

APPROPRIATE TECHNOLOGY: CASE STUDY OF SHRIMP FARMING IN THAILAND AND VIETNAM

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Abstract

This paper is concerned with Technology and Mans Capability in handling Technology in general. A comparative study of marine shrimp farming systems as practiced in eastern Thailand and southern Vietnam (Mekong delta area) is cited as case studies of appropriate technology.

1. Introduction

Man uses technology for various purposes. It may be used to produce more or better or cheaper necessary items or to control environment. The use of new technology will affect the social and economic situation of the society, may use more natural resources or perhaps pollute the delicately balanced environment. Man should therefore be very careful when using new technology. On the eastern coast of Thailand and the southern coast of Vietnam which used to have rich natural mangrove resources necessary for the reproduction of young marine animals, the development of shrimp farming technology to produce more shrimp has affected the economy of the region, causing social change, using up very limited natural resources and upsetting the environment. Lessons learnt from situations in one country would serve as a very valuable lesson to other countries.

2. Objectives

1. To observe the use of shrimp production technology and the effect it has on social, economic, resources and environment of the eastern sea coast of Thailand and the southern coast of Vietnam.

2. To make a comparative study of the use of technology in eastern Thailand and southern Vietnam.

3. Essential components of technology

3.1 In using technology the following four components are essential :

- (i) Equipment/machinery or "Hardware".
- (ii) Methodology/operating system or "Software".
- (iii) Mans capability to handle the technology or "Peopleware".
- (iv) Mans management capability to manage the technology efficiently o"managementware"

The first two components address the knowledge and operation of technology while the last two components address the capability to use technology.

3.2 The level of difficulty of technology.

Both "Hardware" and "Software" components have different levels of difficulty of technology and can be classified into four catagories namely :

(i) Low or Village Technology. These are simple technologies which can be transfered by demonstration.

(ii) Intermediate technology. These are technologies using simple machines and simple

software usually transferred by users attending schools or undergoing intensive training.

(iii) High Technology. These involve complex machines and complex software, often transferred by users attending technical institutions.

(iv) Advanced Technology. These involve very complex hardware and software, often transferred by user attending universities and undergoing training practices or research practices.

3.3 Mans own ability to operate the Technology.

Different men have different technology training background therefore they will have different levels of capability to operate the technology. These capabilities can be further classified as :

(0) Benefit only. They do not need to know or take part in the operation of technology. They simply enjoy the benefit of technology operated by others. They can have any level of educational background.

(1) Operate only. They simply operate the technology and do not know what is involved. They should have at least primary education.

(2) Select, operate and maintain. They know more about the technology up to the level that they are able to choose, operate and maintain the technology well. They should have at least secondary school background.

(3) Replicate; adapt/modify or create new technology.

They must know and understand the technology very well up to the point that they can produce new technology. The minimum educational background should be either at a higher technical institution or university.

For the majority of Thai and Vietnamese shrimp farmers, their educational backgrounds are mostly primary school with few persons ever attending secondary school or higher. At best they handle technology up to the intermediate level of difficulty (level 2). The farmers will not be able to cope with anything of higher difficulty or they have the ability to create new technology, and hence will require support from other agencies.

3.4 Technology system.

The technology system involves four parts as follows: Inputs, Processes, Outputs and Sup-

ports. For details of shrimp farming technology, see Fig.1

3.5 Appropriate Technology

The appropriateness of technology addresses the technology users viability to control the four components of the system as follows :

(i) Technology is simple enough for the user to handle.

(ii) Managable by local people.

(iii) Use local funding/resources.

(iv) Use locally produced machinery equipment.

(v) Use local materials.

(vi) If required, experts support can be found easily.

(vii) If required, mans capability can be upgraded by local training team.

(viii) There are texts/manuals available for consultation.

4. Shrimp cultures in Eastern coast of Thailand [1].

The author traveled and observed the shrimp farming system at Koongkabanc Chandburi, and the observation can be divided into three periods: pre 1982, 1982-92 and post 92

4.1 Thailand pre 1982

Farmers use the natural technique of shrimp culture,

- Step 1. Pond preparation is done by hand and simple tools (level 1)
2. Pond drying is by the sun only with lime added to the bottom of pond (level 1).
3. Pumping of sea water is done by locally made pump (level 2).
4. No water quality checking nor treatment.
5. Young shrimp are pumped in with sea water (level 2).
6. Feeding is done by giving shrimps natural food (level 1).
7. Medicine is not used.
8. Harvesting is done by drag net (level 1)
9. Pumping of waste water is done by locally made pump (level 2).

The farmer can easily handle all steps of this process of production technology.

Results : low yield but benefit/cost ratio is about 2.

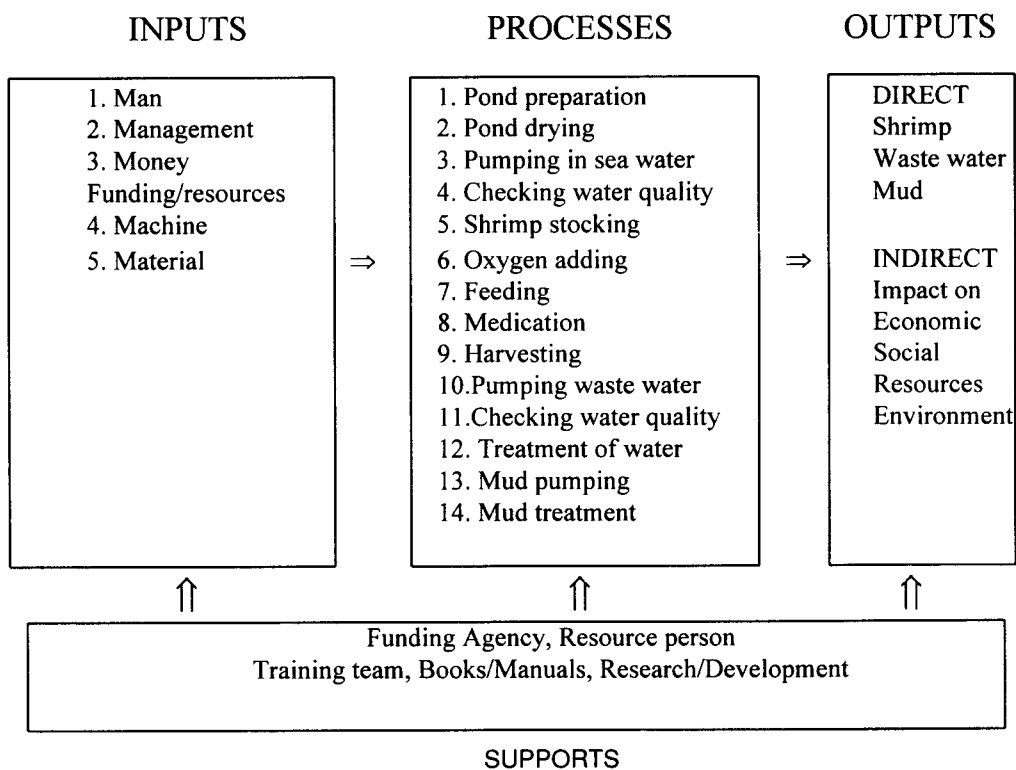


Figure 1 System of Shrimp Farming Technology (as observed by the author)

(4.2) 1982-1992 : Intensive shrimp culture,
Step 1. Pond preparation is done using large backhoe (level 3).

2. Drying of pond is done by the sun and the addition of lime (level 1).
3. Pumping in sea water is done by locally made or improved pump (level 2 or 3).
4. Checking water quality is done by using sophisticated equipment (level 3).
5. Young shrimp culture is done by government research center or private organization (level 3 or 4).
6. Stocking is done by using P 15 state shrimp with approximate eye counting at 30/m² (level 2).
7. Oxygen addition is done by locally made impulse roller (level 2)
8. Antibiotic drugs are used (level 3).
9. Animal or shrimp feed are locally made by Thai industrial process (level 3 or 4).
10. Harvesting is done by drag net (level 1).

11. Pumping of waste water is done by improved pump (level 3).
12. Checking of pond waste water quality is done with sophisticated equipment (level 3).
13. Mud pumping is done by locally produced pump (level 2).

Results of such operation can be observed as :

(a) Farmers start to lose control of the technology system. Assistance must come from government research centers and private organizations in steps which require a level higher than 3.

(b) Intensive farming has increased shrimp farming area which has depleted the natural mangrove area.

(c) Waste water from the pond was found to be high in biochemical oxygen demand (BOD) (>5 ppm) and low in dissolved oxygen (DO) (1% or less). Sea water closer to the coast was polluted (Clams are now cultured in drainage canals to take care of excess feed in the pond).

(d) The production of shrimp rose from about 20,000 tons/year in 1982 to 93,000 tons in 1991 but declined to 79,000 tons in 1992. Average yield is 4 tons/hectare.

(e) Export to Japan and USA hit a maximum high of around US \$500 M(FOB) in 1991 but slightly declined in 1992.

(4.3) Post 1992.

(a) Pumping of sea water is done by using sophisticated pump which requires an operator. Distribution of water is through locally produced HDPE or PVC pipes to avoid rusting (level 3).

(b) Quality of drained waste water is checked and treated to reduce the amount of BOD and increase DO before being pumped to the sea (level 3).

(c) Mud quality is checked and treated before being pumped to trucks and transported elsewhere. When all these improvements are completed it is expected that there will be :

(i) Improved yield and reduced effect of pollution on the environment.

(ii) Better education of farmers not to destroy more natural mangrove resources.

5. Shrimp culture in southern Vietnam (Mekong delta area)

The author traveled and observed shrimp culture in three provinces Travin, Soc Trang and Min Hai in 1993.

The process of shrimp culture in southern Vietnam as observed by the author were as follows :

- (1) Digging of ponds and drainage canals is done by hand (level 1) on by large machine (level 3).
- (2) No sun drying of pond .
- (3) Drawing in of sea water is done through gravity and simple pipe work (level 1).
- (4) Young shrimp culture is done by government research station (level 3/4).
- (5) Stocking is done by easily counted P 30 young shrimp at a rate of 2-3/m² (level 1).
- (6) No oxygen adding machine is used.
- (7) Medicine is used (level 3).
- (8) Harvesting is done by drag net (level 1).
- (9) No pumping of waste water is done.
- (10) No Checking of water quality or mud is done
- (11) Mud removal is done by hand (level 1).

The farmer is able to control almost all steps of activities in the farm. No bad effect on environment has been observed yet. Sikor and O'Rourke[2,3]. also report a rise from 0 hectare in 1982 to 20,000 hectares of shrimp farming area in Min Hai. Some 8% of farming area was found to be abandoned due to depleted mangrove resources and some sign of pollution in sea coast environment.

6. Conclusions and Recommendation

6.1 Conclusion

Intensive shrimp culture technology is found to be too difficult for Thai and Vietnamese farmers to handle at the present time. If continued the mangrove resources and the sea coast environment will be badly affected leading to many other problems such as pollution and loss of young marine life breeding areas.

6.2 Recommendation

(1) Changing of technology is dictated by economic requirement and improved social conditions but usually has bad effects on the limited natural resources and delicate environment balance Technology must therefore be scrutinized before being used.

(2) To compete with countries having more advanced economic conditions, one must learn all the advantages and disadvantages of using new and more difficult technology which will enable one to compete with the others effectively and efficiently.

(3) Carefully checking of the new technology system must be done before any new technology can be used, and if found to be too difficult, effective transfer of technology must be carried out to upgrade the technology user's capability before embarking on the use of that new technology.

(4) It is recommended to invest in education for the young so that they have a better chance of learning new technology.

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8. References

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