STRATEGY FOR TECHNOLOGY TRANSFER IN
THE FISH CURING INDUSTRY
CHAPTER FIVE

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5.1. Technology transfer

A wide gap exists between the technological innovations in fish curing developed at our research centres and their actual use by the fish curers. Transfer of technology starts after its perfection and ends in its utilization by the target group.

There are four sets of basic activities involved in the transfer of technology (Jaiswal and Arya, 1981).

1) Technology production system or research system to evolve technology.
2) Extension system to transfer the technology from research organisations to the actual users.
3) Technology utilization system or the client system which adopts the technology.

4) Support system which supports the technology transfer process and provides necessary inputs required for the use of technology and also provides facilities for marketing of the output.

5.1.1. Research system:

The research system takes care of the technology production. It consists of various research institutes where innovations are created. The main organisations conducting research in fish curing technology in the country is Central Institute of Fisheries Technology, Cochin under the Indian Council of Agricultural Research. The Central Food Technological Research Institute, Mysore under the Council of Scientific and Industrial Research is another organisation where some amount of research in fish curing is being carried out. Some of the State Fisheries Departments and Agricultural Universities have also conducted some research investigations in the fish curing technology.

5.1.2. Extension system:

The extension system consists of change agents or extension personnel belonging to government and
non-government agencies who act as links between the research system and client (fish curers) system. In addition to transferring the new technology to the potential users, the extension system is also supplying the research system with feedback about the field problems. The extension workers contact the fish curers in person, in groups or through indirect media like newspapers, magazines, leaflets, radio, television etc.

Even though a large network of extension institutions have been established in the country for the transfer of technology in agriculture, the agencies engaged in transferring fish curing technology are very limited in number. Some of the State Fisheries Departments and Agricultural Universities are having extension systems for fisheries development. But this system gives priority to fish farming. Only minor work is done on fishing or fish processing including fish curing.

Extension work on curing or other aspects of fish processing technology is mainly looked after by the Central Institute of Fisheries Technology. The Marine Products Export Development Authority is also engaged in technology transfer related to processed fish for export. Export Inspection Agency is undertaking in a very small
scale the technology transfer in fish processing.

The extension service has not reached the entire fish curing community. Some of the factors responsible for this are administrative bottlenecks, lack of effective linkage between research and extension, lack of sufficient fishermen oriented programmes, lack of an educational approach on effective use of extension methods, lack of coordination among various development departments, lack of an integrated approach, lack of dedication and knowledge among extension workers, supervisors and their administrators, unmanageable areas of operation of extension workers, lack of suitable transport facilities, lack of information, lack of easy, timely and adequate availability of inputs, lack of facilities for marketing of high quality cured products, financial limitations, lack of sufficient price for high quality cured products etc.

5.1.3. Technology utilization/client system:

This system consists of the actual users of the technology. In the case of fish curing industry, this system refers to fish curers. They are scattered all along the coastal belt. They mainly follow the traditional methods of curing resulting in the production of poor quality cured fish.
5.1.4. Support system:

The support system consists of government as well as private agencies dealing with the credit and input supplies and marketing such as co-operatives, corporations, banks etc. This system also includes agencies responsible for the creation and management of other infrastructures like electricity, transport aid and other services.

In the case of fish curing, support system is very weak compared to other agricultural fields. Facilities for loans, subsidy and other inputs are very limited. Potable water, ice and quality salt are not supplied to fish curers. Marketing facilities for securing a higher price for cured fish produced by improved methods are also not existing at present. The administration and management with regard to the fish curing industry are also not properly co-ordinated at any level.

5.2. Strategy for technology transfer in the fish curing industry

Taking into consideration all the existing factors, a new strategy is proposed for technology transfer in the fish curing industry. Figure 23 shows the proposed model of technology transfer related to fish curing.
Fig. 23. Model of Transfer of Technology in Fish Curing Industry.
Description of figure 23

I: CIFT and other research institutes

II: Subject Matter Specialists of Departments of State Fisheries

II-1: Extension Officers, Assistant Extension Officers, Inspectors and Sub-Inspectors of Fisheries Depts.

II-2: Village Level Workers of State Fisheries Departments

III: Subject Matter Specialists of Agricultural Universities

III-1: Extension Officers and Assistant Extension Officers of Agricultural Universities

III-2: Village Level Workers of Agricultural Universities

IV: Marine Products Export Development Authority

V: Export Inspection Agency

VI: Market system

VII: Input system

VIII: Fish curers
There are several improved practices in fish curing developed by the Central Institute of Fisheries Technology and a few other research organisations like Central Food Technological Research Institute. At the first stage, the Subject Matter Specialists of the Departments of Fisheries (II) and Agricultural Universities (III) shall be trained by the above research institutes (I) in the improved fish curing practices. The Subject Matter Specialists should transmit this knowledge to the Extension Officers, Assistant Extension Officers, Inspectors and Sub-Inspectors of Fisheries (II-1 and III-1) working in Fisheries Departments/Agricultural Universities. They, in turn, shall train the Village Level Workers (II-2 and III-2) of Fisheries Departments/Agricultural Universities if such category of officials is available. The Village Level Workers are to ultimately train the fish curers (VII) in the improved practices of fish curing. In the absence of Village Level Workers, the Extension officers and other Officials (II-1 and III-1) shall directly train the fish curers. The research institutes (I) shall also train the intermediate agencies under groups II-1, II-2, III-1 and III-2 if and when necessity arises.
Another channel of technology transfer shall be through the Marine Products Export Development Authority (IV) and or Export Inspection Agency (V). The Quality Supervisors and Technical Officers of these Departments shall be trained in improved fish curing practices by the research institutes. After training, these officials can train the fish curers in their respective localities in the improved practices.

The technical personnel, if any, of the marketing (VI) and input (VII) systems such as co-operatives and other organisations shall also be trained by the research institutes in the new methodology so that these personnel can also give sufficient training to the fish curers.

There should be provisions for the research institutes (I) to directly transfer the new technology to the fish curers (VIII) wherever possible and essential.

Thus the improved technology should flow from research system (I) to the fish curers (VIII) through 13 different channels as shown in the model. The problems of fish curers shall be transmitted back to the research institutes through the same channels.
5.2.1. Channels for technology transfer:

The flow of technology related to fish curing through different proposed channels is given below:

1. CIFT and other research Institutes

   Subject Matter Specialists of Departments of State Fisheries

   Extension Officers, Asst. Extension Officers, Inspectors and Sub-Inspectors of Fisheries Departments

   Village Level Workers of State Fisheries Departments

   Fish curers
2. CIFT and other research institutes

Extension Officers, Asst. Extension Officers, Inspectors and Sub-Inspectors of Fisheries Departments

Village Level Workers of State Fisheries Departments

Fish curers

3. CIFT and other research institutes

Extension Officers, Asst. Extension Officers, Inspectors and Sub-Inspectors of Fisheries Departments

Fish curers
4. GIFT and other research institutes

Village Level Workers of State Fisheries Departments

Fish curers

5. GIFT and other research institutes

Subject Matter Specialists of Agricultural Universities

Extension Officers and Asst. Extension Officers of Agricultural Universities

Village Level Workers of Agricultural Universities

Fish curers
8. CIFT and other research institutes

Village Level Workers of Agricultural Universities

Fish curers

9. CIFT and other research institutes

Marine Products Export Development Authority

Fish curers

10. CIFT and other research institutes

Export Inspection Agency

Fish curers
11. CIFT and other research institutes

Market system

Fish curers

12. CIFT and other research institutes

Input system

Fish curers

13. CIFT and other research institutes

Fish curers
Considering the facilities existing at present, it is suggested that the technology transfer shall be carried out by different agencies to the extent as given below:

<table>
<thead>
<tr>
<th>Agency</th>
<th>Percentage of technology transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Fisheries</td>
<td>50</td>
</tr>
<tr>
<td>Agricultural University</td>
<td>20</td>
</tr>
<tr>
<td>Research Institutes</td>
<td>10</td>
</tr>
<tr>
<td>Marine Products Export Development Authority</td>
<td>5</td>
</tr>
<tr>
<td>Export Inspection Agency</td>
<td>5</td>
</tr>
<tr>
<td>Input system</td>
<td>5</td>
</tr>
<tr>
<td>Marketing system</td>
<td>5</td>
</tr>
</tbody>
</table>

The division of responsibility of technology transfer proposed here is only approximate. As the existing man power and the technical skill of the officials vary from state to state, the extent of assignment of duties to the officials related to technology transfer in fish curing shall also vary within reasonable range.
5.2.2. State Fisheries Departments:

At present, state fisheries departments are having large teams of fisheries officials covering the entire coastal areas. Inspectors, Sub-Inspectors, Extension Officers, Assistant Extension Officers and Village Level Workers are posted in these areas to look after various aspects of fisheries. These officials should be given training in improved methods of fish curing technology and they should be assigned with the duty of transferring the new and improved fish curing technology in their respective areas. They should be trained by research institutes where the improved technologies are available. They should also be trained in extension methods to equip themselves for effective extension work. These extension workers, after training, should conduct demonstrations, discussions with fish curers, film shows, exhibitions, distribution of technical leaflets etc. to persuade fish curers to adopt improved practices.

Reasonable targets of extension work for adoption of improved fish curing practices should be fixed for each extension worker and the performance of the individual extension worker should be assessed.

Regular and frequent visits of extension workers to fish curing yards, combined with their sound advice
on problems needing immediate attention will create very good impact on fish curers. Adoption of improved fish curing practices, particularly non-monetary type, will receive good response from the fish curers. Effective supervision and technical support should be extended to grass root extension workers.

Close links should be established among research, fish curing and extension so that the problems of fish curers are fed back for solution.

The extension workers should have appropriate training, recognition, incentives and opportunities for advancements. If required, more extension workers should be recruited by the Departments to cover the entire area of fish curing under their jurisdiction.

More fishermen training centres should be established. These centres should include fish curing in the syllabus and teach fishermen on improved methods of fish curing and persuade them to cure fish by scientific methods. The fisherwomen and fisheryouth should be encouraged and trained to take up fish curing instead of selling the fresh fish to middle men at very low price. Popular and technical articles should be prepared in regional languages and widely distributed.
to the fish curers. Film shows on scientific methods of fish curing should be organised in each fishing village. Importance of scientific methods of fish curing should be projected through radio, television and newspapers. Model fish curing yards should be constructed and given on lease to the fish curers for production of cured fish in modern way.

Fisheries Departments should have the overall responsibility of extension work, developmental task, regulatory function and ensuring supplies and services in the field of fish curing. The Departments should study field problems and convey to the research organisations, conduct field trials and demonstrations and organise training programmes for field workers and fish curers. These departments should establish an information cell acting in collaboration with the research institutes and maintain up-to-date data on the development of fisheries. The Departments should properly plan, monitor and evaluate various programmes in fish curing.

5.2.3. Agricultural Universities:

As mentioned earlier, at present the extension work carried out by Agricultural Universities with respect to fisheries is mainly confined to fish farming
and only a very limited fisheries extension workers have been appointed in the Universities. More fisheries extension workers of different status shall be appointed by the Universities to carry out extension work related to fish curing and the technology transfer should be effected in the same manner as it is suggested for the Fisheries Departments.

5.2.4. Marine Products Export Development Authority:

MPEDA has posted Quality Supervisors and Technical Officers to look after the quality of processed fish for export. These personnel should be allotted some specific extension work for the transfer of fish curing technology. They may be regularly trained by research organisations in the improved practices of fish curing technology so that they will be able to transfer such technologies to fish curers. MPEDA can help the State Fisheries Departments in publication and distribution of popular and technical leaflets, organisation of film shows, exhibitions and other mass media programmes pertaining to fish curing.

5.2.5. Export Inspection Agency:

This agency is the authority to certify the quality of processed fish including cured fish for
export. The Agency has got a large number of Technical Officers in all the centres from where processed fish is exported. These personnel can be trained by the research organisations in improved methods of fish curing technology and it should be a part of their duty to transfer this technology to the fish curers in their respective areas.

5.2.6. Research Organisations:

Apart from the research activities, research organisations should conduct training programmes and other extension activities to transfer the technology directly to the fish curers or through extension workers in other departments.

The Central Institute of Fisheries Technology and other research organisations should further mobilise their extension activities in fish curing. They should train the extension workers in other departments in improved fish curing practices and extension methods so that these workers can effectively transfer the technology to the actual users.

In addition to giving training to the change agents in other departments, research organisations
should directly transfer the improved technologies to the fish curers in various states in collaboration with the respective State Fisheries Departments.

5.2.7. Input supply and services:

At present, this system has not provided facilities to any considerable extent to the fish curing industry. Banks and other financial agencies should provide certain quota of loans and subsidy for the development of fish curing. Technical Officers in the Banks should also be exposed to fish curing technology so that they can transfer this knowledge to the fish curers in a limited way.

Marine Products Export Development Authority and the State Fisheries Departments, though included in the extension system, have to play a dual role of extension system as well as support system to help the fish curing industry. Loans and subsidy should be provided by MPEDA for construction of improved fish curing sheds and raised platforms for drying fish. Provision for good quality ice, salt, chemicals, packing materials etc. should be made by MPEDA. Community drying centres with tunnel dryers, and proper storage rooms should be constructed for providing to the fish curers for their
use on nominal charges. The State Fisheries Departments also should share the responsibility of providing the above facilities to fish curers.

The fishermen co-operative societies also should make arrangements for supplying necessary inputs for fish curing by improved methods. They should also contribute to the technology transfer utilising all the facilities available.

5.2.8. Marketing facilities:

Marketing facilities should be developed. The fishermen co-operative societies and/or marketing federations should take the responsibility of marketing the cured fish produced by the individual fish curers. These societies should be in a position to pay advances to the individual fish curers on the basis of quantity and quality of cured fish taken by the society for marketing. The agencies can play active role in persuading the fish curers to take up improved method of fish curing.

5.2.9. Administration and management:

There should be proper co-ordination of the administration and extension efforts of all the concerned
organisations as to make the technology transfer more effective.

It is proposed to strengthen the administrative set up in different levels with the assignment of responsibility to senior technical personnel. There should be decentralisation of authority responsibility, planning and monitoring as much as possible. Linkages between various agencies involved should be strengthened.

The interdepartmental co-ordination and linkages among extension, research, input and other supporting agencies, fish curers and local authorities should be ensured at appropriate levels. Committees should be set up at various levels to ensure adequate co-ordination between official agencies and autonomous bodies connected with fisherie development.

The extension machinery should be reorganised in such a way that extension workers are available to meet the fish curers often and identify their problems and to guide and train them for wide adoption of fish curing technology.

The fishermen co-operative societies should be established where they are not existing and those which
are already existing should be mobilised.

Some legislation on quality should be enforced in fish curing sheds and cured fish markets so that the quality of cured fish can be improved. The curing sheds, cured fish, packaging materials, salt, storage rooms, cured fish markets etc. should be frequently inspected by the authorised agencies. License should be issued to fish curing sheds maintained in proper conditions and fish curing should be allowed only in such sheds. Poor quality cured fish should not be allowed to be sold and such products should be immediately removed from godowns, markets etc.

5.2.10. Fish curers:

Fish curers are the ultimate users of the technology. They should analyse their situations, identify their problems and organise themselves to solve such problems with the assistance from other three systems - research, extension and support systems. They should try to improve their socio-economic conditions and develop themselves by making use of the appropriate technologies and other facilities available to them. The other three systems can only provide favourable situations to transfer the improved technology. The fish curers should be mentally prepared to adopt such technologies for their own benefits. They should show a receptive mind to the other systems.