Section I
Managing Aquaculture Businesses

INTRODUCTION TO SECTION I: MANAGING AQUACULTURE BUSINESSES

This section focuses on the use and application of economic tools and interpretation of their results. It is designed primarily for owners and managers who hire others to prepare financial statements and analyses. At the same time, those who are trained to conduct economic and financial analysis but who are not familiar with aquaculture should also find this section useful.

Aquaculture is a management-intensive business. The need for intensive and skilled management stems from the high level of capital invested in the facilities, and in the high levels of operating capital required to operate a competitive and profitable business. Throughout aquaculture, undercapitalization (not having enough capital to make payments and survive the sometimes lengthy startup periods) has been a consistent problem.

Individual companies must answer a series of questions that involve pricing, output, and market positioning. Key questions that the manager must answer include: (1) how much should be produced; (2) how much input should be used; (3) what is the optimal size of the business; (4) how should cash flow be managed; (5) how should risk be managed; (6) how will the business be financed; and (7) how can business performance be optimized? Thus, it is the manager who must develop the business plan, monitor economic and financial performance of the business, and manage cash, capital, labor, and risk. Each of the following chapters discuss specific aspects of the types of management functions and decisions that need to be made by the manager.

1
Starting an Aquaculture Business

Aquaculture has grown rapidly in volume and in complexity around the world in the last several decades. While aquaculture has a centuries-long history as a source of food for households in Asia and Africa, the most dramatic change in more recent years has been the development of aquaculture businesses into complex industries. These industries operate on national and international levels.

Development of efficient and viable businesses requires careful evaluation and thorough planning for the new business. This book presents details on the process of business planning (see Chapter 3) as well as on how to prepare the various types of financial statements needed for thorough planning (see Chapters 10 through 14). Chapter 1 begins by outlining steps to be considered before starting the business.

The new business owner must think carefully about what will set his or her business apart, both from other existing businesses and from other future businesses. It is critical to identify the strengths, abilities, and skills owned and available that will help the farm owner to be successful. This chapter discusses the motivation and goals for starting an aquaculture business, and the capital- and management-intensive nature of aquaculture. Marketing challenges and trade-offs associated with various organizational structures, financing, and the availability of resources are contrasted. It concludes with a discussion of permits, regulations, and sources of assistance. Figure 1.1 illustrates the various steps that will be needed to start a successful aquaculture business.

MOTIVATION AND GOALS

The first step to starting an aquaculture business is to carefully consider one's goals and motivation. An individual interested in starting an aquaculture business must fully understand why he or she wants to do this. Some individuals enjoy working outdoors with fish and dislike office work and paperwork. These individuals may do an admirable job like raising fish on the farm. However, inadequate attention to the business aspects of the aquaculture business will result in financial failure. If the owner spends all his or her time caring for the fish, who will take care of the permits, regulations, financial statements, and economic performance of the business?

Others who wish to start an aquaculture business may view it as a way to make a great deal of money. There certainly are success stories of aquaculture businesses that have become profitable businesses. However, aquaculture businesses are intensive businesses that require management committed to working long hours under often difficult conditions. Who will provide that level of management?

Still others view aquaculture as the wave of the future and want to get in on the ground floor. However, businesses developed to raise the latest "hot" species with the newest production technology frequently are beset with substantial levels of financial, price, and yield risk. Aquaculture entrepreneurs must be prepared to manage the degree of risk associated with their business model and plan.

It is important to develop clear and specific goals for the business from the beginning. For example, what is adequate revenue for one individual may not be sufficient to entice another to invest the necessary time and money. The effects of starting a new business on the farmer's family must be considered carefully. Will family members be supportive and helpful or will they resent the time that must be invested in the business? The early years of an aquaculture business may generate minimal revenue, and the family may be required to live for a time on reduced income.

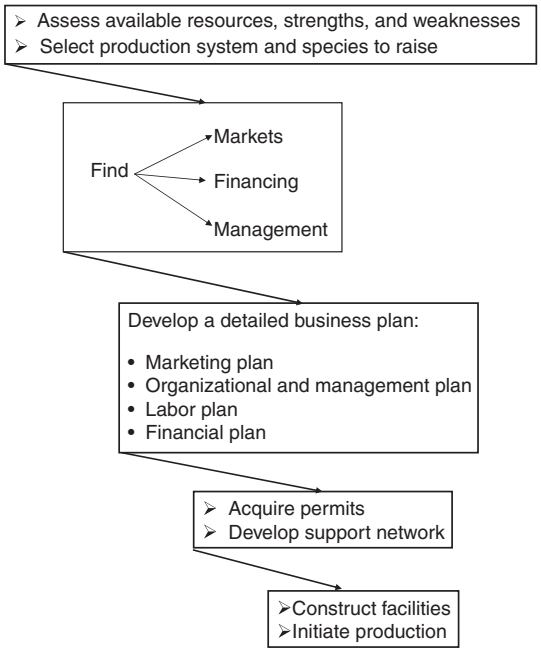

Figure 1.1. Starting an aquaculture business.

AQUACULTURE IS A CAPITAL-INTENSIVE BUSINESS

The majority of aquaculture businesses require substantial amounts of both operating and investment capital. One of the largest problems encountered in starting an aquaculture business often is to acquire sufficient capital. Undercapitalized farms and processing plants rarely survive. Careful thought and planning need to go into determining the amount of capital needed to operate at an efficient level and to identifying sources for the needed capital.

Capital requirements begin with the investment capital needed to purchase land, build production facilities, and purchase equipment. Depending on the specific location, new roads may need to be constructed, electric power lines may need to be installed, or there may be additional infrastructure required that will increase the total amount of investment capital needed. Capital required for marketing facilities must be included in the planning. Is a shed needed to hold, grade, and sell the fish? If so, a water supply system to fill hauling trucks will also be required. Perhaps an ice machine is required, depending on the form of the products sold. If the farm will do its own hauling and transportation, then the trucks, tanks, oxygen systems, and loading equipment will also be needed. In all, investment capital for an aquaculture business typically will be several thousand dollars an acre of production for pond systems, and can range from $0.30 to $7.00/lb across the many different types of species and production systems. More information on investment capital requirements can be found in Chapter 10, and techniques to measure the profitability of such an investment can be found in Chapter 13.

The high level of investment capital required for an aquaculture business results in high levels of annual fixed costs (see Chapter 10 for more details on what constitute annual fixed costs). The best way to reduce the fixed cost portion of the cost of producing fish is to produce at an intensive level with high yields. High yields spread the annual fixed costs over a greater level of production and lower the cost per pound of production.

Operating capital requirements often are as substantial as investment capital requirements for aquaculture businesses. Frequently, this is because high yields are needed to lower the per-pound annual fixed costs and keep production costs at a competitive level. Achieving high yields requires high numbers of fingerlings, large amounts of feed, greater electricity for aeration, and corresponding amounts of other inputs such as labor, repairs and maintenance, and fuel. Operating costs frequently can be $2,000–$5,000/acre for pond systems and $33,000–$150,000/acre for intensive systems such as raceways and indoor systems.

Operating cost requirements are compounded by the fact that some types of fish raised do not reach market size in one growing season. Thus, the prospective fish farmer often must prepare to operate the business for more than a year without receiving revenue from the business. Careful financial planning and good communication with one's banker are keys to having access to sufficient amounts of capital with which to build the business until it reaches its full production capacity.

The high levels of capital required for many aquaculture businesses result in substantial amounts of financial risk (see Chapters 8 and 16). The profit potential is often accompanied by a variety of risks, and the large sums of money invested in an aquaculture business can be lost quickly. The best method to prevent such losses is adequate and thorough planning, monitoring, and assessment of the economics and finances of the aquaculture business throughout its life. If the owner is not willing to spend the time to monitor the business' financial performance, then it is essential to hire or

retain an expert to keep a constant and close eye on its economic aspects. Otherwise, the likelihood of failure and severe financial losses is high.

AQUACULTURE IS A MANAGEMENT-INTENSIVE BUSINESS

The high levels of investment and operating capital required in aquaculture businesses, along with the intensive nature of production of aquatic animals requires a high degree of management. When aquatic animals are confined in a production unit, constant attention is needed to the quality of the growing conditions for the fish. Maintaining adequate levels of oxygen and other critical water quality parameters, and preventing problems associated with the breakdown of waste products in the system, takes careful and constant monitoring. Diseases spread rapidly when animals are maintained in close confinement. Thus, attention must be paid to monitoring the health of the animals and taking necessary actions when there are indications of disease.

Marketing and sales of aquatic products can represent management challenges depending upon the nature of the target market. Farms engaged in direct sales will require a great deal of management attention to marketing functions and activities. Even farms that sell directly to a processing plant must have managers who pay close attention to the requirements of processors. These requirements include quality standards and delivery requirements, among others, to minimize dockages from fish that do not meet specifications. Top managers ensure that their farm is considered to be a preferred supplier, one that consistently delivers quality fish, within specification, and on time.

Management must keep a close eye on costs and production efficiencies throughout the production process. This includes monitoring the efficiency of labor, feed usage, use of electricity and fuel, and use and care of equipment. Feed, for example, is frequently the largest single component of the cost of raising an aquaculture crop. Feeding carefully and appropriately will ensure a better feed conversion ratio and will result in more pounds of fish produced per pound of feed applied. Similarly, judicious use of aeration can provide adequate oxygen levels by turning aerators on sequentially, as needed, rather than turning on more aerators than are needed at one time. Taking time to keep equipment well maintained and to ensure that it is operated correctly will reduce the costs of repairs and will extend its life. This will reduce the cost of equipment as a percentage of the total cost of production.

Moreover, the manager must be able to think and plan strategically. Preparing to stay ahead of future challenges requires examination of the business's strategic plan from a variety of different perspectives.

MARKETING CHALLENGES

Many individuals who wish to start an aquaculture business are captivated by the animals and plants that they wish to raise and will spend many hours talking about their biology and growing requirements. However, the marketing challenges of starting a new aquaculture business often are greater than the production challenges and ultimately more important. Successful aquaculture businesses are managed and owned by individuals who spend as much time exploring marketing options and trends as they do working on production efficiencies. Chapter 2 of this book discusses marketing issues and strategies related to aquaculture products in greater detail and Chapter 3 outlines steps in the development of marketing plans as part of an overall business plan. This chapter discusses some general concepts.

There are a number of overarching trends and challenges that prospective aquaculture business owners should consider. Most species that are being aquacultured at one time were primarily a wild-caught species. Many of these species have existing markets and demand that were based originally on supply from capture fisheries. Preferences for wild-caught as compared to farmed fish vary by region. Care must be taken to understand these preferences in the market targeted for the business's product. As farmed product becomes available in the market, it frequently must compete with wild-caught product that is already well established in the market. However, the cost of producing farmed fish, especially in the early years of startup businesses, requires a price that often is higher than that of wild-caught fish. To establish a new product in the market often requires differentiating it from wild-caught and other similar products to capture a price that will cover production costs.

The seafood market has undergone dramatic changes in the last several decades. The possible effects of current and emerging trends must be considered carefully in planning for successful marketing programs. Seafood in earlier decades was primarily a locally sourced, fresh product supplied by either

fishermen or specialized jobbers and small-scale wholesalers. Changes in packaging and freezing technologies have opened the door for global trade in seafood that has continued to increase dramatically. The increase in global trade in seafood has resulted in a number of conflicts and competition with fish raised domestically. All types of fish and seafood are now shipped around the world to satisfy various markets.

Dynamic markets like those for seafood, while challenging, can also offer opportunities for entrepreneurs. For example, the shrimp and salmon industries worldwide have benefited from the increase in global trade and technology. These segments of aquaculture have grown to dominate shrimp and salmon markets worldwide.

Food marketing in general has undergone dramatic changes in recent decades that have resulted in changes along the supply chain. The driving force has been the emergence of strong market power at the level of the large hypermarket discount retail sector, exemplified by companies like Wal-Mart. In response to this concentration of market power, wholesalers and food service distributors have also become more concentrated. This has increased pressure on growers to either consolidate by integrating vertically to capture market power, or to form cooperative or other forms of organizations to be able to compete.

Startup aquaculture businesses must identify the specific market that the business plans to target. The overall marketing plan (see also Chapter 3) must also identify the competition and the unique position the company's product will occupy in the market. The product must be defined well and must match the way it is positioned in the market for the targeted customers. Careful attention should be paid to the size of the market, long-term price trends, and distribution patterns of similar products.

The marketing plan must lay out an effective promotion and advertising plan. Even the smallest-scale aquaculture farms must have a plan to spread the word about their products. Promotion is a way to transmit information about the attributes of the product, the price, and why the consumer should purchase it.

Appropriate and effective market channels must be developed. Is the farmer planning to transport all the fish produced to the various markets? The amount of time needed to transport fish to markets must be determined and adequate personnel included in the business plan. The length of round trips that can be undertaken feasibly can be an important factor. If the farmer does not intend to transport his or her own fish, relationships and agreements will be needed with a wholesaler or distributor.

ORGANIZATIONAL STRUCTURE FOR THE AQUACULTURE BUSINESS

Most farms in the United States have a single owner and are classified as sole proprietorships. In a sole proprietorship, the farmer is self-employed and has legal title to the property. This is the simplest form of business structure, but it also entails the greatest risk. Risk results from the liability for any debt obligations or accidents that falls entirely on the owner in a single proprietorship. Moreover, the liability is not limited to what the farmer has invested in the business. The farmer can lose his or her land and home as a result of severe adverse situations.

Some farmers form partnerships with family members or others to gain access to additional resources such as land, equipment, labor, or management. Partnerships can be either general or limited. Partners share in all ownership, management, and liability in a general partnership. Limited partners share in the profits and losses of the business but not in the management. In this way, the limited partner provides resources such as capital, but management decisions are under the control of the principal owner.

Some segments of aquaculture have integrated vertically and have developed into corporations. In a corporation, capital is provided by shares of stock, and the management and control are provided by the stockholders, the board of directors, and the officers. The board sets policies, and the officers manage the daily activities of the company. Stockholders, while owners of the company, are not personally liable for actions of the corporation. Their liability is limited to their investment in stocks.

There are also subchapter C and subchapter S corporations. With C corporations, dividends received by stockholders are taxed as income, while S corporations are taxed as limited partnerships. The officers are paid before the remaining profits are distributed.

AVAILABLE RESOURCES

An important step in starting an aquaculture business is to develop a frank assessment of the resources available for the business. New businesses fail more often than they succeed, often due to the lack of adequate resources. The assessment of available resources begins with the individual. The owner must be innovative, persistent, resourceful, and determined to find

solutions to the many problems that will arise. The assessment should extend to physical resources available that include land, existing ponds, wells or other types of water supply, farm equipment, and buildings. The assessment must be thorough and detailed. For example, the individual may have an adequate quantity of land available, but current or impending zoning regulations may prohibit its use for aquaculture. Water and soil analyses should be done to check the suitability for the species to be considered. Some freshwaters have enough salinity to consider some crops like marine shrimp that can tolerate low levels of salinity. There must also be adequate backup equipment in the event of breakdowns, generators for power outages and backup aeration equipment. Resources also include the availability of adequate quantities of seedstock.

The availability of labor resources can be an important factor in the success or failure of a new business. The assessment of labor availability should include any family labor that is available to assist with the farm. A realistic assessment must be made of the local labor supply and the availability of adequately trained labor that can be hired for the aquaculture business. The type of labor is also an important consideration. Aquaculture businesses often require more skill than some other types of agriculture, and the ability of workers to handle the new responsibilities must be evaluated carefully. For example, workers who cannot swim or who are afraid of the water may have difficulty adjusting to working around it constantly. Much aquaculture requires long and irregular hours during the main growing season. Workers may or may not be willing to work such hours. The degree of equipment on the farm requires a great deal of maintenance. An aquaculture business requires either a mechanic hired on the farm or the business must be prepared to have higher repair and maintenance costs.

The availability of management resources must be assessed. The level of expertise and skill of the owner to manage the production, marketing, and financing of the aquaculture business must be evaluated frankly. If the owner has excellent aquaculture skills but is weak in financial analysis, an appropriate accountant or financial analyst will need to be hired, contracted, or retained. Similarly, if the owner has good business skills in marketing and financing, but lacks experience in culturing aquatic animals, hiring a production manager with adequate aquaculture skill and expertise will be essential.

Sufficient capital resources must be available as well. Both investment and operating capital are required in necessary quantities to be received at appropriate times. The operating line of credit must be structured to continue the business throughout the entire startup period during which the business begins to generate returns. Depending on the type of business, this may be a period of 2–3 years before substantial revenue can be generated from the aquaculture business. The investment capital must be available in sufficient quantities to provide facilities to minimize risk. This includes sufficient redundancy in equipment to cover power outages, breakdowns, and unanticipated extended periods of adverse weather conditions. Maintenance requirements must be accounted for in financial planning. This includes the capital to be able to replace all equipment and facilities when necessary.

The availability of adequate credit will depend in part on the ability of the owner to finance the operation through equity or to have the credit capacity to borrow the necessary amounts of capital. This in turn will depend upon the individual's balance sheet, availability of collateral, and overall credit worthiness.

The particular species selected and their product forms are critical decisions. These must match the projected price point and the quantity demanded for that product form for that species. In selecting the species to be raised, thought must be given to whether there is competition from imported species or capture fisheries, or both. Diversifying farm production with several species also serves to spread the market risk of price downturns for one specific species.

The key to starting a successful aquaculture business is to match the species to be produced, the production system to be used, and the scale and scope of operation with the available markets and resources (labor, land, capital, and management). Mismatches are likely to result in business failure. For example, a particular species and production system may exhibit strong economies of scale. If the owner is unlikely to be able to acquire sufficient capital to construct and operate a farm of a large size, it is better to rethink the business plan to develop one that is workable with the capital resources available. Undercapitalization is often a major reason for failure of aquaculture farms and processing plants. Mismatches between projected and actual capital requirements result in financial failure.

FINANCING

Adequate financial resources are essential to a successful business, and the ability to acquire sufficient capital is a key factor. One of the first steps is to identify the sources of capital that are available. Venture capital can be difficult for aquaculture and often follows

certain patterns and trends that may not always favor financing aquaculture businesses. Private capital from partners, whether active or silent, can be considered in establishing the business. However, private lenders finance most aquaculture businesses. Many lenders may be skeptical about aquaculture and view it as a risky business. Perceptions of high risk in aquaculture may lead to less favorable terms of lending, requirements for greater owner equity in the business, higher interest rates, or refusal to consider loans for aquaculture ventures.

Financing from private lenders can also be complicated by the fact that many lenders may not have substantial experience with aquaculture. Lack of familiarity with the business can result in unwillingness to assess business loan proposals; the loan officer may not be comfortable with the estimates of yields, costs, or efficiency measures that form the basis of the proposal. It may be necessary to spend a great deal of time working with a lender to help them understand the basics of aquaculture, introduce them to people who are knowledgeable about successful aquaculture businesses and the keys to their success, and to keep them informed of the most recent trends in aquaculture. It is important to plan for adequate capital to provide for the family through the very difficult early years of the business.

HARVESTING AND PROCESSING

Decisions must be made early on in the development of an aquaculture business on how the fish or other animals will be harvested and whether they will be processed, stored, and transported by the farm business. If not, these services will need to be contracted. Serious thought needs to be given to the implications of these decisions. In areas with little aquaculture production, these services may not be available. If the farm owner must hire a seining crew, process the product, and store and transport it, the owner likely will need to operate on a relatively large scale. There are some examples of small-scale aquaculture businesses that perform these functions, but typically these will require a larger scale of business. Processing in particular has substantial economies of scale that must be considered before proposing this type of component to the business.

Product handling throughout transportation and processing will affect the end quality of the product. If proper conditions are not maintained during harvest and transport, the quality of the fillet may suffer. Similarly, if processed fillets are not stored or packaged properly, the result will be a poor quality product. Adequate planning for these functions is necessary.

PERMITS AND REGULATIONS

Part of a careful assessment for a startup business includes identifying the permits and regulations that will affect the new business both currently and in the future. Chapter 18 discusses the role of regulations and preparing to manage them in greater detail.

There are a wide variety of types of permits that are required in different states, provinces, and countries. These permits may refer to the site, the business, access to water supplies, discharges, predator control, or processing.

All legal and regulatory statutes relevant to the business must be understood and planned for. Some types of permits may require lengthy application periods that may delay startup of the business.

SOURCES OF HELP

There are a number of sources of help and technical assistance available to the individual considering a startup aquaculture business. Table 1.1 summarizes several types of assistance available. It is advisable to develop an excellent relationship with these groups. Universities, extension agents, trade associations, and diagnostic laboratories are all essential sources of support, technical assistance, and help. Joining the relevant trade association and inclusion on the mailing list of the local extension office will ensure that the new farmer receives the latest updates on permits, regulations, issues, and research.

Plans must include developing contacts with the local diagnostic laboratories, pathologists, and technicians. Understanding the best way to submit samples for diagnosis and training workers in the procedures required will reduce the time to initiate appropriate treatments.

International sources of help include international networks that promote aquaculture such as the Network of Aquaculture Centres in Asia-Pacific (NACA). A network in Eastern Europe, the Network of Aquaculture Centres of Central-Eastern Europe (NACEE), similarly promotes aquaculture and provides information to industry.

In the United States, available help includes personnel of United States Department of Agriculture-

Table 1.1. Sources of Help and Assistance for New Aquaculture Businesses.

Type of organization	Type of assistance
Extension services	Research-based information
Disease and water quality diagnostics laboratories	Diagnosis of disease and water quality problems
Industry trade associations	Updates on issues
State	Political action
National	Trade journals
International	News
Species specific	Updates on issues, meetings
Multispecies	Updates on issues, meetings
Government agencies	Information on permits and programs
State	Information on permits and programs
Federal	Information on permits and programs
Related industry segments	Information on trends, costs, products
Equipment suppliers	Information on trends, costs, equipment
Feed manufacturers	Information on trends, costs, products
Supply company representatives	Information on trends, costs, products, permits
Bank	Information on financial position and trends
Local government entities	Information on trends and permits
Chambers of commerce	News and local events
Economic development offices	Business and financial assistance and new programs

Animal Plant and Health Inspection Service/Wildlife Services. Permits are required in the United States to control fish-eating birds. Severe fines and penalties can be levied on farmers who have not obtained the necessary permits. Wildlife Services personnel have a variety of programs to provide assistance in the control of fish-eating birds and in the process of obtaining the necessary permits.

Local and state aquaculture associations can be of great help. Subscriptions to aquaculture journals, magazines, and newsletters help to keep abreast of current news and impending legislation.

Extension professionals are some of the best sources of information. These are trained scientists who are skilled in techniques to disseminate information effectively. They also have the latest research results at their fingertips and may offer opportunities for farmers to cooperate in on-farm or verification trials.

Some states and provinces have government offices that will assist aquaculture growers. Equipment suppliers, feed manufacturers, supply company representatives, and restaurant owners can be good sources of information on trends, costs, and market data. Local chambers of commerce, economic development offices, and banks can also provide relevant and useful information.

RECORD-KEEPING FOR AQUACULTURE BUSINESSES

The intensive nature of successful businesses requires managers to maintain detailed records. Those contemplating starting an aquaculture business should prepare to spend time to maintain records and to analyze them periodically throughout the year. This level of management can make the difference between success and failure.

Records required will include complete records on input purchases, use, and inventory. Labor and sales records that indicate the quantity sold, the price received, and any dockages incurred with each sale must be maintained. The ability to sort records into feed amounts and fish sales by pond or other fish culture unit will provide the manager with a means to evaluate pond-level performance and relate this back to management changes in that pond. Reports from diagnostic laboratories on disease incidence by pond will enable the manager to search for ways to minimize losses due to disease. Financial records must be maintained for each loan along with depreciation schedules for all equipment in the business. All paperwork related to permits and compliance with regulations must be maintained over time along with all chemical use on the farm.

Each of the following chapters presents detailed suggestions on how to organize and use records to monitor and evaluate farm performance relevant to the topic discussed in each chapter. Management decisions made from detailed farm records will be more effective and have greater positive results over time if based on detailed historical performance records of the farm business.

PRACTICAL APPLICATION

Throughout this book, each chapter includes an example of an application of the material presented in each chapter to the case of a fish farm. To start such a farm, the owner will need to begin to address the critical issues related to acquiring the necessary management skills and capital. If the owner is not skilled and experienced in managing a fish farm, it will be necessary to recruit and hire a skilled manager. Careful thought as to how to obtain the capital that will be needed must be given from the very beginning. Preliminary contacts with lenders will be necessary to identify those more likely to loan to fish farmers and to identify the levels of lending that each bank can provide.

Decisions related to the overall structure of the business can affect the supply of capital available for the fish farm. Developing a partnership or joint venture with a friend or family member can provide a source of capital. The overall financial plan needs to detail the capital that will be available from the owner and any partners and how much will need to be borrowed.

Marketing decisions also will need to be made early on in the planning process for the business. Overviews of the market for that particular business and analysis of its position in the market can be important. The rest of this book provides details of each component and analysis that is required to start and maintain a successful aquaculture business.

OTHER APPLICATIONS IN AQUACULTURE

Engle and Valderrama (2001) developed a training manual designed to assist shrimp growers to begin to develop business plans. The Engle and Valderrama (2001) document emphasizes the financial statements needed for a comprehensive business plan for shrimp farming in Honduras. A CD is provided with spreadsheet templates to assist those who wish to develop comprehensive business plans for their shrimp operations. Self-guided tutorials and exercises are included.

SUMMARY

Aquaculture businesses should be entered into only after considerable thought and analysis. Greater capital, more intensive labor, and high levels of management are required to be successful in aquaculture regardless whether the business is large or small.

Comprehensive business and marketing planning is necessary. However, other considerations such as effects on the family, personal motivations, and the availability of adequate resources must also be analyzed carefully. The remaining chapters in this book present detailed information on the steps needed both to start up and to maintain a successful aquaculture business.

REVIEW QUESTIONS

1. What types of specific goals must be set when starting an aquaculture business?

2. Why is it important to assess one's motivation to enter into an aquaculture business?

3. Why is aquaculture considered to be a capital-intensive business? Identify some specific examples of the capital requirements for various aquaculture businesses.

4. Where does financial risk come from?

5. Why is aquaculture considered to be a management-intensive business? Give some specific examples for various types of aquaculture production.

6. What are some of the marketing challenges involved in starting up aquaculture business? Give some specific examples.

7. What types of resources must be available for different types of aquaculture businesses? Pick two different aquaculture production systems and contrast the differences in resource availability that would be required.

8. List three types of organizational structures that can be used for aquaculture businesses and compare the advantages and disadvantages.

9. What are some of the key considerations related to financing new aquaculture businesses?

10. What are some sources of help and assistance for new aquaculture businesses?

REFERENCE

Engle, Carole R. and Diego Valderrama. 2001. Economics and management of shrimp farms training manual. In: M.C. Haws and C.E. Boyd (eds). *Methods for Improving Shrimp Culture in Central America*. Managua, Nicaragua: Editorial-imprenta, Universidad Centroamericana. pp. 231–261. (in English and Spanish)