

## **Community Fish Smoking Kiln (COFISKI): A CIFT Technology for Hinterland Fisher Folks**

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Fisheries are playing a very important role in the country's economy in generating much needed foreign exchange, providing employment to millions of people and also in enhancing nutritional status of the people especially those who are residing in hinterlands. Unlike marine fisheries sector which is well organized owing the importance of foreign exchange, the freshwater fisheries sector is diffused and scattered in the vast and widely distributed water bodies. The pragmatic problems associated with this are collection of all these resources, transportation to a central place, processing, value addition and marketing. The Central Institute of Fisheries Technology (CIFT) under the ICAR has been working on these problems for several decades now. Years of intense and serious efforts lead to development of different models of community fish smoking kilns popularly known as COFISKI. This has resulted in production of better-quality smoke cured fish, with longer shelf life and could fetch better price than traditional smoke cured freshwater fish. The research findings were presented in various National and International symposia/ seminars/ workshops and published in the form of popular, technical and review articles, in proceedings and, as book chapters and research papers in peer reviewed journals. Our team at CIFT Visakhapatnam Research Centre have carried out number field studies, conducted training cum demonstration programs, trainer's trainings, workshops, in taking COFISKI technology from lab to the land. This has benefited thousands of fisher folks, especially the economically under privileged groups who belong to SC and ST and are residing in remote fishing villages of East and North Eastern States of India. The plan was laid to produce better quality smoke cured fish with longer shelf life, fetching better price, as source of animal protein in lean seasons of fish catches. To be precise to develop a technology that suits rural needs East and North Eastern States of India. The aim was to develop easy to implement, economically viable and at the same time a practice of post-harvest handling and product development that inculcates "community approach" to cater nutritional needs and socio-economic problems of fishers residing in remote fishing villages. The target groups were economically under privileged fisherwomen who belong to SC and ST categories. This study was carried in different phases. In the Phase I survey was undertaken in remote fishing hamlets of Orissa, West Bengal, North Eastern states namely Assam, Arunachal Pradesh, Meghalaya and Manipur. Among these some villages were identified that are actively involved in smoke curing of freshwater fishes. In the selected fishing villages socio-economic conditions and the needs for technology development were assessed. In the Phase II the village adoption programs were initiated. This becomes a basis for different awareness programs, transfer of technology and assistance in adopting technologies. As a part of Phase II, work was initiated in design and

development of different models of community fish smoking kilns popularly known as COFISKI. In development of different models, the needs of fishermen community were only priority. In Phase III the models of COFISKI were fabricated and installed at remote fishing hamlets under CIFT adoption. Installation work was followed by organizing training cum demonstration programs that include “Hygienic preparation of smoke cured fish” and “Skill up-gradation in Hygienic preparation of smoke cured fish” for different fisherwomen self-help groups. The installation of COFISKI extended from remote fishing villages of Orissa to East and North Eastern States of the country viz., West Bengal, Assam and Manipur. In Phase IV feedback from the end users was obtained to bring out modifications in design and fabrication wherever necessitated with a view to minimize costs of repair and maintenance that suits rural needs.

**Making of COFISKI Model:** What all the space required is just 30 square feet that includes working area.

**Material:** Material required viz., bricks, sand, stone chips of different sizes, trays, dome cover, ceramic bend, door of smoking chamber. Depending on the type of material used for making the door the cost of total construction can vary and aluminum being costliest (Rs. 2-3 thousands extra) and most viable among the three types of doors, in coastal areas it is suited best in view of serious rust problem. A total of twenty thousand rupees are required for making COFISKI (including the cost of labor) and it can serve the purpose for few decades.

### **Working Model of COFISKI**

#### **Over all dimension (in cm):**

Overall Height: 134.5

- Height of chamber: 108
- Pyramidal Dome: 16.5
- Exhaust Cowl: 10.16

Square shaped exhaust cowl: 103 Sq cm.

In this model in fabrication of smoking chamber discarded body of refrigerator (165 L.) was recycled.

Size of the door: 61x89

Thickness of insulation: 3.81

Size of smoking tray: 50x46

Number of shelves: 7

### Dimension of Kiln (in cm)

Width: 66

Depth: 60

Height: 58

### Shutter

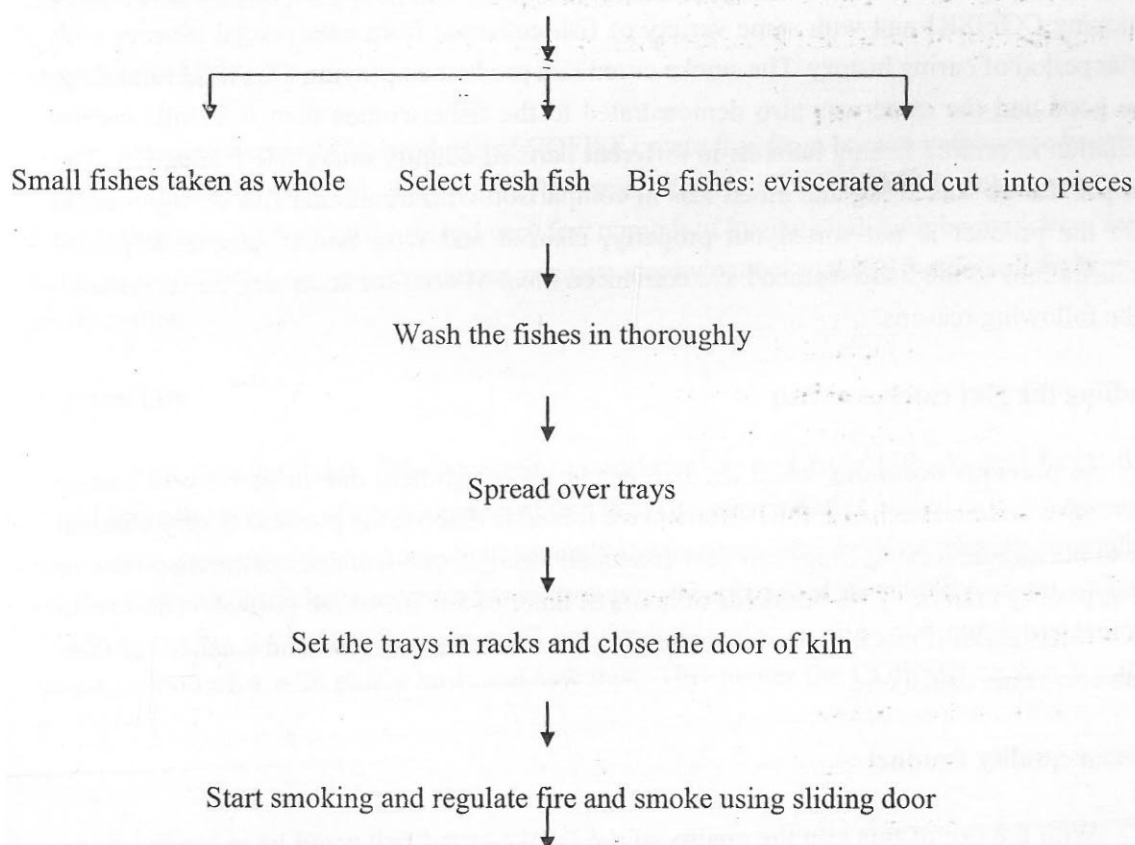
Upper portion (fixed): 34

Lower portion (Sliding): 33

Smoking area of 6 trays: 1.39 Sq. ft.

On each tray 2 kg fish can be smoked. Time taken for smoking is 1.5 to 2 h. AND approximate cost of COFISKI Working Model: RS. 25,000. The cost included material and fabrication charges. The fish smoking kiln designed and fabricated for domestic purpose is called 'domestic fish smoking kiln or DOFISKI. The cost of domestic model is Rs 2500.00 (Two thousand rupees) that includes fabrication charges and per charge 2kg fish can be smoke cured.

### Operation of COFISKI



Keep changing the position of trays from top to bottom, vice versa at regular intervals and also invert the trays keeping an empty tray on top to get fish exposed to smoke on both sides and evenly



Sundry the fish after completion of smoking process



Pack the final product containing 20-30% moisture in polythene bags (200 gauge of different sizes ranging from 100 g to 1kg) /palmyrah leaf baskets/ any other suitable packaging material.



Store the packed product in clean, dry place away from rodents, insects etc

### **Advantages of employing Community Fish Smoking Kiln**

Before taking the technology to fisher folk Community Fish Smoking Kiln was tested for its efficacy and comparative studies were made with freshwater fish smoke cured employing COFISKI and with same variety of fish collected from commercial sources with similar period of curing history. The smoke cured fish product employing COFISKI turned out to be good and the same was also demonstrated to the fisherwomen then it is followed by installation in remote fishing hamlets in different parts of country under CIFT adoption. The yield per charge was 20 kg and albeit less in comparison with traditional fish curing method where the product is not sorted out properly, charred and with broken pieces. Repeated demonstrations to the fisherwomen have convinced them of need for accepting the technology for the following reasons.

### **Handling the glut catches of fish**

In previous occasions when the fish catches were glutted, due to scarcity of simple preservative material such as ice, fishermen were forced to dispose the produce at very nominal price to the middlemen. At times low cost and small sized cloyed fish catches are discarded or used as poultry manure. Thus hundreds of hours of labor of fishermen are vilified. The advent of COFISKI makes it much easier to handle glut, turn the uneconomical and smaller varieties of fish into value added one.

### **Superior quality Product**

With the use of this kiln the quality of the smoke-cured fish could be enhanced many fold to those of commercially smoke-cured fish. Comparative studies were carried on the

fish/shellfish, smoke cured employing COFISKI and the commercial smoke cured freshwater fish product of same variety of fish and with similar curing back ground i.e., curing time and method. The surveys showed that former are far superior in quality than that of commercial smoked cured fish tested from different sources. The studies also revealed that physical, bacteriological, biochemical and sensory characteristics of the COFISKI cured fish are *recherché* to that of commercial products.

### **Impact on socio-economics**

The demand for good quality smoke cured fish is more and so is the prices and the returns for hard labor. A good quality product not only fetches high price but also longer shelf life. A product of good quality will be helpful in meeting animal protein requirement in interior places especially during lean/off-seasons of fish catch. Though there is ban during monsoon period i.e., 15 June to 15 August, which is also breeding period for the fish, fishermen tend to stray into waters for catch more out of need than out of greed. This happens mainly to meet both ends in the absence of subsidiary source of income in the impoverished hinterlands. In this regard smoke fish product act as alternative source of income thus helping in improving socioeconomic conditions of poor fishermen. This also constitute a low-cost animal protein to undernourished growing children, pregnant women and other immuno-suppressive/compromised groups recuperating from illness related to malnutrition and old age problems.

### **Hygienic Product**

The smoke cured fish products of COFISKI were free from human pathogenic bacteria such as Salmonella, Shigella and *E. coli*. The scientifically cured product is not only be free from pathogenic bacteria but harbored very few number of hygiene indicator bacteria viz., fecal coliforms, fecal streptococci, coagulase positive staphylococci making it safe and fit human consumption.

### **A green kiln**

Few decades' back fishermen tend to collect firewood from hillocks and forest that could serve the purpose of smoke curing of fish too. The same practice was blessing in disguise as the same prevented forest fires. Subsequently the numbers of fishermen who are depending on the same resource have increased tremendously. This resulted in extensive deforestation. While operating this kiln fisherman need not depend totally on firewood but can substitute major portion of it with paddy husk and saw dust. This makes the COFISKI an eco-friendly one.



## Overcoming health problems

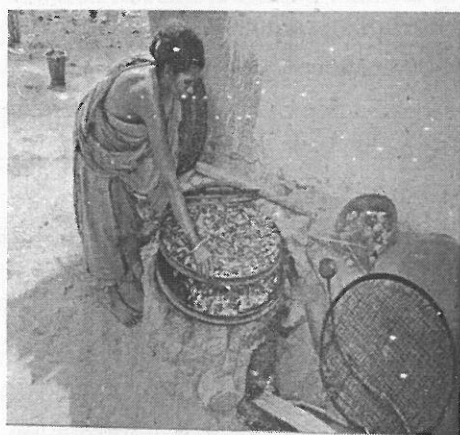
In traditional smoke curing of fish fisherwomen are continuously exposed to smoke. This causes not only irritation to eyes by dry cough due to inhalation of smoke and exposure to toxic material. In the absence proper medical facilities, if available lack of affordability to get proper treatment resulted chronic problems to the fisherwomen.

Consumption of unhygienic and contaminated fish results in sickness, a common expression among fisherwomen is that “it did not digest” and in reality it is ingestion of contaminated fish. The smoke cured fish from COFISKI makes it safe for consumption thus avoiding unwanted health hazard that not only fisherwomen sick but also renders them not going for work for a day or two resulting in loss of earning daily wages and not attending domestic chores. This aspect is unseen and un-noticed aspect that causes serious hardship financially and significant impact in socio-economic condition.

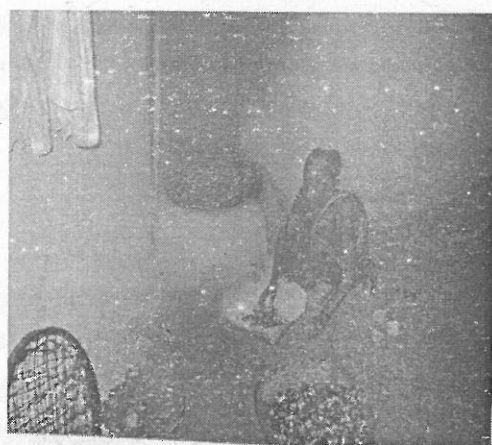
## Community approach

In traditional fish smoking kilns curing of fish are confined to individual family, whereas, COFISKI inculcated community feeling among the fisherwomen in all the villages under adoption. Thus removing socio-economic barriers and tackling the problem as one group instead of solving alone.

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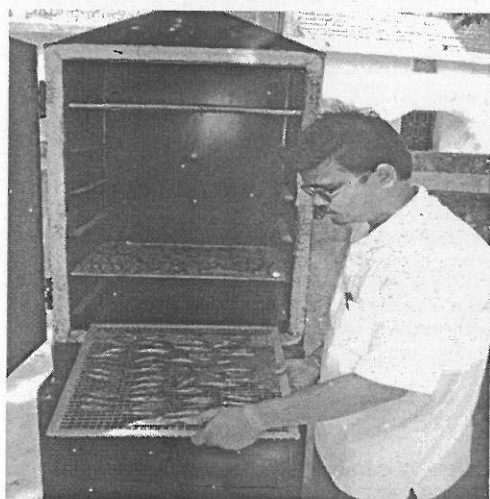
**Fig I: Traditional smoke curing of fish**



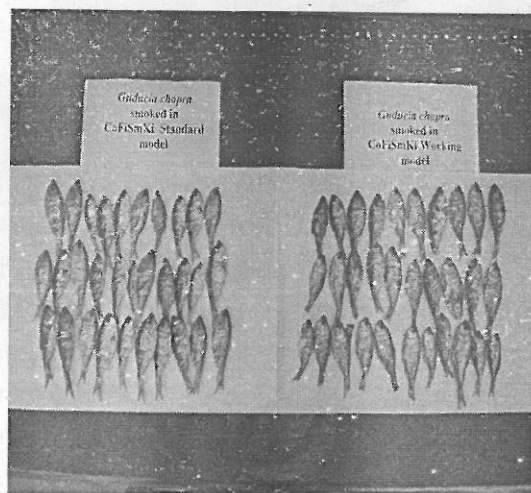
**Fig II: Hazardous conditions in fish smoke curing**



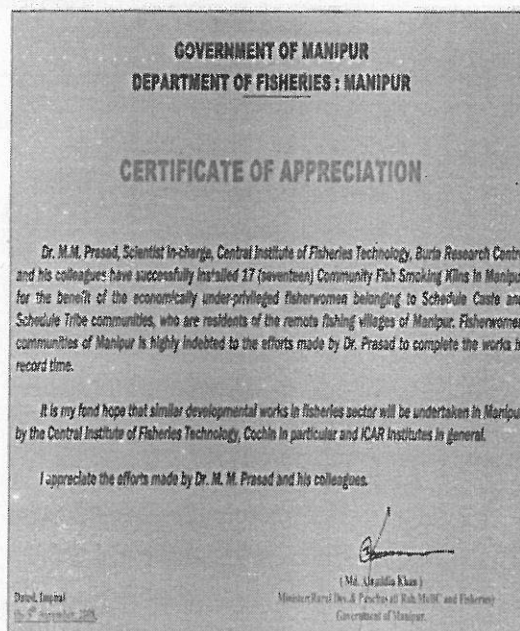
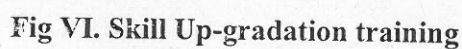
**Fig III: COFISKI Model**



**Fig IV: Smoke curing of fish using COFISKI**



**Fig V: Smoke cured fish from COFISKI**



**Fig VII: COFISKI Installation in India**

### Fig VIII: A Letter of Appreciation