CHAPTER V

SUMMARY AND CONCLUSION
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The study has some objectives and hypotheses. The first objective of the study is to analyze the status of fixed assets among the selected shrimp farms in the study area. The corresponding hypothesis is that there is a considerable regional variation in the status of fixed assets among the shrimp farms in the study area. The study includes the cost of land, cost of pond, civil construction, electrical installation, farm machinery and farm equipments' in the fixed cost. This fixed cost consisting the fixed assets varies from region to region and in various farm techniques. The average fixed cost per hectare in extensive technique is Rs. 1,49,629. This is maximum in South Arcot district with Rs. 2,23,650 and minimum in Thanjavur district with Rs. 1, 33,895. In this, the average spending for land occupies the top in all the four techniques and next comes pond construction cost and cost of farm equipments cost comes last. Only in extensive and improved-extensive technique the civil construction cost does not influence the production and hence, it comes last in semi-intensive and in intensive technique and at the same time farm equipments' cost influences than civil construction. In improved-extensive technique the average fixed cost is Rs. 1, 56,728/ha. and this is maximum in South Arcot and minimum in Thanjavur district with Rs. 1,95,840 and Rs. 1,33,443 respectively.
In semi-intensive technique the average fixed cost per hectare is Rs.1, 79,327/ha. In Chengalpet district it stands top with Rs. 2,11,328/ha. Nagappattinam stands the last with 1,69,687/ha. In Intensive technique the average fixed cost per hectare is Rs. 2,35,392. Nagappattinam stands first in this regard with Rs.2,58,511/ha. followed by South Arcot with Rs. 2,27,951.

The second objective of the study is to examine the various aspects of cost of shrimp culture among the chosen shrimp farms in the study area. The consonant hypothesis is that the regions do vary with respect to various cost of culturing shrimps. The total operational costs embodies the cost of seed, feed, fertilizer, power and fuel, salary and wages, maintenance, harvest expenses and miscellaneous costs etc., The total operational costs varies from region to region and technique to technique. The average operational costs per hectare of shrimp farm is increasing corresponding to the technique adopted. It is Rs.1, 23,845/ha. in extensive, Rs.1, 67,434/ha. In improved-extensive, in semi-intensive it is worked out as Rs.2, 45,832/ha. and in Intensive it comes to 3,54,405/ha. In the case of extensive technique the highest is recorded in South Arcot district with Rs.1, 28,262/ha. and the lowest is in Chengalpet with Rs.1, 14,182/ha. In the improved-extensive technique Chengalpet tops with Rs.1, 77,185/ha. In the Semi-intensive technique Thanjavur district leads the maximum of Rs.2, 52,356/ha. South Arcot becomes the last with having Rs.2, 09,511/ha. and in intensive Nagappattinam holds the highest record with Rs.4, 16,264/ha. South Arcot the last with Rs.3, 28,933/ha.
In general, in all the regions and in all the techniques, feed cost alone dominates more than any other costs in the production process. On the contrary, the fertilizer cost comes last in all the regions irrespective of techniques. The third objective of the study is to examine the operational efficiency of the selected shrimp farms. The corresponding hypothesis is that there is a remarkable farm type variation in the study area. In the regionwise analysis, the average cost of production is worked out as Rs.88.99/Kg, but, in South Arcot the cost of production per kilogram exceeds the average with Rs.92.25/Kg, lowest is recorded in Nagappattinam at the minimum of Rs.86.32/Kg. In addition to the regional variation there exists variation in the cost of production in the various techniques. The lowest cost per kilogram is in farms with extensive technique which is Rs.83.47/Kg. This is lowest in South Arcot with Rs.76/Kg. and highest is Rs.85.19/Kg. The average cost of production in farms with improved-extensive technique is Rs.87.21/Kg. The lowest cost of production is seen in South Arcot district where it is worked out to Rs.86.13/Kg. and it is the highest in Chengalpet with Rs.89.65/Kg. In the case of semi-intensive technique farms, the average cost of production is Rs.94.05/Kg. The highest in this technique is in Thanjavur district where the cost of production is Rs.99.90/Kg. The lowest is in Nagappattinam district where the cost of production is Rs.88.24/Kg. Under the four techniques, the cost of production is the highest in intensive culture where the cost per kilogram comes to Rs.107.82/Kg. Intensive technique was carried out only in South Arcot is Rs.110.18/Kg. and in Nagappattinam district it is Rs.103.55/Kg.
This study confirms that the operational efficiency differs in regions and differ also under the four techniques.

The fourth objective of the study is to identify the production performance and profitability (Net profitability) status of shrimp farms in the study area. The corresponding hypothesis is there is a significant regional and farm type variation on operational efficiency and profitability of shrimp culture. The study has identified seventeen predictor variables influencing net profit. In this, total farm land, number of ponds and pond area are insignificant attributes towards net profitability of the shrimp culture, but water spread area influences considerably. The total cost does not influence more than the variable costs. Price sold, stocking density, rearing days, body weight survival rate, type of feed, type of shrimp and educational qualifications are also significantly influencing net profitability. On the other hand, size of pond, age and caste does not show any significance on net profitability.

The study has also identified the regionwise variation; the average net profit per hectare is worked out Rs.2, 93,532/ha. In this, South Arcot district holds the top of Rs.3, 17,125/ha. Chengalpet with the minimum of Rs.2, 42,498/ha. Net profit varies with the technique also. The maximum is under semi-intensive technique, where it is Rs.3, 40,127/ha. and the minimum is under extensive technique with Rs.2, 59,280/ha.
The \( r^2 = 0.75269 \). This shows that predictor variable 75.27 per cent is determining the net profit.

The fifth objective of the study is to apprise the factors influencing production of shrimps: The corresponding hypothesis is that there is a significant regional variation in production of the shrimps among the different types of farms. The study has identified seventeen predictor variables which are influencing shrimp production namely total farm land, total pond area, total water spread area, number of ponds, total fixed costs, total variable costs, price sold, stocking density, rearing days, average body weight, survival rate, size of pond, type of shrimp, type of feed, age, caste and education. The predictor variable such as age, caste, and price sold exhibits the negative influence in shrimp production but the other variables have a positive influence on the dependent variable that is, shrimp production. The calculated value of \( r^2 = 0.8489 \) shows that 84.89 per cent of influence on the predictor on the dependent variable. The study has also identified the regional variation in the production of shrimp. The average production of shrimp is 1698/kg/ha. In Chengalpet this is minimum in extensive (1346/Kg/ha.) technique and in maximum of 2122/Kg/ha. in semi-intensive technique. The average production was 2280/Kg/ha. in South Arcot district with a minimum of 1687/Kg/ha. in extensive and maximum in intensive with 2985/Kg/ha. So far as Nagappattinam district is concerned, the average production is 1903/Kg/ha. the minimum production in Nagappattinam is 1526 Kg/ha. In extensive and the maximum in intensive with 4020/Kg/ha. So far...
as Thanjavur is concerned the average production is 1783/Kg/ha., with a minimum of 1446/Kg/ha. in extensive and 2526/Kg/ha. in semi-intensive technique. The study has confirmed that there are variations in production performance in four regions and in four techniques adopted in the survey area.

The sixth objective is to suggest some policy measure to enhance the performance of the shrimp farms. The relevant hypothesis is that many predictor variations influencing the production of shrimps. FAO (Food and Agricultural Organization) of the UN (United Nations) in 1991 set up some guidelines towards development of shrimp farming: They are (i) balanced plan for coastal aquaculture development and management (ii) establishment of Environmental Impact Assessment (EIA) programme (iii) Regulating and monitoring aquaculture methods (iv) Treatment of aquaculture effluents (v) Appreciating the importance and assessing the carrying capacity of the surrounding eco system (vi) establishment of appropriate regulations and mangrove protection and use of wet lands. These guidelines set by FAO is very much suited for the Coromandel Coast of Tamil Nadu. Proper legislation and monitoring of shrimp farming by the government will make shrimp farming profitable to the farm owners and the country earning foreign exchange.
SUGGESTIONS FOR Viable AQUACULTURE

Suggestions are made to implement a crash programme in all relevant states to determine the land and water areas available for coastal aquaculture development. Within each state, the coastal zone readily available for shrimp farming should be demarcated after interacting with local communities. The public at large should be made aware that profitable aquaculture would be feasible in land which is not suitable for agriculture as well as other development purposes.

Available data indicate that sizable extents of brackish water zones are available in the country for development of sustainable aquaculture enterprises. Hence, there appears to be no justification for shrimp farming to be concentrated in selected regions like Thanjavur district, paddy and farm produce growing land could be easily excluded from potential shrimp farming operations. Norms for coastal zone management on a sustainable basis have to be defined.

As regards constructing aquaculture structures in mangrove areas, it is true that indiscriminate destruction of the mangroves can certainly cause serious adverse effects on the ecosystems and water movements. However, if proper care is taken to locate and design the facilities with due
consideration of biological and ecological parameters, it would be possible to arrive at compromises and develop viable projects in specified areas.

The rules to be made for licensing shrimp farm construction should provide for expert appraisal of the location and design. The precise regions where shrimp farms would be allowed during the next 5-10 years should be clearly demarcated. An additional requirement would be rules for specifying the minimum distances to be maintained between individual farms and strategic freshwater resources as well as those areas affected by tidal erosions. Future development of coastal aquaculture should be in a phased manner. Short term and long term action plans may be developed.

Production targets have to be controlled scrupulously. The terms intensive, semi-intensive, extensive, traditional etc. are rather vague and can be twisted to meet one's own needs. Appropriate area specific and technology specific production targets have to be worked out in all approved zones, in relation to the carrying capacity of the surrounding waters. A maximum production target of 2 tons/ha./crop, with a maximum of two crops per year, appears to be the safe limit for sustainability. Further, the specified targets should be inter-linked with the stocking rate, anticipated survival rate, feeding rate and composition of feed used. If there is justification for stipulating a higher production target for shrimp culture, the same should be allowed only if the carrying capacity of surrounding waters warrant such a decision. Environmental Impact Assessment process (EIA) should be strictly
enforced. The standards to be evolved in this connection should be precise and meaningful. Non-profit organisations and Research and Development institutions may be encouraged to specify EIA requirements.

The salt-water seepage problem appears to be genuine and such areas should be avoided for establishing new shrimp farms. Seepage of saline water can be prevented by plastic sheet or coal tar bottom farming technique (at the bottom of the pond high density polyethylene (HDPE) sheet or coal tar can be spread to avoid seepage of saline water. One layer of clay / sand will create the natural atmosphere for shrimps). The concepts of satellite farming and cooperative farming should be encouraged provided the location and designs meet the legal, social and biological requirements. A strong controlling and monitoring system should be statutorily established urgently. Adequate measures should be adopted to ensure adoption of sustainable management methods. Import of shrimp seed should be totally banned.

Import of shrimp feed should be progressively reduced. The composition of imported feed would have to be strictly monitored and urgent action to prevent inclusion of growth promoting substances in the feed is needed. Appropriate effluent treatment systems should be included in the designs for shrimp culture facilities. Methods to reduce and treat wastes are available and obligatory provisions need to be incorporated in the licensing system. Biological methods to mitigate at least some of the harmful effects of
shrimp pond wastes are known and they would be acceptable to majority of the aquaculturists for implementation.

Export earning should not be the only criterion for development of shrimp farming. Similarly, provisions should be made for concessions and exemptions for production of shrimps for domestic consumption. Such a strategy would make aquaculture acceptable to many communities.

Diversification of shrimp species used for farming could be insisted upon, at least on a percentage basis, in coastal zones. Emphasis should therefore be placed on the culture of species like penaeus indicus, penaeus semisulcatus penaeus merguiensis, rather than only penaeus monodon. Such an action will result in establishment of shrimp farms in saline areas alone.

In conclusion, it is strongly urged that a concerted and substantial rethinking of the shrimp production strategy be effected urgently. Mechanisms for resolving most of the conflicts are feasible, but may not be fully acceptable to vested interests. Aquaculturalists, particularly those involved in shrimp farming as an industry with an eye only on quick and large profits, should consciously accept their social obligations and change their philosophy and outlook in order to promote sustainable and socially
acceptable systems with strict control and monitory mechanisms. Sustainability is "being based on improved human welfare for the disadvantaged, not just increases in production and consumption. It is maintaining average output on definitely without depleting renewable resources and conserving socioculture aspects of rural society" (Beuntland Commission Report). Using the mother prawns removed from the sea in hatcheries and collecting of wild seed in millions to stock the farms deprive the sea of regeneration of shrimp stock. Further, the collection of seed is also non-selective since a number of fish seeds are wasted or destroyed in the process. This is sheer callous decimation of living resources of the sea, In contrast to the Japanese practise of releasing certain portions of the hatchery reared seed in to the sea.

Thus shrimp farming in coromandel coast of Tamil Nadu is a profitable economic activity that helps the country to generate income and foreign exchange. But proper precaution is essential to make the industry eco-friendly and economically viable.

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