-ready seaweed salads, spice blends, etc. Please note, the majority of products currently available in the retail outlets are from imported sources; however, domestic seaweed products are gaining and establishing market share. This is the primary market for seaweeds farmed in the United States.

2. Fertilizer and animal feeds: This market category includes seaweeds sold for and processed into fertilizers, soil amendments, biostimulants, animal health supplements, and animal and pet feeds. It is important to understand that while these markets require a larger volume, they are typically lower in value than food and, therefore, maysell at a lower price point. U.S. wild harvested seaweed, primarily rockweed *(Ascophyllum nodosum)*, accounts for the majority domestic market share in these categories.

3. Seaweed extracts and cosmetics: Although mostly sourced from overseas, seaweed products in this category include extracts such as hydrocolloids (i.e. alginates) used as thickening agents in the food industry and fucoidan, which is used in high-value nutritional supplements. While very limited, some farmers have incorporated kelp as an additive in soaps and beauty products, either in their whole form or processed into extracts. Lack of processing facilities and biorefineries required to extract the desired components from kelp are factors limiting market viability for this category.

4. Biofuels and biomaterials: This category represents both current and ***prospective*** markets. Prospective biofuel markets will be driven by volume and will be dependent on the availability of biorefineries and associated infrastructure. Though benchtop trials and R&D for the production of seaweed-derived biofuels are underway, realization and commercialization of this market may be many years away. However, biomaterials represent a current and expanding market for farmed seaweed, with seaweed currently used as a plastic replacement in commercial products such as injection-mold resins and home-compostable packaging and films.

5. Non-consumptive market opportunities: This category is a ***prospective*** market, which includes carbon capture and ecosystem services—markets that produce environmental benefits rather than tangible products. Though research is underway, no voluntary carbon protocol for seaweed currently exists, and prospective carbon sequestered by seaweed is not included in voluntary carbon markets. Privately-funded subsidies based on the assumed climate benefits of farmed seaweed exist, and some seaweed farms have tapped into these markets.. While not yet established, this does represent a ***potential*** market opportunity as the research necessary to establish this market is underway..

It needs to be noted that processing infrastructure is currently limited and primarily located in Alaska and Maine. The Island Institute (2020) reports that domestic processors of sugar/skinny kelp, bull kelp, and ribbon kelp, as well as a small number of regional species (such as dulse and laver that are cultivated in tanks/land-based systems, not open water), have primarily focused their product development efforts on value-added products, in dried and fresh formats, for snacking, appetizers/meal accompaniments, condiments, salad components, beverages, and seasonings.

The Island Institute (2020) reports that retail outlets make up an estimated 65% of the U.S. edible seaweed market, primarily U.S. Asian markets, with health and natural food stores as the only segment regularly selling domestically produced seaweed products. Food service outlets, primarily Asian restaurants, make up the remaining market, with only independent fine dining restaurants and colleges/universities listed as regularly using domestic seaweeds. In all, three market channels totaling 23% of the U.S. edible seaweed market regularly sell at least some seaweed products of domestic origin.

McKinley Research (2021) reports that farm-gate prices (the price paid for a crop at harvest) by processing or manufacturing companies have generally trended down in the first few years of commercial sales in Maine and Alaska. In Maine, average prices for the entire farmed seaweed harvest dropped from $0.71 a pound to $0.60 a pound between 2018 and 2020 (Maine Department of Marine Resources, 2022). In Alaska, average prices dropped from $0.70 a pound to $0.54 a pound from 2018 to 2019. These price drops likely reflect the costs associated with scaling processing operations and reaching new markets for processors, who often set the farm-gate price by contracting with farms at the beginning of the season. For crops that are not sold directly to a processor, seaweed farmers report an average retail sale price between $8-$12 per pound (wet weight). While this seems high, the farmers selling direct to consumers take on the burden of branding, marketing, and sales, in addition to packaging and transport. Also, the volume sold directly is often much lower than seaweed sold to processing or manufacturing companies.

For food markets, primary-processed crops that are shelf-stable have a higher market value and may buy farmers and processors time to reach markets and diversify sales. Kelp contains a high water content, making it extremely perishable if not properly stored and processed into a shelf stable form shortly following harvest. For human food markets, the Food and Drug Administration (FDA) considers seaweed as a Raw Agricultural Commodity. Under this category, kelp farmers wishing to extend the shelf-life of their products can conduct minimal stabilization techniques (i.e. drying) and generate access to more potential markets, including commercial processors, value-added food manufacturers, chefs, and final consumers via direct sales. The Island Institute (2020) reports that farmers completing the first stage of processing to dry the seaweed can expect to receive $6.00–$8.00 per dried pound. (Note: it typically requires approximately 10 pounds of wet seaweed to yield one dry pound.). Those interested in processing beyond minimal techniques and pursuing the development of value-added products will need to keep in mind additional state and federal regulations may apply. Though not included within the scope of this business planning document, farmers may want to consider the direct and indirect benefits to incorporating a stabilization process as part of their on-farm operations.

Additional information on primary processing can be found here: *Seaweed Handling and Processing Guidelines for Alaska:* **https://seagrant.uaf.edu/bookstore/pubs/MAB-81.html**

Species produced also influences average prices for farmed seaweed. Among the current primary species grown, ribbon and winged kelp (Alaria spp.) generally sells at higher prices than sugar kelp. Though not widely farmed, a number of domestic wild harvested seaweed species, such as dulse (Palmaria spp.) and nori (Porphyra spp., Pyropia spp.), have well established, high value and market demand compared to kelp species. Finally, organically certified seaweed products may achieve a price premium.

Four varieties of dried seaweed and kelp seasonings were among products from Maine displayed at the Seaweed Showcase during the National Seaweed Symposium in March 2020.

Currently, information about market structures for kelp seed production (or the nursery phase) is limited. Due to the short production cycle and required infrastructure and expertise, the demand for kelp seed is filled by vertically integrated nursery-processor businesses, farmer cooperatives and research laboratories, as their resources can cover the costs to produce seed and seeded spools. Determining the value of seed (or how much it's worth) can contribute to a better informed end price point for fully grown kelp. A kelp farmer may consider incorporating seed production into their operations if they don't have access to or are located at great distances from a nursery facility or want to ensure a back-up supply of seed. Farmers may also consider selling reliable seed to other farmers, potentially generating additional revenue. However, farms not experienced in seed production should keep in mind the considerable technical laboratory skills, time, and equipment required to successfully operate a kelp nursery.

Develop a marketing plan

Now that you have a sense of the overall market potential and pricing for kelp and kelp seed, you need to develop a **marketing plan** which addresses how you are going to achieve sales in those markets. Finding a market for the kelp produced may be the most important task. Marketing must be considered in planning the enterprise. Knowing where the crop is going to be marketed could influence what is grown; the farm design; seeding, harvest, and handling strategies; among other factors. All too often, the product is produced, and then a market is sought. ***Marketing must be considered before the product is grown and not as an afterthought.*** As a kelp farmer, you have to first know what the market wants and then produce for it. You will have to shift away from a strict "production mentality" to a "market mentality," to where the market will drive production decisions within technological limitations. Understanding market requirements such as product form, quality, volume, and location can lead to higher prices and higher profits when market information is included in production management.

Information for market planning is available through a variety of sources including aquaculture industry publications, other producers, industry associations, agribusiness firms, university researchers, government agencies, Sea Grant extension, processors, and buyers (See Annex 1).

Background on the market for kelp should explain:

- the total size of your industry
- trends in the industry—is it growing or shrinking?
- the total size of your target market, and what share is realistic for you to obtain
- trends in the target market—is it growing or shrinking? How are customer needs or preferences changing?

Knowing that a market exists is the starting point. Gaining access to the market can often pose a problem. There may be entry barriers that must be overcome before the product can be marketed. **Barriers to entry** might include:

- high startup costs
- high production costs
- high marketing costs
- brand recognition challenges
- finding qualified employees
- need for specialized technology, infrastructure or patents
- regulations and permits.

One of the biggest mistakes you can make in a marketing plan is to claim you have "no competition." Every business has **competitors**. Your plan must show that you've identified yours and understand how to differentiate your business. List key companies that compete with you (including names and locations), products that compete with yours, and/or services that compete with yours. Do they compete across the board, or for specific products, for certain customers, or in certain geographic areas? You can use the worksheet below to keep track of the competitive landscape.

You should have a clear understanding of your **business's niche** (your unique segment of the market) as well as your positioning (how you want to present your company to customers).

How can a new producer gain **access to the market**? Some methods require innovation and salesmanship, while others are more direct. A small producer may find direct sales to consumers as the best alternative. A larger producer may be able to contract with an established buyer/processor. Examples on direct market strategies are available here: Alternative Marketing of Your Catch | Market Your Catch (ucsb.edu); Direct Marketing - Fishbiz: Alaska Fisheries Business Assistance Project (uaf.edu).

To take the best advantage of the market, you should develop and keep an up-to-date **marketing plan**. Due to the uncertainty of demand and prices, planning the marketing strategy becomes very important. Market planning is not a one-stage process. It must be continuous throughout the year. A successful market plan must be flexible. The market plan must address several critical points, including:

- the location of the market
- the competition
- the volume the market requires
- when the market needs the product
- when the harvest will be ready
- the quality necessary to satisfy the market
- the market requirements (size, form)
- product delivery and handling
- the cost/price relationship.

The market plan should be reviewed and revised often. Market planning is not to "predict" but to "interpret" pricing and market alternatives. Pricing and market decisions should be made when the odds are that realistic pricing and financial goals can be reached based on the outlook. Market planning requires discipline and tough decision-making but can determine the success and failure of the kelp aquaculture operation. A marketing plan should be prepared for each outlet and product chosen by the producer.

The marketing plan can help make decisions about the next step processing of the kelp crops. Will it be sold raw? As unprocessed kelp has an extremely short shelf life, will you need to consider some processing and storage to extend shelf life? Will the kelp be sold directly to end-users or a commercial processing facility? Does a kelp processing facility exist in the area? In most states, there are a limited number of commercial seaweed processors to serve this geographically dispersed industry.

The marketing plan can also help make decisions about the nursery operation and the market for kelp seed. What is the current market for, and value of, seed and what will be the future market based on the projected growth of the kelp aquaculture industry?

We discussed pricing briefly in the "Products & Services" section; now it's time to go into more detail. How do you plan to set prices? Keep in mind that few small businesses can compete on price without hurting their profit margins. Instead of offering the lowest price, it's better to go with an average price and compete on quality and service.

- **Does your pricing strategy reflect your positioning?**
- **Compare your prices with your competitors. Are they higher, lower, or the same? Why?**
- **How important is price to your customers? It may not be a deciding factor.**
- **What will your customer service and credit policies be?**

Distribution channels

Distribution is a highly important and visible part of your marketing efforts. The type of distribution channel you choose may be direct (to the end user) or indirect (through intermediaries, wholesalers, distributors). The right channel for *your* business may consist of more than one channel of distribution, a decision not to be made lightly. What do other people in your industry do? Should you alter this or (more likely) follow the trend? You can use the **worksheet provided** to help you think through the options for distribution channels.

Potential distribution channels include:

- **sale to a processing company or value-added producer**
- **contract with a processing company to process the crop that is then returned to the farmer for a fee**
- **local sales to stores—fish markets, food markets, specialty stores, restaurants**
- **sales to chain outlets—restaurants, supermarkets**
- **sales to institutions—government agencies, food service**
- **sales to a cooperative to aggregate crop**
- **sales through a seafood broker**
- **sales for export**
- **direct sales of raw kelp to consumers**
- **seafood buying clubs/CSA programs**
- **e-markets (online sales)**
- **roadside stand and food trucks.**

There are higher and lower profit margins within these market outlets. For example, direct sales to consumers at a farmer's market may be a high-profit margin (very high price per pound) for the farmer, but will likely require working with smaller volumes and investing additional time and resources. On the other hand, commercial processors are more likely to consistently purchase much higher volumes and streamline the selling process for the farmer, but typically offer a lower price per pound. An important distinction is that for lower volume, higher value sales, the farmer is often setting the price. For the higher volume/lower value sales, the processor/product manufacturer is typically the one setting the price.

In many situations, the volume, quality, and price may be determined by the buyer. Consequently, the producer must be willing to work with the buyer and meet the market requirements. Product quality is vital for successful marketing, as is the ability to provide good service at competitive prices. Major factors of importance to buyers at the time of purchase include:

- **available and consistent supply**
- **quality guarantee**
- **price.**

Furthermore, buyers in food and food products markets may be interested in additional factors including appearance, flavor, freshness, and food safety. An understanding of the market requirements and a commitment to fulfilling them are fundamental to success. Marketing takes effort. Undertaking you own marketing of kelp products entails costs that many producers don't consider and can include:

- the physical delivery of the products to the customers
- harvest, handling, and storage methods that comply with food safe practices
- personal transportation to and from customers
- opportunity cost of your time spent marketing (what it costs you to spend your time doing marketing vs. doing other things that can earn money)
- effort and time dedicated to outreach and education on your crop and ways customers can utilize it
- product branding and brand identity including social media (even if it's free, it's not free)
- networking with other kelp farmers and seafood producers.

Note: Sea Grant's Seaweed Hub provides a marketing tool that can help with this. https://www.seaweedtoolkit.com

A sample outline for a marketing plan

Many businesses have found the following outline useful in developing their marketing plan. Keep in mind that your marketing plan should not sit on a shelf; your marketing plan provides the information that you need to keep up-to-date with market trends and opportunities and make informed business decisions. While you don't need to write and re-write a formal document year after year, having all this information available in one place will be invaluable.

Marketing History – once you're in operation, you will want to keep this information up to date:

- inventory of previous production—producer/competition
- harvest dates
- transportation costs
- prices in various markets
- market requirements
- problem/opportunities

Current Market Situation – The information provided in the previous section of this guidebook is a starting point, but you will need to keep up to date and relevant to your particular market and location. It is important to document your sources of market information to ensure they are reliable and don't provide a false sense of the trends.

- market situation—size of market, price, consumer profile
- production situation—form, quality, size, price
- competitive situation—market share, production, market strategy, market location
- distribution situation—market channels, market margin
- macroeconomy situation—political, regulatory, financial, international
- buyer situation—number, requirements, location

Opportunity and Issue Analysis—This is a summary of major problems/opportunities/strengths and weaknesses, as well as issues facing the product. This is discussed in more detail in the **Planning for the Future** of this guidebook.

Business Objectives—This will help to define the future goals of the business as they relate to production, profit, growth, and market share.

Market Strategy—This is a market alternative identification for primary and secondary markets and salvage operations. This process will help you come up with a strategy for each market alternative price, market requirements, processing, distribution services, costs, buyer needs, linking arrangements with other products, profit.

Cost Estimates—This includes cost of production, break-even price and production cost estimates from competing areas, which you will derive from the business planning process.

Action Program—This will help you to coordinate with potential buyers to determine price, volume, availability, market requirements, market services, harvest, and delivery time. You can use the worksheets provided later in this section to develop a marketing action program.

Coordinate Feedback Procedure—This will help you establish feedback procedures and controls to monitor plans from customers, buyers, etc.

Before you move on

- Complete the worksheets to define the action-oriented elements of your marketing plan.
- Enter your thoughts into the Customer Relationships, Customer Segments, and Channels sections of your Business Model Canvas.
- Once you've done the necessary research, draft a marketing plan which addresses all the points above.
- Remember that this first draft will probably evolve as you work through the details in the rest of your plan.

Kelp seed is nurtured on string would around PVC pipe in a nursery. Gary Fretog / Alaska Sea Grant

OPERATIONAL PLAN—YOUR KEY ACTIVITIES, RESOURCES, AND PARTNERS

In this section of your business plan, you specify the details of how your kelp aquaculture business will operate. In addition to describing your operating procedures, you also need to address how you will organize and manage the business and what kinds of resources are available to you.

According to various studies of factors involved in small business failures, 98% of the failures stem from managerial weakness. Two percent are due to factors beyond the control of the persons involved. Your business plan must take this into account. If you are preparing a financing proposal, you should make sure that your prospective financing source is aware of what steps you have taken or are taking to correct any weakness in your managerial staff (which includes you and other managers); if you are to use your business plan to its fullest, you should use this segment to highlight both strengths and weaknesses of management for your own benefit.

Please note that this publication is not a kelp aquaculture technical instruction manual. The introductory material below is meant to provide a general overview of kelp aquaculture. Technical assistance can be obtained from your state Sea Grant or private consultants.

Kelp Culture: Overview

Algae refers to both macroalgae (seaweed) and microalgae, which are photosynthetic aquatic organisms. Seaweeds are a diverse group of macroscopic multicellular marine algae that are a fundamental part of ocean and coastal ecosystems. Seaweeds are primary producers and form the energy base of the food web for aquatic organisms; they can provide various environmental benefits and ecosystem services, such as eutrophication mitigation, carbon capture or sequestration, ocean acidification mitigation, habitat provisioning, and shoreline protection, among others. Many species of seaweeds have also been important marine resources for humans for centuries. Kelps (a type of seaweed) have a seasonal cycle of growth and reproduction. The combined influences of light, photoperiod, and temperature influence kelp growth and development (Luning, 1990). Cultivated kelp in the United States has a winter growing season that begins in fall and extends until the spring harvest, with much of the growth occurring in early spring as light levels and nutrient availability increase.

Kelp species *(Laminaria/Saccharina)* also *Alaria, Nereocystis*, etc., have the same basic life cycle and can be cultivated using the same techniques (Redmond et al., 2014). The life cycle has two phases (called a heteromorphic life cycle: a large visible phase (the sporophyte phase) that produces large blades known for forming underwater forests, and a microscopic phase (the gametophyte phase) that is filamentous and impossible to view with the unaided eye. The natural life cycle of kelp produces two harvestable sporophyte (adult) populations per year in most locations (Egan and Yarish 1990; van Patten and Yarish 1993; Boderskoy et al. 2021).

The growth cycle starts when reproductive material (sorus tissue) develops. From the sorus tissue, male and female spores are released. After germination, they develop into microscopic gametophytes which produce eggs and spermatozoids. After fertilization, a diploid sporophyte develops. In a natural environment, the sporophytes settle on a suitable substrate (i.e. rocks), while in a kelp nursery these juvenile sporophytes settle onto thin twine (seeded string) in tanks. Growth of these sporophytes in the nursery takes approximately 1.5 to 3 months, after which the seeded string can be deployed on longline systems at sea. The kelp grows for 5-8 months, at which point the biomass is harvested from the longline in the spring.

Kelp culture consists of three main steps—***inoculation, lab culture, and field culture*** (Redmond et al., 2014). Inoculation and lab culture occur in a land-based kelp nursery setting, and field culture occurs in a grow-out system on a permitted coastal site. The farming calendar is dictated by the species, the weather, the local water conditions, and sometimes the buyer (Flavin et al., 2013). ***In general, nursery work (inoculation, lab culture) takes place from September through November (Q3 of the calendar year), seeding takes place from late October through November (Q4 of the calendar year), and harvesting takes place from April through June (Q2 of the calendar year).*** Most kelp farms are fully seeded before December and then harvested in the spring before the water temperature rises, avoiding biofouling (organisms that attach to the kelp and gear) that degrades the quality of the kelp.

Users of this planning guide may be operating a stand-alone kelp nursery, a stand-alone kelp farm operation, or a vertically integrated operation. A vertically integrated business is one that controls various stages in the supply chain (i.e. nursery and grow-out farm) or the various stages involved with getting product to the end consumer (i.e. farm and processing). While vertically integrated businesses may be better able to control price, product, and volume as they control various stages of the kelp supply chain, there may a higher investment on the front end, seasonal conflicts with other components of a fisheries or maritime business (i.e. lobstering), and require diversified operations and occupational skill sets (i.e. lab manager vs. on-farm operations).

Economies of scale exist in aquaculture. Economies of scale are represented by a decrease in the per-unit cost of production as output (total production) increases (Engle 2010). Economies of scale are used to identify the optimal or best size of the farm, or the farm size that results in the lowest cost per pound of production. If the costs of production per pound decrease as the farm size increases, economies of scale exist. The enterprise budget, described below, can provide information on determining economies of scale.

The following questions can help you think about the biophysical requirements for kelp culture:

- **What are the land, water column, or water bottom size requirements for the operation?**
- **How is the access to the area? Can you reach the area in winter weather conditions?**
- **Will you need to access or establish a shore-based facility for operations?**
- **Is the water quality suitable for your product? Temperature__ alkalinity__ dissolved oxygen__ hardness__ salinity__ ammonia__ pH__ water clarity__ water current__**
- **Is the area protected from or susceptible to storms?**
- **Are you able to expand your farm in the future if desired?**
- **Are there any federal or state regulations restricting use of the site? For example protected habitat, endangered species, etc.**
- **Can you purchase required production equipment locally?**
- **Can you make or retrofit needed production equipment?**
- **Can you get specialized production equipment serviced locally?**
- **Is trained and reliable labor available?**
- **What diseases and predators affect the species?**
- **Are dependable disease diagnostic services available?**
- **How many favorable growing season days are there in a year?**
- **What is the length of the expected production cycle?**
- **Is your production goal reasonable for your location and available environmental resources?**
- **What could cause losses in the operation?**

Permitting

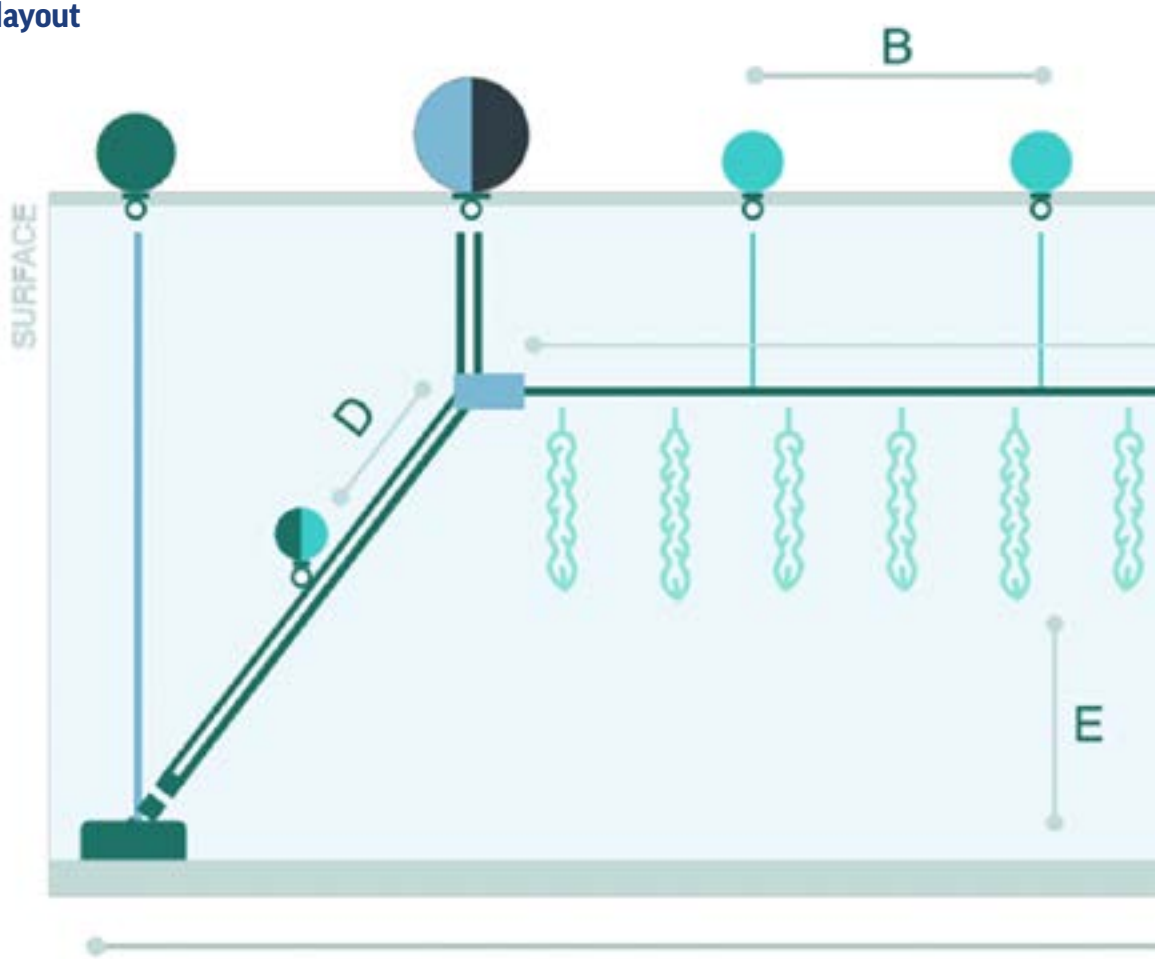
Each state has a different permitting process for kelp aquaculture, and, regardless of the state, a permit from the U.S. Army Corp of Engineers, and possibly local municipal authorities, will be required. Anyone interested in investing in kelp culture must be aware that federal and local regulations may affect business plans, and they should spend time investigating regulations and the potential impacts of these regulations on the business. In addition, the regulatory process of permitting on-land nursery operations will differ from ocean-based grow-out systems .

Information and assistance for the permitting and leasing process for kelp farms can be obtained from the contacts provided by state in the Annex to this document.

Permitting: nursery operations

A land-based kelp nursery may require permits regulating the pumping of seawater and discharge of waste. States will have different pumping and discharge regulations. Regulations restricting the importation and/or transport of reproductive sorus tissue will also vary by state. Other permits to operate a land-based facility may be necessary.

General kelp line layout



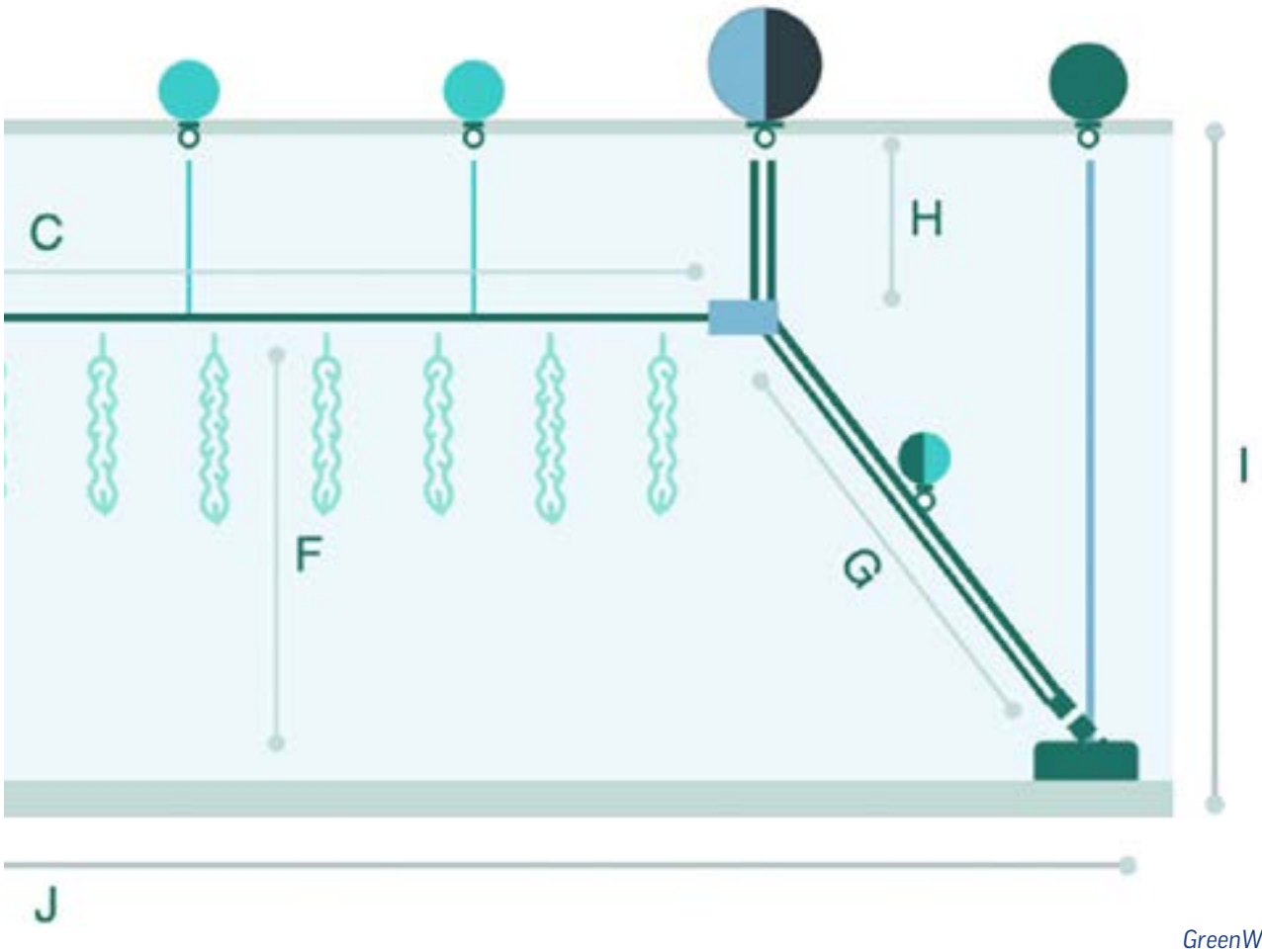
Permitting: Farm operations

Any kelp farm operation will need to obtain a site lease or license. A kelp lease or license is a legal agreement between the lessee and the lessor detailing the authorized use and restrictions on a specified site. Some states and/or municipal authorities may identify sites eligible for kelp culture purposes. The lease applicant may need to be a resident of the state in which the application is being made. A state and/or municipal authority may identify a maximum amount of acreage that any one individual or business may be assigned on any single application. Leases are normally granted for a fixed time.

As mentioned, the process of obtaining a lease permit will differ by state but, in general involves:

- government agency application and site review
- public hearing and/or public notice
- decision on application
- application fees.

The application process may require the hiring of professionals, such as engineers or lawyers to provide information on system design, mapping and regulations.



GreenWave's Hub

Each state may put restrictions on a lease use such as gear specifications, water column use, and seasonal gear removal. State authorization may be required for use of aquatic organisms. In order to harvest and sell a product for public consumption, the applicant may need a harvest license and need to take appropriate food safety trainings and measures, and undergo possible inspection of vessels and facilities. A processed seaweed product (cut, blanched, cooked, frozen) may require additional licensing (i.e., municipal business license). Contacts listed in the Annex can assist potential applicants with navigating these processes in each state.

Site Selection

Site selection is a critical consideration for potential kelp operations. Site selection criteria include providing for the biophysical needs of the kelp, regulations, and operational factors. Kelp culture requires four components—clean seawater, current/water flow, water temperature, and light. These considerations will influence the growth and survival of the kelp, as well as costs and profits. For ocean farms, site selection will be a compromise between meeting federal and state requirements, understanding the priorities of the community and other marine users, and meeting the biological needs of the kelp (Flavin et al., 2014). Site location and access are important as there will be frequent visits. A site that is difficult or time consuming to access either by land or water may not be economically feasible.

Site Selection: Nursery Operations

Generally, a kelp nursery is a land-based facility located near the ocean or inland, although some operations have a floating facility, such as a barge or vessel. Sea water can be obtained either directly from the sea (pumped in) or brought to the nursery in transfer tanks. Distance to be traveled from the source of seawater to the nursery will add costs to the operation. Other considerations include access to fresh water, road access, shipping logistics, and water disposal.

The financial model associated with this planning guide allows for two options for a kelp nursery, as described above. The first option—"Pumped In"—tends to be a larger facility, whereas the second option—"seawater transport"—tends to be a smaller facility.

Site Selection: Farm

Grow-out systems are comprised of horizontal longlines suspended at a depth below the surface of the water where the kelp will receive enough sunlight during the growing season. In addition to the list of biophysical requirements and regulatory considerations provided above, Flavin et al. (2014) provides additional grow-out site selection guidance (although it will differ by state). Some of these recommendations are:

- adequate current (one to two knots during peak ebb and flood)
- sufficient nutrients
- a protected lee from winter storms and ice flows. This will reduce wear and tear on the gear.
- good holding ground for the moorings or anchors.
- a depth in excess of 18 feet at mean low water (MLW). This will reduce the chance of kelp touching bottom, helping to keep it clean by reducing the amount of biofouling on longlines.
- is at least 1,000 feet from any state- or municipally owned pier, beach, etc.
- sites at least 1,000 feet from the nearest riparian owner. A riparian owner is a shorefront property owner, and some may object to having a kelp farm close to their shorefront property. If possible, siting farms away from riparian owners may minimize conflicts.

Nursery systems operations

Please note that the technical skills and knowledge required to operate a nursery are significantly different than running a grow-out farm.

Of nursery systems, Flavin et al. (2013) write that:

"The nursery or laboratory is an area that is used for isolating kelp spores and supporting the early growth of young kelp plants (e.g., sporophytes) for later out-placement to sea. Regardless of the size or goals of the nursery, each nursery designed to grow kelp must aim to replicate the essential environmental conditions (water temperature, light, salinity, nutrient levels) found in its native habitat. One key advantage of a nursery setup is the ability to control these conditions for optimal growth and increased survival. As such, the function of every nursery is threefold: 1) support the growth of kelp from spores through sporophytes, 2) replicate the environmental conditions found naturally, and 3) control contamination.

"Operation of the nursery requires the understanding and use of basic laboratory equipment, attention to detail, and the ability to monitor and control the environmental conditions to support growth of the kelp. A variety of nursery designs and procedures are available for private and commercial seaweed growers; however, each of these are specifically tailored for the goals and capabilities of that particular nursery. For instance, factors such as cost can vary dramatically depending on the nursery design and equipment purchased to meet these requirements."

Building a kelp nursery facility

While guidebooks on nursery operations exist, please note that the research into new techniques and improving efficiencies is rapidly advancing. Current basic requirements for kelp nursery operations consist of the following:

- a space
- a means to get seawater into your space
- a seawater filtration/sterilization system
- a collection of sorus tissue from wild stocks or gametophyte culture
- a nursery tank culture system
- a lighting system
- an aeration system
- seed spools
- laboratory equipment
- nutrient media and seawater additives.

The following publications are recommended for more detailed information on kelp nursery systems:

Barbery, K., Stephens, M., Hamilton, A., Augyte, S. April 2020. "GreenWave Kelp Hatchery Standard Operating Procedures." GreenWave, New Haven, Connecticut. Connecticut Seaweed Hub seaweedhub.org
Starting an ocean farm: https://hub.greenwave.org/dashboard/ocean-farming-start/assess
Running an ocean farm/annual operations: https://hub.greenwave.org/dashboard/ocean-farming-run/fall
Starting a kelp hatchery: https://hub.greenwave.org/dashboard/hatchery-start/assess
Annual operations/running a kelp hatchery: https://hub.greenwave.org/dashboard/hatchery-run/prepare

Boderskov, T., M.B. Rasmussen and A. Bruhn. 2021. *Obtaining Spores for the Production of Saccharina latissima: Seasonal Limitations in Nature, and Induction of Sporogenesis in Darkness. Journal of Applied Phycology (2021) 33:1035–1046.* (Please contact your Sea Grant extension specialist to obtain a copy.)

Egan, B. and C. Yarish. 1990. "Productivity and life history of *Laminaria longicruris* de la Pyl. at its southern limit in the Western Atlantic Ocean." *Mar. Ecol. Prog. Ser. 76: 263273263273.* (Please contact your Sea Grant extension specialist to obtain a copy.)

Redmond, S., L. Green, C. Yarish, , J. Kim, and C. Neefus. 2014. *New England Seaweed Culture Handbook-Nursery Systems.* Connecticut Sea Grant *CTSG-14-01. 92 pp.* URL: http://seagrant.uconn.edu/publications/aquaculture/handbook.pdf. 92 pp.

Flavin, K, N. Flavin, B. Flahive. 2013. *Kelp Farming Manual: A Guide to the Processes, Techniques, and Equipment for Farming Kelp in New England Waters.* Ocean Approved. Portland, Maine. OceanApproved_KelpManualLowRez.pdf *(maineaqua.org)*

Van Patten, P. and C. Yarish. 1993. "Allocation of blade surface to reproduction in *Laminaria longicruris* of Long Island Sound." *Hydrobiologia 260/261: 173¬181* (Please contact your Sea Grant extension specialist to obtain a copy.)

Kelp Farm System Operations

Of kelp farming systems, Redmond et al. (2014) write that:

"Grow-out systems are horizontal longline systems placed at some depth below the surface of the water that will provide sufficient amount of sunlight to the growing kelp blades, especially during the winter months. Ideal depth may change depending on light availability and water clarity, and lines are adjusted to optimize growth. Seeding of longlines uses a procedure wherein the grow-line is threaded through the PVC seed spool, and seed string is 'spooled off' in a spiral fashion onto the grow-line. Optimal depth placement of the longlines will depend on the growth site, water clarity, and season, but recommended depth placement is at 12 meters. Once out-planted, blades require little attention. The longline system is checked on a regular basis to ensure that there is no loss or damage from storms, vandalism, or passing boats. If blades are too crowded, thinning of the lines may be required."

Flavin et al. (2013) write that:

"The operation of the kelp farm is similar to any farmer or fisherman's work. Each phase of the operation has unique requirements which vary over time. Once the lines have been set and the sporophytes transferred to the site, the frequency of visits may drop to once every two weeks. However, as the kelp plants grow, the visits must be more frequent, up to once a week to weight any lines that may have become buoyant due to the increasing amount of gas contained in the stipes of the kelp."

After the winter farming season, farmers should be prepared to harvest kelp in the spring, once water temperatures begin to near 50˚F, when biofouling organisms will begin to degrade the quality. Of all the farm activities, kelp harvest and handling is the most time and resource intensive. Harvest season will require significantly more labor, planning, and costs as compared to other farm activities such as planting or winter maintenance. In advance of the harvest season, farmers should develop a harvest plan which consults with buyers and end users and organizes operations to minimize unforeseen costs.

Users of this guidebook should refer to the following publications for more detailed information on kelp grow-out systems:

Redmond, S., L. Green, C. Yarish, , J. Kim, and C. Neefus. 2014. *New England Seaweed Culture Handbook-Nursery Systems. Connecticut Sea Grant CTSG-14-01. 92 pp*. URL: http://seagrant.uconn.edu/publications/aquaculture/handbook.pdf. 92 pp.

Flavin, K, N. Flavin, B. Flahive. 2013. *Kelp Farming Manual: A Guide to the Processes, Techniques, and Equipment for Farming Kelp in New England Waters.* Ocean Approved. Portland, Maine OceanApproved_KelpManualLowRez.pdf (maineaqua.org)

Integrated System

The kelp farmer may want to consider vertical integration to position the business more favorably in the industry. A vertically integrated business is one that controls various stages in the supply chain (for example, a kelp nursery) or the stages as the product moves to the end consumer (for example, processing). A vertically integrated business may be better able to control price, product, and volume as it controls various stages of the kelp supply chain.

A nursery system may be integrated with the grow-out farm system. This vertical integration may allow the kelp farmer to manage the supply and quality of kelp sporophytes. The integrated system can supply sporophytes to the farm operation (i.e., keep for own use) and sell excess for additional income. The vertical integration may allow for retaining staff through multiple roles in the production process and certain equipment (i.e., out-planting) and infrastructure (i.e., building) and reduce overall operation costs. Economies of scale (reduced operational costs) may also be obtained from the integration.

However, vertically integrating these two business models comes with many additional considerations and costs. It can take years for nurseries to produce reliable high-quality seed, and farmer-operated nurseries should plan for a significant learning curve. Additionally, farmers seeking to vertically integrate should consider their capacity to incorporate new and developing nursery technology and methods, which could rapidly change domestic seed production.

Business Management

The kelp farming business requires careful thought and analysis of both how the business is structured and how it is managed. Business management is not only production but marketing, finance, personnel and staffing, administration, and accounting.

The following questions can help you think about how the business will be managed:

- What are your goals and objectives for the aquaculture business?
- Which type(s) of aquaculture interests you? Species____ Production method___
- Will your operation be a separate nursery, farm operation, or a combination of individual operations?
- What level of management intensity (extensive, semi-intensive, intensive) and/ or degree of integration with other products will the enterprise have?
- Is there a market potential, management, or cost efficiency reason for a particular size business?
- What experience do you have in managing the operation?
- Are you willing to provide the time and effort required to learn how to grow the product?
- Do you think that you will like the work and skills needed to produce the product?
- What skills and abilities will be needed to make the business successful?
- How will the business be organized? Sole proprietorship__ partnership___ corporation___ other____
- How much money can you survive on?
- How much money can you afford to invest?
- How will the business affect your family?
- How will the new business affect your present job?
- Will the aquaculture operation require hired labor? full-time__ part-time__
- How long until you expect the business to become operational?

- How long until you expect the business to become profitable?
- Are you in an area where the production facility can be leased or sold if you decide to cease operation?
- Do you have the necessary legal permits to produce the product?
- Do you know where to obtain information and technical assistance on the aquaculture of your selected species?

An important decision to be made early in the design of an aquaculture business is whether the **owner will manage the business** or whether it will be necessary to **hire a full-time manage**r or appropriate professional. In either case, the general manager of the business will need to engage in a variety of activities that are essential to the efficient performance of a business. Some managerial decisions involve very broad and long-term decisions related to the scope, scale, and targeted markets of the business, while other decisions involve very specific details of the business, such as accounting, boat maintenance, seawater collection for the nursery, finding and keeping labor, and harvesting the kelp. The manager must be able to think and plan strategically while maintaining efficiency in the day-to--day operations. (*Later in this guidebook, in the Operational Plan section, you will be prompted to provide much more detail about your management and organizational plans.*)

In the longer term, managers need to be prepared to stay ahead of risks and challenges. This planning guide includes a section on risk assessment and strategic planning. The frameworks for competitive assessment and financial risk evaluations are important parts of a professional aquaculture manager's toolkit. Management activities include a variety of activities that are essential to the efficient performance of a business.

A sample outline for an operational plan

Many businesses have found the following outline useful in developing their operational plan. As your business grows, you may want to update this information to meet your changing needs. As with the marketing plan, you don't need to write and rewrite a formal document year after year but having this information readily at hand will be useful. The operational plan will differ depending on the business model (i.e. kelp nursery, farm, or integrated system) you have.

1. Production

How will you produce your product or deliver your service? Describe your production methods, the equipment you'll use, and how much it will cost to produce what you sell.

2. Quality control

How will you maintain consistency? Describe the quality control procedures you'll use.

3. Location

Where is your business located? You briefly touched on this in the Company Overview. In this section, expand on that information with details such as:

- the size of your location
- the type of building, if applicable
- permitting requirements and schedule for renewal
- accessibility
- costs, including rent, maintenance, utilities, insurance, and any buildout or remodeling costs
- utilities
- opportunities for expansion.

4. Legal environment

What type of legal environment will your business operate in? How are you prepared to handle legal requirements? Include details such as:

- any licenses and/or permits that are needed and whether you've obtained them.
- any trademarks, copyrights, or patents that you have or are in the process of applying for.
- the insurance coverage your business requires and how much it costs.
- any environmental, health, or workplace regulations affecting your business.
- any special regulations affecting your industry.
- bonding requirements, if applicable.

5. Personnel

What type of personnel will your business need? Explain details such as:

- What types of employees? Are there any licensing or educational requirements?
- How many employees will you need?
- Will you ever hire freelancers or independent contractors?
- Include job descriptions.
- What is the pay structure (hourly, salaried, base plus commission, etc.)?
- How do you plan to find qualified employees and contractors?
- What type of training is needed, and how will you train employees?

6. Management

A description of the people behind your business, their roles and responsibilities, and their prior experience. If you're using your business plan to obtain financing, know that investors and lenders carefully assess whether you have a qualified management team.

Biographies

Include brief biographies of the owner/s and key employees. Include resumes in the appendix. Here, summarize your experience and those of your key employees in a few paragraphs per person. Focus on the prior experience and skills that have prepared your team to succeed in this business. If anyone has previous experience starting and growing a business, explain this in detail.

Gaps

Explain how you plan to fill in any gaps in management and/or experience. For instance, if you lack financial know-how, will you hire a CFO or retain an accountant? If you don't have sales skills, will you hire an in-house sales manager or use outside sales reps?

Advisors

List the members of your professional/advisory support team, including:

- attorney
- accountant
- board of directors
- advisory board
- insurance agent
- consultants
- banker
- mentors and other advisors.

If they have experience or specializations that will increase your chances of success, explain. For instance, does your mentor have experience launching and growing a similar business?

Organization Chart

Develop and include an organization chart. This should include both roles that you've already filled and roles you plan to fill in the future.

7. Inventory

If your business requires inventory, explain:

- What kind of inventory will you keep on hand (raw materials, supplies, equipment, parts)?
- What will be the average value of inventory (in other words, how much are you investing in inventory)?
- What is your lead time for ordering inventory?

8. Suppliers

List your key suppliers, including:

- names, addresses, websites
- type and amount of inventory furnished
- their credit and delivery policies
- history and reliability
- Do you expect any supply shortages or short-term delivery problems? If so, how will you handle them?
- Do you have more than one supplier for critical items (as a backup)?
- Do you expect the cost of supplies to hold steady or fluctuate? If the latter, how will you deal with changing costs?
- What are your suppliers' payment terms?

9. Credit policies

- If you plan to sell to customers on credit, explain:
- Is this typical in your industry (do customers expect it)?
- What are your credit policies? How much credit will you extend? What are the criteria for extending credit?
- How will you check new customers' creditworthiness?
- What credit terms will you offer?

How will you handle slow-paying customers? Explain your policies, such as when you will follow up on late payments and when you will get an attorney or collections agency involved.

10. Development an Operation Schedule

- What are the major activities involved in running your operation?
- When do they need to occur?

Before you move on

- Complete the worksheet for important aspects of your operations.
- Enter your thoughts into the Key Activities, Key Resources, and Key Partners sections of your Business Model Canvas.
- Once you've done the necessary research, draft an Operational Plan which addresses all the points above.
- Remember that this first draft will probably evolve as you work through the details in the rest of your plan.

Packages of dried kelp are displayed for sale at Fiddleheads Food Co-op in New London, CT.

FINANCIAL PLAN—Your projected cost structure and revenue streams

Business plans consist of two sections: the narrative section (discussed in the prior chapters of this guide) and the financial plan. Your financial plan will consist of several projected **financial statements**, a description of the **assumptions** that were used to generate the statements and some discussion of the **sensitivity** of your projections to changes in key inputs. Sea Grant's **Integrated Financial Planning Model for Kelp Aquaculture** is a 14-page Microsoft Excel Workbook that walks you through the process of providing inputs that generate the reports (financial statements) that go into your financial plan.

The necessary financial statements are:

- balance sheets
- profit and loss statements
- cash flow statements
- enterprise budgets

The data needed for the statements can be determined by careful, educated assumptions. Expenses are more easily projected than income as they can be easily determined. Planning income is more difficult. Your goal is to ensure that enough cash will be on hand during the early months of operations.

There are two primary purposes of the financial section of a business plan. You will need it if you are seeking funding from banks (loans) or potential co-owners (equity investors). Lenders are going to want to see numbers that say your business will be able to pay back the loan through its operations. Equity investors will want to see the value of the business—and their share of it—grow at a reasonable rate over time.

More importantly, developing realistic financial projections will enable you to understand how your business will do and what elements are most important to watch for or control in order to maintain profitability.

Financial Management and Financial Statements

Managers must keep close track of costs and production efficiencies throughout the production process. Access to and managing of financial resources have become the key to a successful aquaculture operation. Proper financial management provides a projection of the financial needs of the aquaculture business for the use of the producer and creditors. Financial management permits control of the business through record-keeping and preparation of financial statements. Evaluation and adjustment of the business enterprise based on the financial statements and analysis of the operation with financial ratios is required for continued success.

Financial management builds upon accurate, detailed, and complete records of the aquaculture operation. The manager should keep detailed records of the operation. This includes not only production records of parameters including water temperature, growth rates and pounds harvested, but input purchases, labor, sales, prices, regulatory compliance, and loans. The information provided by the records permits the construction and use of enterprise budgets, cash flow statements, balance sheets, income statements, and financial ratios. The manager should consult with an accountant for more assistance with financial management.

The easiest way to develop and evaluate production costs is through an enterprise budget. **Enterprise budgets** are tools for business planning and profitability analysis. The enterprise budget provides detailed estimates of variable (operating), fixed and total costs, total cash returns, and capital investment requirements for a particular enterprise. Enterprise budgets can be used to call attention to the inputs and production practices required by an enterprise. They also provide much of the information necessary to project the cash flow from the business, to provide information for comparison of alternative enterprises, and to provide the basis for a total farm plan.

In addition to evaluating the total costs and returns associated with an enterprise, you should also know the amount and timing of these costs and returns. The **cash flow statement** summarizes the estimated cash inflows (receipts) and outflows (expenditures) of a business over a specific time period. The accounting period usually is a year divided into months. The cash flow statement allows the manager or lender to: (1) estimate when specified amounts of cash will be available or needed; (2) determine when any borrowed funds will be needed; and (3) determine the debt repayment capacity of the business. The cash flow statement helps in quantifying the amount of debt the operation can support and in scheduling repayment.

The **balance sheet**, which is sometimes called a net worth statement, is one of the most frequently used financial statements to assess the economic well-being of a business operation. This statement is used to list the assets and liabilities and can be used to analyze the financial position of the business. The balance sheet is an accounting statement that describes the financial position of a business at a specific point in time. It shows the cumulative results of past decisions to the point when the balance sheet is completed. The basic objective is to provide the user (farmer or lender) with an accurate statement of the liquidity, solvency, and wealth of the business at a specific accounting date. When balance sheets from several time periods are compared, they reveal whether the business is growing or contracting, but they do not tell why the changes are occurring. The balance sheet provides an understanding of: (1) the capital needs of the business; (2) the allocation of resources in the business; (3) how much capital or seed money you put up; and (4) what has to be financed.

The **income statement** measures the profit or loss generated by the business for the specific time period used for financial analysis. It summarizes the financial transactions that affect revenue and expenses for the period of time specified in the income statement and measures the difference between revenue and expenses. The income statement is useful to determine whether the business was profitable for the time period but is also used to monitor profits from one year to the next.

Funding: Loans

Obtaining capital for kelp cultivation can be a formidable task as it is a relatively new enterprise.

Individuals considering kelp farming should be financially sound and should not start production undercapitalized or unsure of funding sources. Unexpected cash flow or production risks may cause failure of the enterprise.

Most lenders are unfamiliar with kelp farming and will have made very few loans (if any) to kelp farmers. Lenders are usually cautious with new operations, and financing may be difficult to obtain. The kelp farmer should educate the lender about production, financial, and marketing factors. Lending criteria and requirements for aquaculture credit are generally varied. Profits and return on investment, while important, are not the only criteria that influence the decision-making process. Business risks and individual risks are also considered. Other factors include the borrower's character, repayment capacity, collateral, and equity capital, as well as the nature of the enterprise.

The prospective borrower should have adequate collateral for the loan requested. The borrower must provide current accurate financial statements and supporting records. A balance sheet, with supporting schedules and inventories, is essential. A projected income statement and a projected cash flow for the business are needed. A five-to-10-year projected cash flow period may be required. Use realistic figures that represent average values rather than inflated figures unlikely to be obtained. The financial analysis should reflect the specific farm situation. The borrower must provide a marketing plan explaining to whom, at what price, and how the kelp will be marketed. Letters of reference from professionals, seafood brokers, or other market customers supporting the business can be helpful. Any actual experience producing kelp commercially or participation in kelp farming training and educational programs should be noted. The character of the principals in the business is of major interest to the lender. The producer must be willing to keep records, inform, listen to and work with the lender.

Once credit is obtained, properly managing it becomes a major challenge. Three basic financial statements—balance sheet, income statement, and cash flow statement—are used to monitor the financial strength of a business. A successful enterprise must exhibit strength in repayment ability and capacity, liquidity and solvency, profitability, and financial efficiency.

Funding: Equity Investment

Many start-up businesses are funded, at least partially, via loans or gifts from friends and family. In some cases, friends and family may wish to purchase an ownership share of your business via an equity investment. You should treat investments from friends and family with the same type of formality as you would a bank loan. Although the review process they will undertake is not as detailed as you'd see with a bank or outside investor, you don't want to risk the relationship due to improper communication and expectations. In general, when approaching friends or family for financing, you should:

- **Understand what kind of financing you seek (debt or equity). For either of these, you should be prepared to use a well-drafted promissory note (for a loan) and a term sheet/buy-sell agreement for equity investment.**
- **Have a formal meeting with your potential investors to explain the business.**
- **Provide your business plan and financial projections.**
- **Enlist an attorney to help you draw up the formal documents you will need.**

Developing a Financial Plan

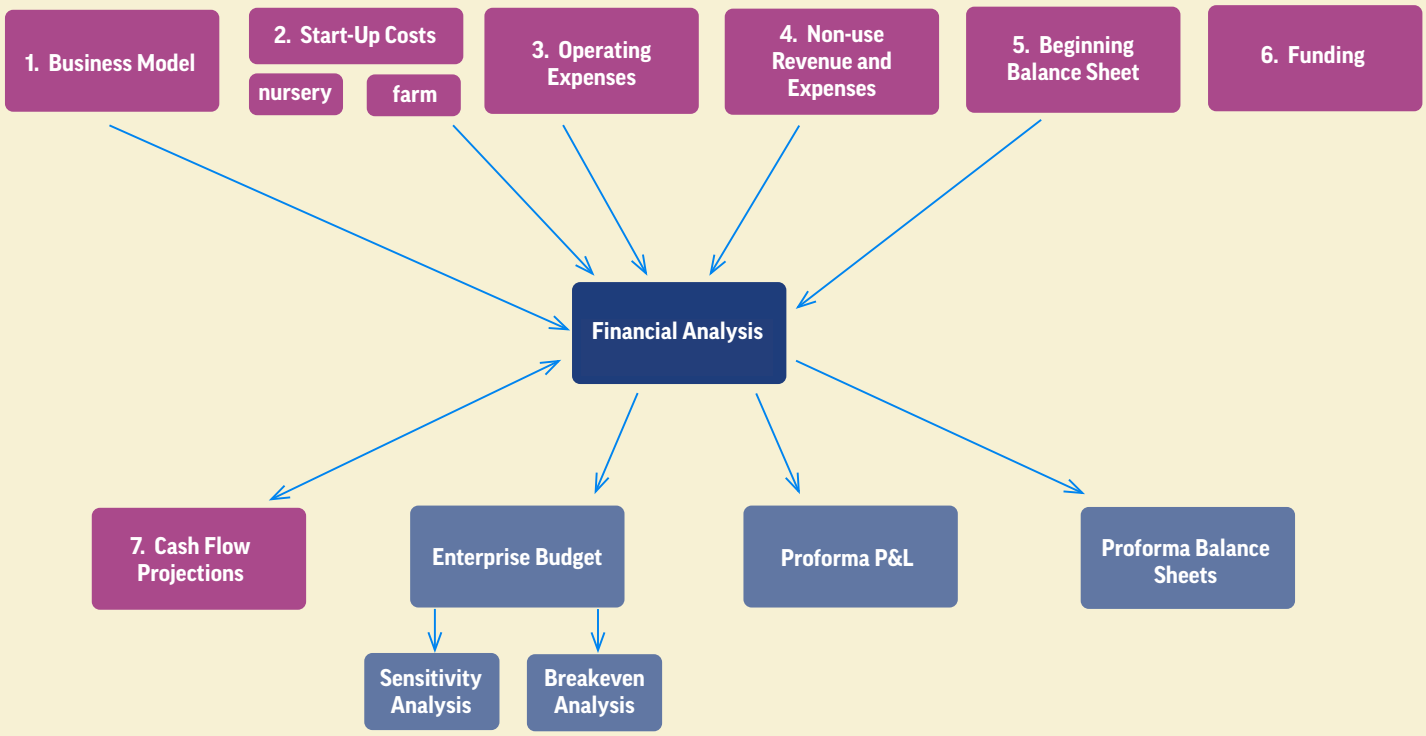
As you develop each section of your business plan narrative, you should be gathering information about cost elements. How much will each aspect of your marketing plan cost, and when will the cost be incurred? How much will each aspect of your operational plan cost, and when will those costs be incurred? As you answer those questions, you will be completing the inputs **to a financial model (link),** which, when complete, will give you a comprehensive picture of the financial aspects of your business.

Some factors that should be considered in preparing or evaluating financing for a kelp aquaculture operation include:

- **What are the necessary financial requirements for facility construction, if necessary, and kelp production?**
- **What equipment, vessels, land, facilities, etc., do you possess?**
- **Is the profit potential for the selected product higher than that for other alternative products or other investments?**

- What are the equipment needs for the operation?
- What are the costs of production—operating, fixed, total, per pound (kg), per piece?
- What are the initial construction costs?
- What are the equipment replacement costs for the business?
- What is the timing of cash inflows and outflows from the business (cash flow)?
- What is the projected annual income from the business?
- When will the money invested in the business be paid back from income produced by the business?
- How will price, cost, and yield variability affect the financial analysis?
- Will current interest rates and interest costs on investment and operating capital permit a reasonable profit?
- Will the expected profit provide an adequate return for the labor, management, and risk?
- Are you using expected production and yield values that are realistic for your situation?

Glossary of Accounting Terms

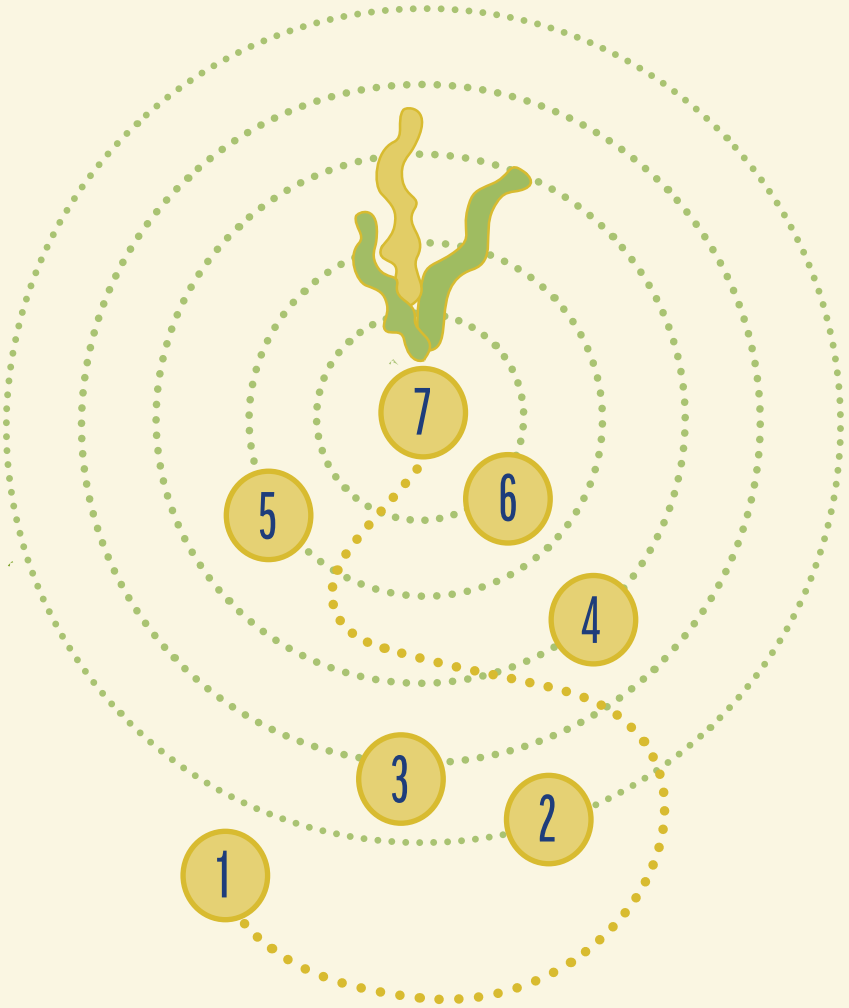


Sea Grant's Integrated Financial Planning Model for Kelp Aquaculture

3 Beyond the Business Plan

Where do you want your business to be in the future?

Successful organizations have found that a strategic planning and risk management process helps them achieve their goals within a dynamic and competitive environment. Strategic management is a comprehensive process designed for operations to best use their resources and capabilities to provide superior operational performance. You should plan to assess your strengths, weaknesses, opportunities, and threats, as well as the risks facing your business, on a regular basis once your business is up and running.



Path to a goal

Strategic planning

Analyze your Strengths, Weaknesses, Opportunities, and Threats (SWOT)

To be successful in the long term, you should regularly assess your (internal) strengths and weaknesses and the (external) opportunities and threats facing your business. A SWOT analysis is a simple strategic planning tool that can help you look at your business in a new way and from different directions. It can also help you to:

- create or fine-tune your business strategy
- prioritize areas for business growth to achieve your business goals.

You can start the process by gathering a group of employees or advisors who have different perspectives on your business. If you don't have employees, you can ask family members, business advisors, or mentors. The key is to have different points of view. Using the prompting questions below as a guide, you can conduct a brainstorming session to discuss ideas about each SWOT category. After brainstorming, create a final prioritized list of points in our SWOT analysis template. List the factors in each category from highest to lowest priority.

Strengths are internal, positive parts of your business. These are things that are within your control. Ask yourself:

- What do we do well?
- What do we do better than our competition?
- What unique assets do we have internally (such as knowledge, background, network, reputation, or skills) and externally (such as customers, patents, technology, or capital)?
- What positive aspects of the business give us a competitive advantage?

Weaknesses are internal, negative factors. These are things that you might need to improve on to be competitive. Ask yourself:

- What and how can we improve?
- What do our competitors do better?
- Where are the gaps in our assets and resources (such as knowledge, cash, or equipment)?
- Is the thing that sets us apart from our competition obvious?
- How can we improve business processes?

Opportunities are external, positive factors that may give a competitive advantage and contribute to success. Ask yourself:

- What trends can we use to our advantage to increase the use of our product or service?
- Are there any changes or events that might positively impact us (such as consumer behavior, regulation, policies, or new technology)?
- Has anything changed in the market that creates an opportunity for us?
- Does the public like us?

Threats include external factors beyond your control that may put your business at risk. Consider putting in place contingency plans for dealing with them if they occur. Ask yourself:

- What factors beyond our control could place us at risk?
- What potential competitors may enter the market?
- Are our resource and material supplies unstable or insecure?
- Are there any changes or events that might negatively impact us (such as consumer behavior, regulation, policies, or new technology)?

Use your SWOT analysis

Once you have completed your SWOT analysis it can be used to develop strategies for achieving your business goals. You can create a plan to continue building on your strengths while improving on your weaknesses. When using your SWOT analysis to create a strategy, ask yourself:

- How can we use our strengths to take advantage of our opportunities?
- How can we use our strengths to minimize our threats?
- What do we need to do to overcome and minimize our identified weaknesses?

RISK ASSESSMENT

All businesses face risk. It's important to understand the risks to your business and find ways to minimize them. A risk management plan helps you to do this by detailing how you deal with risks to your business. By spending time and resources developing your strategy for managing risk, you'll provide a safe workplace and reduce the chances of negative impacts on your business.

Risk refers to the possibility that some unfavorable event will occur. The level of risk in kelp farming requires that managers plan to make adjustments to the business when a negative outcome may or does occur. Risk must be accounted for in every aspect of the business. Planning begins with careful identification of the types of risk that may occur and to identify the possible outcomes of each type of risk. Jolly and Clonts (1993) identify several types of aquaculture risks:

- Social risks include changes in tastes, attitudes, or social behavior toward production and consumption of a certain species.
- Economic risks include changes in price of inputs and outputs, inflation, recession, depression, and other economic conditions which affect national income.
- Marketing risks result from uncertainty in demand, supply, and prices.
- Production risks result from problems with production, such as storms and disease.
- Financial risks are related to changes in supply of funds or credit restrictions.

Consider these steps to help identify, analyze and evaluate risks in your business.

1. Decide what matters most

Before you create a risk management plan, think about which areas of your business it will refer to. For example, you might only be interested in hazard-based risks. Some of the internal and external things to think about when creating your plan are:

- social, cultural, political, and regional issues
- economic, technology, and competitive trends
- government policies and law
- your business aims, policies, and strategies.

In addition, there are operational risk factors specific to the kelp aquaculture industry. These include:

- poor water quality (i.e. contamination from heavy rainfall, harmful algal blooms, etc.)
- diseases

- contamination
- biofouling
- predation
- poachers and vandals
- low prices and high production costs
- equipment failure and breakdown
- personal stress
- working long hours during the day and night
- shifts in market demand
- crop loss due to storm events or environmental conditions.

Risk management is the identification, measurement, and economic control of risks that threaten the assets and income of the aquaculture business. Engle (2010) states that reducing risk can be achieved by: (1) setting a minimum income or price level, (2) maintaining as much flexibility for decision-making as possible, and (3) improving the ability of the business to bear risk. There are several strategies to mitigate each type of risk. These include (Engle 2010):

- skilled management through knowledge, information, and experience
- diversification of production and marketing
- long-term contracts with suppliers and buyers
- forward contracts
- marketing cooperatives
- crop insurance
- credit reserves
- third-party equity capital
- cash flow analysis

2. Identify the risks

Working out the risks to your business could be as easy as thinking about what could go wrong and how and why it could happen. You might also need to do some research into:

- past events and risks
- possible future changes to your business environment, such as changes in economic trends
- social and community issues that could affect your business.

To identify risks, you can also:

- look at hazard logs, incident reports, customer feedback and complaints, and survey reports
- review reports such as financial audit reports or workplace safety reports
- do a strengths, weaknesses, opportunities, and threats (SWOT) check for your business
- discuss business issues with your staff, customers, suppliers, and advisers.

3. Evaluate the risk

Risk criteria set a standard to assess risks to your business. To set your risk criteria, state the level and nature of risks that are acceptable or unacceptable in your workplace. Our **risk assessment template** provides an example of a risk level guide to help you evaluate risks.

To evaluate risk, compare the level of risk for various events against your risk criteria. You should also check if your existing risk management methods are enough to accept the risk.

4. When to accept risk

Your strategy for managing risk may be more than just deciding whether to accept the risk or not. If your business is part of a bigger supply chain that involves retailers, distributors, or primary producers, you can spread the risk across a number of areas.

Sometimes businesses choose to accept risks and not spend any resources on avoiding them. You might decide to accept a level of risk for the following reasons:

- The cost of treatment is much higher than the potential results of the risk.
- The risk level works out to be very low.
- The benefit of taking the risk greatly outweighs the possible damage.

5. Addressing risks to your business

Your evaluation will have helped you to identify any risks that need to be addressed. Develop a plan to address risks, so you can:

- identify each risk type and the level of risk to your business
- suggest strategies to treat each risk
- create time frames for each strategy
- decide who's responsible for specific parts of the plan
- work out resources required, such as money, staff, and external help
- schedule future actions such as regular checking and updating of risks, if needed.

6. Commit to reducing risk

Committing to quality risk management can help you create a stable business that prepares for unexpected events. As a business owner, it's a good idea to:

- make sure your business aims link to your risk management plan
- clearly describe your risk management plan to everyone in your business
- show support for risk management
- set up a way of measuring the success of your risk management plan
- regularly check that your way of measuring is giving you useful information
- clarify who's responsible for what
- provide enough resources at all levels of your business
- ask for feedback from everyone in your business, including customers and suppliers
- use feedback to update your plan
- explain risk management to new employees and in training programs.

Scenario Analysis: A Spreadsheet Tool For Risk Assessment

You can conduct risk assessment directly in your financial plan. The spreadsheet model associated with this planning guide allows you to conduct scenario analysis, an analytic tool which shows cash flow and profitability results from changing a number of financial inputs. A video is provided which walks you through the process.

LIFE CYCLE ASSESSMENT

A Life Cycle Assessment (LCA) model for Kelp Aquaculture has been developed as part of this project. The goal of the LCA model is to generate a comprehensive assessment of the environmental impact associated with a kelp aquaculture operation, including the potential for **bioremediation** (i.e., N and P removal) and **negative CO_2 emissions**. More details on the model can be found on the project's website: **https://seaweedhub.extension.uconn.edu/resources/business/**

A life cycle assessment (LCA) is a tool to identify and quantify the environmental impacts of a production system, such as kelp aquaculture. In this context, a product could include any goods, technologies, and services in the kelp production system. A LCA quantifies the environmental impacts per the functional unit of a product system based on its output, for example, one pound of wet kelp at harvest (Baumann and Tillman 2004). The outputs of an LCA are used to identify which processes in the production system can be improved to minimize environmental impacts and optimize production (Seghetta and Goglio 2020). Typical environmental impacts covered by LCAs are resource depletion, global warming, (stratospheric) ozone depletion, acidification, eutrophication, (tropospheric) photochemical ozone creation, human toxicity and ecotoxicity (Baumann and Tillman 2004). The LCA framework has been adapted to evaluate the environmental performance of crop agriculture, animal husbandry, fisheries, and aquaculture production systems (e.g., Seghetta et al. 2016; Mungkung et al. 2013; Pelletier et al. 2009).

The ISO-14040 series, notably the ISO 14044 (2006), provides the procedure for performing an LCA.

An LCA consist of four phases:

1. Goal and scope definition, which specifies why and how an LCA is performed.

2. Inventory analysis, which quantifies all environmental and economic inputs and outputs for all processes in a product system.

3. Impact assessment, which converts all environmental inputs and outputs, from inventory analysis to a range of environmental impacts.

4. Interpretation, which evaluates the results of inventory analysis and impact assessment against the background of the defined goal & scope, in order to draw conclusions.

The quality of a LCA for kelp production is based on data availability and detail level.

ISO-compliant life cycle impact assessment methodologies will be used to evaluate the cumulative energy use, biotic resource use, and reductions in greenhouse gas (CO_2-e), acidifying (SO_2-e), and eutrophying (NO_3-e and PO_4-e) emissions associated with the cradle-to-farm-gate production of sugar kelp in the U.S.

Results from the LCA analysis will be combined with data from the bioeconomic scenarios to obtain 1) a range of costs for sequestering a ton of CO_2-e, and 2) costs of N (NO_3-e) and P (PO_4-e) removal for the U.S. kelp aquaculture industry. The analysis will provide a much more detailed assessment of the economic value associated with the ecosystem services from kelp aquaculture as compared to the preliminary estimates by Buck et al. (2017), given that LCA also considers the emissions from the productive process (i.e., emissions resulting from the installation and daily operation of farms).

References

Baumann, H. and Tillman, A. (2004). *The Hitch Hiker's Guide to LCA. An Orientation in Life Cycle Assessment Methodology and Applications,* Sweden, Lund: Studentlitteratur Ab.

Buck, B.H., N. Nejevan, M. Wille, M.D. Chambers and T. Chopin. 2017. *Offshore and multi-use aquaculture with extractive species: Seaweeds and Bivalves.* Pages 23-70 in Buck, B. and R.

Langan (Editors). *Aquaculture Perspective of Multi-Use Sites in the Open Ocean: The Untapped Potential for Marine Resources in the Anthropocene.* Springer, Cham, Switzerland.

ISO 14044 (2006). ISO 14044:2006 *Environmental Management—Life Cycle Assessment— Requirements and Guidelines.* ISO/TC 207/SC 5, Switzerland, Geneva: International Standard Organisation.

Mungkung, R., J. Aubin, T.H. Prihadi, J. Slembrouck, H.M.G. van der Werf and M. Legendre. 2013. "Life Cycle Assessment for environmentally sustainable aquaculture management: a case study of combined aquaculture systems for carp and *tilapia." Journal of Cleaner Production 57: 249-256.*

Pelletier, N., P. Tyedmers, U. Sonesson, A. Scholz, F. Ziegler, A. Flysjo, S. Kruse, B. Cancino and H. Silverman. 2009. "Not all salmon are created equal: Life Cycle Assessment (LCA) of global salmon farming systems." *Environmental Science & Technology 43: 8730-8736.*

Seghetta, M. and P. Goglio. 2020. "Life cycle assessment of seaweed cultivation systems." *Methods Mol Biol. 1*980: 103-119. doi: 10.1007/7651_2018_203.

Acknowledgements: Many of the tools and templates included in this guide are adapted from the United States Small Business Administration's SCORE program **(www.score.org)** and the Commonwealth of Australia's web portal business.gov.au (creative commons attribution – copyright CC BY **https://business.gov.au/legal-notices/copyrighthttps://business.gov.au/legal-notices/copyright©)**

Glossary of Accounting Terms

Accounts Payable – Accounts payable are amounts due to vendors or suppliers for goods or services received that you have not yet paid for.

Accounts Receivable – Accounts receivable (AR) is the balance of money owed to you for goods received or services delivered but not yet paid by customers.

Assets – An asset is anything of value that can be converted into cash.

Balance Sheet – A financial statement of assets, liabilities, and capital; the report details the balance of income and expenditure over a specified period of time.

Breakeven – The level of production at which the costs of production equal the revenues for a product or service.

Cash Flow – Cash flow is the net amount of cash and cash-equivalents being transferred into and out of a business.

Cash Flow Projection – A cash flow projection shows the amount of money expected to come into a business minus money expected to go out over a determined amount of time.

Contribution Margin – Determines how much revenue can be used to contribute to fixed costs and profit.

Cost Analysis – The goal of cost analysis is to determine the true cost of the products or services you are offering.

Cost of Goods Sold – An account for costs directly related to producing a service or product for sale.

Direct Cost – A cost that can be directly tied to the production of specific goods or services.

Equity – The net worth of a company. This is the difference between what you owe (liabilities) and what you own (assets).

Expenses – A resource or service you spend money on in order to generate revenue (wages, computers, etc.).

Fixed Asset – A fixed asset is a long-term tangible piece of property or equipment that a firm owns and uses in its operations to generate income. Fixed assets are not expected to be consumed or converted into cash within a year.

Fixed Costs – A cost that does not change with an increase or decrease in the amount of goods or services produced or sold.

Gross Profit Margin – Gross profit margin is the proportion of money left over from revenues after accounting for the cost of goods sold (COGS).

Indirect Cost – A cost that is not directly related to a cost object (such as a specific project, facility, function or product).

Inventory – Products you purchase and currently stock to resell or products in stock you produce from raw goods to sell.

Liabilities – Your company debt. What you owe.

Net Profit Margin – Net profit margin is the percentage of profit generated from revenue after accounting for all expenses, costs, and cash flow items.

Overhead – Ongoing business expenses not directly attributed to creating a product or service.

Revenue, Sales, Income – Revenue is the income a company generates before any expenses are subtracted from the calculation. Sales are the proceeds a company generates from selling goods or services to its customers. Income is a company's total earnings or profit.

Statement of Cash Flow – A financial statement that provides aggregate data regarding all cash inflows a company receives from its ongoing operations and external investment sources.

Variable Costs – A variable cost is an expense that changes in proportion with production output.

Worksheet 1: Business Model Canvas

Key Partners

- Sea Grant
- Association Coops
- Growers
- Input Suppliers

Key Activities

- Gather sorus tissue
- Maintain water system
- Nurture seeds

Key Resources

- Water
- Temperature control
- Chemicals

Value Proposition

- Grow the industry via having a reliable source of seeds, and educating others
- Maintain water system
- Nurture seeds

Customer Relationships

- Virtual Community
- Personal relationships

Channels

- Sale to locals
- Ship to distance

Customer Segments

- Local growers
- Distance growers
- New entrants

Cost Structure

- Cost of components
- Utilities
- Marketing, etc.

Revenue Streams

- Sale of seeded string
- Sale of equipment
- Consulting services

Example: Canvas for a kelp nursery

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
	Key Resources		Channels	
Cost Structure		Revenue Streams		

Worksheet 2: Elevator Pitch

TOPIC	BEGINNING OF PHRASE	FINISH THE SENTENCE
WHO	We are / I am... Our clients include / We work for... The reason why we / I started the company because..	
WHAT	We help our clients... Our product/service is... Our products are characterized by...	
WHY	Our clients buy our products because... We are different from our competitors because... We had a client who experienced...	
HOW	You can buy our products by... It works by... You can get in touch with me by...	

FORMULATION OF YOUR ELEVATOR PITCH

ELEVATOR PITCH STATEMENT

- What do you sell? How do you help your customers? Describe your product or service.
- How is your business special? Why would somebody buy from you?
- How can I reach you or your business?
- Now that you have answered the four questions succinctly, put them all together in one statement of your elevator pitch.

Worksheet 3: Company Description

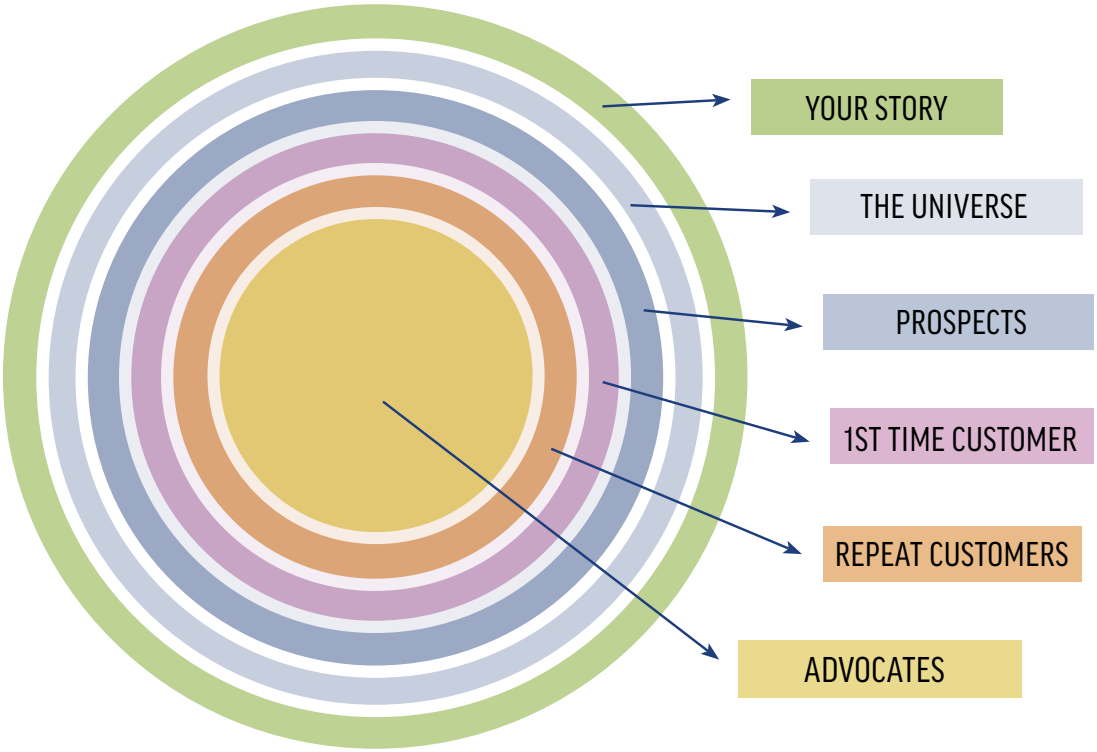
Business Name	
Company Mission Statement	
Company Philosophy/ Values	
Company Vision	
Goals & Milestones	**1.** **2.** **3.**
Target Market	
Industry/ Competitors	**1.** **2.** **3.**
Legal Structure/ Ownership	

Worksheet 4: Product & Service Description

Business Name	
Product/ Service Idea	
Special Benefits	
Unique Features	
Limits and Liabilities	
Production and Delivery	
Suppliers	
Intellectual Property Special Permits	
Product/Service Description	

Worksheet 5: Bullseye Marketing

Many businesses benefit from envisioning a "bullseye" for their marketing plan. Each successive ring of the target entails a different set of activities which has a different cost structure. As you begin developing your marketing plan, think through the facets of your business listed in the bullseye illustration below.



- Why are you in business? What is your value proposition? Be clear about who you are and what you do.

- How will you get your story out into the world? (Website, printed materials, social media, etc.)

- How will you communicate more directly with people who might buy from you? (Trade shows, targeted martketing, etc.)

- How will you convert a prospect to a customer? (Direct contact, tours, samples, offers, etc.)

- How can you make sure your customers return? (relationship management systems, offers, etc.)

Worksheet 6: Competitive Analysis Worksheet

For each factor listed in the first column, assess whether you think it's a strength or a weakness (S or W) for your business and for your competitors. Then rank how important each factor is to your target customer on a scale of 1 to 5 (1 = very important; 5 = not very important). Use this information to explain your competitive advantages and disadvantages.

FACTOR	Me	Competitor A	Competitor B	Competitor C	Importance to Customer
Products					
Price					
Quality					
Selection					
Service					
Reliability					
Stability					
Expertise					
Company Reputation					
Location					
Appearance					
Sales Method					
Credit Policies					
Advertising Image					

Worksheet 7: Distribution Channel Assessment

	Distribution Channel 1	Distribution Channel 2	Distribution Channel 3
Ease of Entry			
Geographic Proximity			
Costs			
Competitors' Positions			
Management Experience			
Staffing Capabilities			

Worksheet 8: Operational Plan

1. Production	
2. Quality Control	
3. Location	
4. Legal Environment	
5. Personnel	
6. Management	
7. Inventory	
8. Suppliers	
9. Credit Policies	
10. Development and Operational Schedule	

Worksheet 9: Organizational Structure

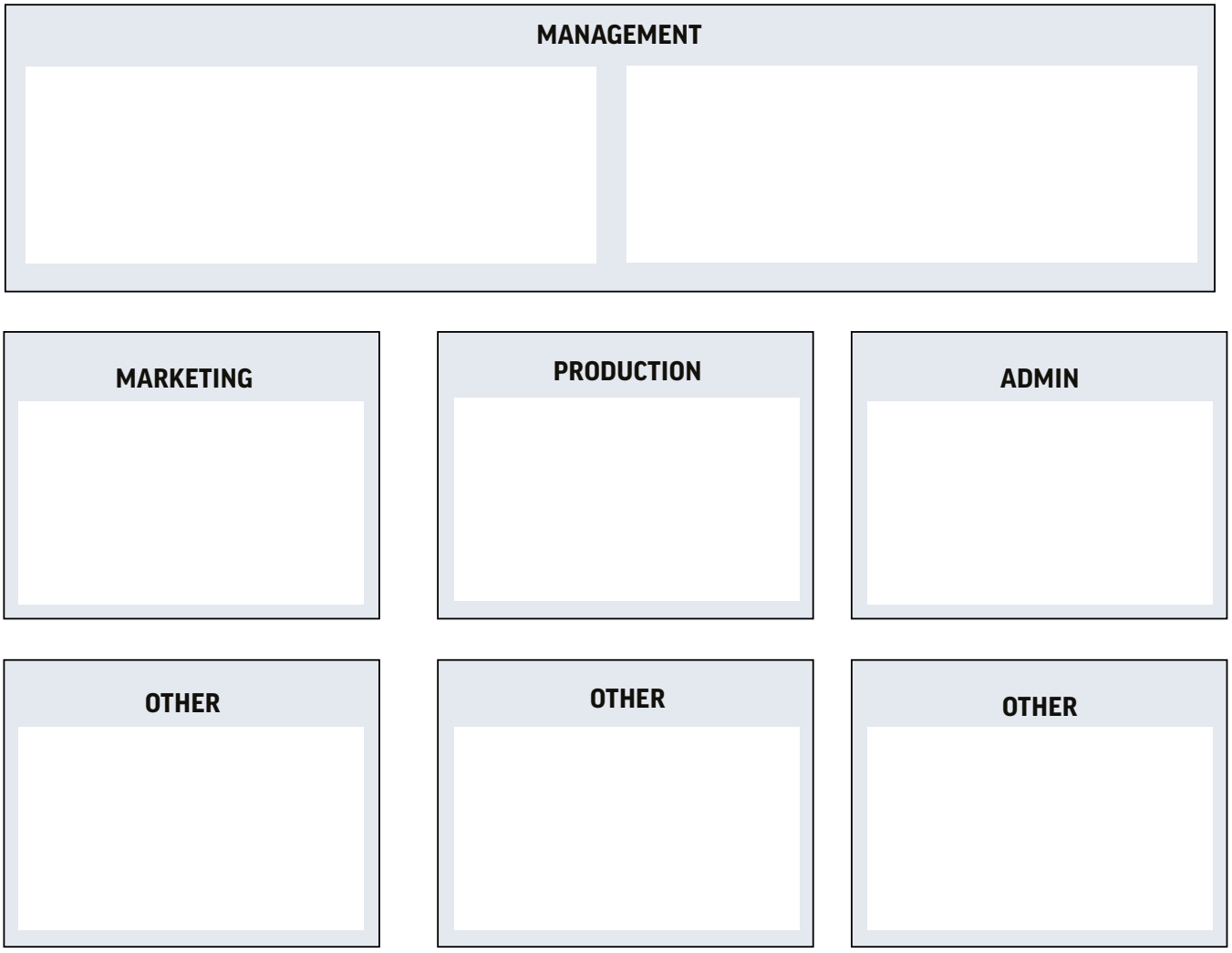
A new business needs to hire new employees on an ongoing basis.

By getting an overview of their roles and work areas in the business, you can more easily make a decision about the next hire.

Use this worksheet to identify the roles that you need to fill in your business and **specify the areas of responsibility associated with each role.**

Process

- Start by listing all the employees needed by the business and the most important work areas.
- Continue by figuring out which functions should be carried out by the employees that should be hired in either the short or long term.
- Next, decide if some of the functions should be covered by freelancers.
- Finish by writing down the most important areas of responsibility that the employees should have and write a job description.



Worksheet 10: SWOT Analysis

	Strengths	Weaknesses	Opportunities	Threats
Product/ Service Offering				
Brand/ Marketing				
Staff/HR				
Finance				
Operations/ Management				
Market				

Can any of your strengths help with improving your weaknesses or combating your threats? If so, please describe how below.
Based on the information above, what are your immediate goals/next steps?
Based on the information above, what are your long-term goals/next steps?

Worksheet 11: Business risk analysis

Consider what risks your business faces and what impact those risks could have. Understand the types of risks that could affect your business. Add more rows if you need them.

Risk	Likelihood	Consequence	Risk level	Planning and control
What is the risk? What could this risk result in?	How likely is this to happen?	What is the severity of the risk? Would it cause a lot of damage?	This number indicates the level of risk. (Higher number indicates higher risk.)	What will you do to prevent or minimize the risk? What actions will you take?
Example: The prolonged use of computer screens could result in headaches, eye strain, blurred vision and neck and back pain.	Select likelihood	Select level	Likelihood number x consequence number = risk level	Example: We'll use software that tells staff to take a computer break every hour and stretch.

Risk level guide

These parameters are a guide. You may set your own risk levels based on your businesses risk profile.

Risk level	Priority	Risk level	Priority
one – four	Low risk – minimal action required	five – eight	Moderate risk – Needs corrective action within 3 months
nine – 12	High risk – Needs corrective action within 1 month	13-16	Severe risk – Needs immediate corrective action

For video tutorials and resources for this guidebook:
https://seaweedhub.extension.uconn.edu/resources/general-resources/

ANNEX: SOURCES OF INFORMATION

To help you learn about the "how-to" of kelp farming and marketing, there are many sources of information. You should start by contacting one of your state's Sea Grant marine advisory agents, the Cooperative Extension Service, a marine research university or laboratory, a state agency, or a private firm (a listing of these follows). These organizations can give you literature, names of kelp farmers and marketing businesses you can visit, as well as initial observations and recommendations. Small-scale farms may be able to plan and begin operation without the need to hire consultants, while large-scale farms may benefit by hiring experienced consultants.

ALASKA

The Nature Conservancy
715 L Street, Suite 100
Anchorage, AK 99501
907-531-4239
alaska@tnc.org

Alaska Sea Grant
https://alaskaseagrant.org/our-work/aquaculture/
Melissa Good
Kodiak Seafood and Marine Science Center
118 Trident Way
Kodiak AK 99615
907-486-1517
melissa.good@alaska.edu

Alaska Department of Fish and Game
https://www.adfg.alaska.gov/index.cfm?adfg=fishingaquatic-farming.programinfo
Flip Pryor
Alaska Department of Fish and Game
Division of Commercial Fisheries
1255 W. 8th St.
P.O. Box 115526
Juneau, AK 99811-5526
907-465-4235
garold.pryor@alaksa.gov

Alaska Department of Natural Resources—Aquatic Farm Leasing
https://dnr.alaska.gov/mlw/aquatic/
Karen Cougen
550 W. 7th Ave, Suite 1360
Anchorage, AK 99501-3557
907-269-8543
karen.cougan@alaska.gov

Alaska Department of Commerce, Community, and Economic Development - Mariculture Loan Program
https://www.commerce.alaska.gov/web/ded/FIN/LoanPrograms/Mariculture.aspx
Andy Macaulay
(No US mail delivery)
333 Willoughby Ave, 9th FL
State Office Building
Juneau, AK 99801
907-465-2510
andy.macaulay@alaska.gov

Alaska Department of Environmental Conservation—
Environmental Program (water quality certification)
https://dec.alaska.gov/eh/fss/shellfish/growing-waters/
Angela Hunt
angela.hunt@alaska.gov

Alaska Shellfish Growers Association
https://asga.wildapricot.org/
Eric Wyatt
P.O. Box 1758, Homer, AK 99603
info@alaskashellfish.org
907-299-3351

National Marine Fisheries Service Alaska Regional Office
https://www.fisheries.noaa.gov/alaska/aquaculture/alaska-region-aquaculture
Alicia Bishop
alicia.bishop@noaa.gov

U.S. Army Corps of Engineers
regpagemaster@usace.army.mil
907-753-2712

US Fish and Wildlife Service—Seaweed
Sabrina Farmer
ak_fisheries@fws.gov
907-271-2778

University of Alaska Fairbanks College of Fisheries and Ocean Sciences
https://uaf.edu/cfos/people/faculty/detail/schery-umanzor.php
Schery Umanzor
College of Fisheries and Ocean Sciences
17101 Point Lena Loop Rd.
Juneau, AK 99801
sumanzor@alaska.edu

University of Alaska Southeast – Applied Fisheries
https://uas.alaska.edu/career_ed/fisheries/
Angie Bowers
1332 Seward Ave.
Sitka AK 99835
abowers4@alaska.edu

Alaska Small Business Development Center
1901 Bragaw St.
Room 199
Anchorage, AK 99508
907-786-7201
info@aksbdc.org

CALIFORNIA

Regulatory guidance and planning:

State Aquaculture Coordinator (CDFW)
Permit Guide to Aquaculture in California
Reference portal to all CA aquaculture permitting agencies
https://permits.aquaculturematters.ca.gov/Permit-Guide

CA Department of Fish & Wildlife – Aquaculture
Forms and Information
https://wildlife.ca.gov/Aquaculture
Aquaculture Permit Counter
Virtual permit counter for early interagency coordination
https://permits.aquaculturematters.ca.gov/
Aquaculture Matters
Outreach & News
https://aquaculturematters.ca.gov/

California Coast Commission – Application Guidance for Coastal Development Permits
(Aquaculture and Restoration Projects)
https://documents.coastal.ca.gov/assets/cdp/Draft-CDP-Application-Guidance-Aquaculture-and-Marine-Restoration.pdf

US Army Corps of Engineers
General USACE permitting overview
https://www.spl.usace.army.mil/Missions/Regulatory/Permit-Process.aspx

Jurisdictional guidance
https://www.spl.usace.army.mil/Missions/Permitting/

Nationwide Permit 55 (Seaweed Mariculture) info
NW55 Informaiton Sheet

District Offices (in South Pacific Division)
South Pacific Division directory
https://www.spd.usace.army.mil/About.aspx

Los Angeles District
(213) 452-3425
https://www.spl.usace.army.mil/Missions/Permitting/

San Francisco District
(415) 503-6795
https://www.spn.usace.army.mil/Missions/Regulatory/

Aquaculture extension contacts:

California Sea Grant
Aquaculture Extension Specialists
https://caseagrant.ucsd.edu/our-work/sustainable-fisheries-and-aquaculture
Luke Gardner
lgardner@mlml.calstate.edu
contact: Kevin Johnson-Marquez
kjohn263@calpoly.edu

UC Cooperative Extension
UC Davis Aquaculture Extension Specialist
https://aquaculture.ucdavis.edu/
contact: Jackson Gross
jagross@ucdavis.edu

USC Sea Grant
Education and Marine Extension Specialists
https://dornsife.usc.edu/uscseagrant/people/
Amalia Almada
amaliaal@usc.edu

Seaweed aquaculture research labs/contacts:

Cal Poly Humboldt
https://fisheries.humboldt.edu/facilities
Rafael Cuevas Uribe
aquaculture@humboldt.edu

Moss Landing Marine Laboratories
https://mlml.sjsu.edu/
Michael Graham
mgraham@mlml.calstate.edu

San Diego State University
https://cmi.sdsu.edu/aquaculture/
Matt Edwards
medwards@sdsu.edu

Other supporting organizations:

California Aquaculture Association
Producer association
https://caaquaculture.org/
P.O. Box 4638
Chico, CA 95927
info@caaquaculture.org

Sea Grant
California Sea Grant
https://caseagrant.ucsd.edu/

State Government Website
https://permits.aquaculturematters.ca.gov/Permit-Guide California Department of Fish and Wildlife
Permit Guide to Aquaculture in California

Aquaculture Matters News
https://aquaculturematters.ca.gov/

Army Corps of Engineers
https://www.spd.usace.army.mil/About.aspx
U.S. Army Corps of Engineers,
South Pacific Division

Sacramento District
https://www.spk.usace.army.mil/
1325 J Street—Room 1513
Sacramento, CA 95814
916-557-5100

San Francisco District
https://www.spn.usace.army.mil/
450 Golden Gate Ave.
San Francisco, CA 94102
415.503.6803

Aquaculture Association
California Aquaculture Association
https://caaquaculture.org/
P.O. Box 4638
Chico, CA 95927
info@caaquaculture.org
916-246-6349

Research Labs and People
(Seaweed aquaculture research)
Rafael Cuevas Uribe
Humboldt State University
Telonicher Marine Laboratory
1 Harpst St.
Arcata, CA 95521
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Moss Landing Marine Laboratories
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caseagrant.ucsd.edu

California Department of Fish and Wildlife
Permit Guide to Aquaculture in California
https://permits.aquaculturematters.ca.gov/Permit-Guide

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Connecticut Sea Grant College Program
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State Government Website
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State Government Website
http://www.maine.gov/dmr/aquaculture/index.htm

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