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ECONOMIC AND SOCIAL CONSIDERATIONS IN SEAFARMING AND SEAFARMING

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ABSTRACT

Sustainable development of seafarming and seafarming calls for careful planning. Investments in seafarming must take into account environmental, biotechnological, and socioeconomic considerations. Investment planning must be carefully examined as well as the physical design of production systems such that its negative impact is minimized and the positive impact is accentuated.

Supply from the wild may not be expected to grow much higher than present levels. Many of the major commercially valuable fisheries are now overfished at or close to their respective minimum sustainable yield levels. Seafarming can attract some of the fishermen out of overcrowded fisheries.

Production cost of seafarming produce is a major concern which has to be examined closely if these are to compete with and gradually supplant the supply of fish from the wild. Feed is one of the main inhibiting factors, hence, efficient consideration calls for constantly improving feed conversion and productivity per unit input.

Existing government policies are not clear nor conducive to seafarming in terms of use rights of coastal waters. To attract potential investors into seafarming, governments are encouraged to review existing policies governing use rights to coastal waters, package the necessary technology consistent with the country's wage and price structure, and develop investment profile for seafarming opportunities using conservative criteria.

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INTRODUCTION

The seafood we eat today comes from the wild and aquaculture. The introduction of fish trawling in the 1950s and the use of both active and passive gears have consistently decimated the standing stocks of aquatic resources.

Although marine fish landings can be increased through better management and use of presently underexploited stocks, seafarming is one alternative aquaculture technique for increasing fish supply.

This paper examines the economic and social aspects of seafarming. It sets out and delineates the economics of seafarming to provide the necessary information/data to support its orderly and systematic development and expansion and to attract investors and financial institutions into seafarming.

A broad overview of the techno-socioeconomics of seafarming at the aggregate level, especially the structure of the industry, production, and markets for products are presented.

Seafarming: Tomorrow's Fish Supply

Except for the years 1983/1984 and 1985/1986 when the rate of increase in total fish catch grew by 8.3 and 7.4%, respectively, the world landings of fish has grown very slowly at an annual average of 3.4% due to indiscriminate fishing and fisheries habitat degradation and destruction.

Production from aquaculture, of which seafarming is a recent but increasingly viable source of supply, is steadily increasing. Today, production from aquaculture accounts for at least 15%.

Overexploitation of fisheries resources in many countries, especially developing ones, is due to extreme poverty, unenforceable fisheries management measures, lack of alternative possibilities, lack of better choice in the technique of production for capture and culture fisheries until recently.

The recent improvements in aquaculture technology (seed production, nutrition, production methods), made seafarming a natural and logical extension of capture fishing.

ECONOMIC AND SOCIAL CONSIDERATIONS

Economic and social considerations for seafarming will be examined from two broad perspectives, namely (1) resource-based system means that seafarming methods, practices, and techniques emphasize the use of resources most abundant in the production site more than the reliance on advanced or high technology and (2) technology-based system means the application of advanced technology and science to the production process.

Site and Scale Production

The seafarming system to be developed has direct relationship to the choice of sites and size of operation.

Production site has been identified by various studies as one of the main factors responsible for the failures of aquaculture. Recently, the Committee on Fisheries at its 17th Session has identified, among others, site and social environment as partly responsible for aquaculture's poor performance.

Moreover, production site has a direct relationship to the scale of production (large, medium, or small-scale). The ease or difficulty with site acquisition will vary according to the proposed scale or size of the farm.

Centralization of seafarming set-up (broodstock, hatchery, nursery, transition, and grow-out systems) would facilitate farm management and operation under normal conditions. Production (e.g., labor efficiency) and cost efficiency (duplication of certain facilities) are more easily attainable in one location than in scattered sites.

It is also technically and economically worthwhile to separate the different production sub-systems into more than one site, e.g., disease outbreak in one site will not affect other sites.

Production Intensity

The economics (i.e., costs and returns) of the level of production system intensity (extensive, semi-intensive, or intensive) influence the profitability of seafarming. For shrimp aquaculture in the Asian region, costs of production per kilogram decline more rapidly with each increase in productivity gains for extensive and semi-intensive systems than for intensive culture. Fixed costs (capital investments) of the intensive system is very high and even with improved productivity, the unit costs decline insignificantly.

On the other hand, the cost of production per unit of output is lower for intensive than for extensive operations. As in the case of milkfish aquaculture in Indonesia and the Philippines. Yield per hectare under intensive operation can be increased three times that of extensive culture by doubling the cost of production. The resulting profit is much higher given the price of milkfish, prevailing in the two countries.

Similarly, production cost per ton of common carp in an intensive system is about 40% less than in an extensive system in Israel. Production cost is not only influenced by the intensity of production but also the technology and inputs to be employed.

The natural, spatial, topographical, hydrobiological, and hydrographical features of each potential seafarming site govern the ease of difficulty with which the site can be developed.

The choice of production intensity level also depends on the relative costs of each of the natural resources or inputs available in the area.

If coastal land and sea front is abundant and, thus, land cost is low, the extensive method would be appropriate (as in some parts of Latin America for shrimp culture). On the other hand, if coastal land or long-term accessibility to the sea front (seafarming) is scarce or limited, thus, making beach front land prices and leasehold fees relatively high as in Japan, Republic of Korea, Hong Kong, Taiwan, and Singapore, the intensive method is resorted to.

From the stand point of the national economy and ecology, whatever system intensity is planned, the Seafarming production system developed should be designed with the environment in mind. In the long-run, this approach is socioeconomically sound.

Target Species

The target species to be cultured is another important economic consideration in Seafarming. In general, target species can be classified into: 1) high value, 2) low value, 3) high value, low volume, and 4) low value, high volume.

Depending on its profitability the investor can select the high value species or be encouraged to produce for the low-income markets with suitable government incentives and policy.

At present, Asian aquaculture accounts for more than three-fourths of total world production at 10 million tons. Of this, about 42% and 32% are from fish and seaweeds, respectively. Another 24% are shellfish or crustaceans. Shrimps constitute only 2.5%. Because seaweeds are mostly cultivated in shallow seas and are relatively low-valued, this pattern and trend in production distribution by major species groups show that development of fish and shellfish seafarming could still be developed.

Of the 40 species of fish and 20 species of shellfish cultured in Asia, a large percentage (except some shrimp species) is of relatively low value. Because of the declining catch of marine species, Seafarming of these high value species can fill the supply shortfall from the wild.

Capital Investment Fixed Costs

Availability of capital could directly influence the farm design and layout, size of operation, product or species-mix, and technology to be employed.

The cost of acquiring or leasing the long-term use rights to the sea front or coastal land should also be considered. To safeguard and protect the capital, it is important that such use rights be secured on a long term basis to recover the capital. As much as the coastal zone, is in the public domain, a contract can be drawn up with the government to maintain tenurial or "property" rights.

Once the site is selected, the cost of capital development of production facilities has to be considered. Such capital cost can be partly offset by valuable products from the site like wood, fruits, roof thatch, and other products of aquatic or animal origin. Remodelling the seashore and adjacent land involves sea floor or mud flat modification or preparation for seeding, installation of stakes, longlines and cement/hollow blocks for spat collection, pen and cage, pond, water supply and drainage canal, dikeberm and water gate construction, hatchery building, office (including a modest laboratory), and storage facilities. Other capital items include water pumps and jet sprayers, boats, generator set, and a miscellany of water quality test kits and chemicals.

Production Costs

Production costs are an integral component and consideration of seafarming. The main cost components of aquaculture (mostly variable costs) are: (1) seeds - 20-50%, (2) feeds/fertilizers - 30-70%, (3) labor -15-20%, (4) others - 5-10%.

National Land-use Planning and Policy

Before implementing a seafarming project, national policy (including regulations in coastal resource use), plan, and assistance should be studied and reviewed. Such information can reduce site exploratory costs.

To encourage the orderly development of aquaculture, especially sites for seafarming, government should develop criteria (technical and non-technical) and zoning laws and regulations governing the use of virgin areas for aquaculture. Furthermore, many government bodies have direct or indirect jurisdiction over the use of land and water for fish farming contributing much confusion as to who has the final authority in granting a permit to start a fish farm.

As 80-93% of the world's agricultural land is already in use, the scope for land-based aquaculture production systems is rather limited. Attention can be directed and focused on the sea as possible production sites. However, greater attention should be given to proper planning and implementation.

Present Land Use Pattern. It is important to know whether or not the potential site for seafarming is in an area where aquaculture is earmarked for fish culture, or situated next to an industrial, residential, or agricultural zone.

If the proposed site is within the vicinity of a predominantly agricultural area or adjacent to an industrial zone, agricultural runoffs (both good and bad) would be a concern. The extent of use of chemical fertilizers, pesticides, and industrial effluent will affect water quality.

Tenurial System. Land and water body tenurial arrangements vary from country to country. Depending on the land (reform) laws or laws governing the use of the sea or water bodies in each country, tenurial arrangements can range from outright purchase and ownership to lease or rental arrangement.

Except for water bodies (rivers, lakes and seas) and land adjacent to such water bodies which remain public domain, private citizens are and can own land in many countries. In such cases, land acquisition can be negotiated with the individual owners. Otherwise, land acquisition is arranged with the government.

Property Rights and Security. The foremost consideration under property rights and security are risks and uncertainty. Exposure to risks of a site for seafarming can be minimized if certain precautions are instituted. These precautionary measures cost money to carry out.

Pilferage is of prime consideration because without the assurance of getting an economic return, the farm would fail. The costs of surveillance (guards, and other electronic deterrents) show up in production costs. They are in turn translated into higher selling prices.

Goodwill with the surrounding community or can and must be fostered. Recruiting and employing the local labor force wherever possible would ensure goodwill and cooperation and thus, alleviate part of the social problems.

Insurance Coverage. Is the prospective site for seafarming insurable? Some insurance companies would not sell a policy because of the inaccessibility of the farm. An insurance policy is a wise investment to protect against future loss arising from theft and pilferage, vandalism, or storm damage and other natural causes. The location of the farm plays a role in determining whether a policy can be obtained or not.

Sources of Financing Credit

The source of capital to finance acquisition and development of the farm site has direct relationship to site selection. Large investors usually have little difficulty in financing or obtaining credit while small farmers face real problems in obtaining credit.

To encourage accelerated Seafarming development, many governments are known to provide different types of assistance. These are: 1) small coastal land grant of virgin areas determined as suited for seafarming, 2) low interest credit financing either for capital development (site construction) or operating costs (input purchase), and 3) government coastal land leasehold system with simple and renewable terms such as Philippine Ordinary Fishpond Permit and Fishpond Lease Agreement.

Commercial lending institutions have also shown interest in financing aquaculture investments.

Accessibility to Input and Output Markets

If the production site is inaccessible by the existing road network, additional capital costs would have to be incurred to build an access road linking the existing road system.

Fair to good logistics and low cost means of transportation linking production centers to consumption centers can make or break a new aquaculture facility. The economics of transporting needed inputs to the production site and outputs to the markets (e.g. cold storage facility and onward shipment as exports) need to be determined beforehand.

Labor Supply and Costs

In many developing countries, such as Indonesia, coastal land and shoreline suitable for Seafarming may be found in sparsely populated areas. Supply of a reliable, low-cost skilled labor becomes critical because labor cost accounts for about 15-20% of the total costs of production for most aquaculture system. Thus, many aquaculture sites are found near urban areas which are the population and consumption centers. While recruitment of unskilled labor can

be done locally, recruitment of semi-skilled and skilled labor may have to be done further afield. For some countries, it may be necessary to import such labor.

Employment

Aquaculture is regarded as one national economic sector which can absorb the labor entering the labor market annually. Governments are interested in allocating land along the coast or sea front for aquaculture in the rural areas and are actively pushing its development and expansion.

Shang and Rabanal (1976) also reported that intensive milkfish culture in Indonesia and the Philippines creates more job opportunities in the rural areas because of greater need for fertilization and frequent stocking and harvesting.

RISK OF URBAN ENCROACHMENT

Site selection for seafarming also has to take into account the risk of urban encroachment in the short and long-term. This is a very real problem in many countries because as the population multiplies rapidly, valuable agricultural lands including fish farms are lost to housing or industrial development.

EXTERNALITY

A site for seafarming should also be away from all possible sources of problems which management has little or no control of such as pollution (e.g. domestic sewage, agricultural run-off, and industrial wastes), theft, etc.

The potential seafarming investor should know how other resource users and producers and consumers in the vicinity and adjacent to the site will influence his production and costs. Likewise, he should recognize how his seafarming activities would affect his neighbors. This is important in today's legal works given the opportunity for legal resource for infractions of rights, loss, etc.

DISCUSSION AND CONCLUSION

In Asia where aquaculture dates back more than 2,500 years and land and population account for about 20 and 60%, respectively, of the total world land area and population, sites available and suitable for aquaculture are scarce, in particular on land. Water bodies like the sea are increasingly being looked into as possible new sites.

The success of seafarming depends largely on site-specific factors. While the biotechnical factors describe the production possibilities or production frontier, economic and market forces shape the profitability of seafarming.

By pointing out as well as bringing together all possible considerations from the economic and social perspectives, the technical evaluation of seafarming can be broadened and enriched.

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