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THE FUTURE OF FISH PROCESSING INDUSTRY OF INDIA

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ABSTRACT

The fish processing industry in India, during the past ten years has been rather exclusively concerned with shrimps largely because of the easy market which the shrimps provide abroad. The impact of shrimp export has not been very healthy, as the industry failed to diversify itself to other fish and fish products. Shortage of Shrimps as raw material in some areas or in certain seasons has led to under utilization of the freezing and canning plants. Surely the future of the processing industry in India does not lie in shrimps alone, for these constitute only about 12% of the country's total catch. Therefore, all other fishes including the trash fish should be considered first as important by the industry.

The Central Institute of Fisheries Technology has made considerable advance on the economic utilization of many other varieties of fish. These include marketing of the entire fish, fish fillets and picked meat. Other products such as fish flour, fish protein concentrate, fish hydrolysate, fish soup powder, fish flakes and fish sausages seem to have great possibilities. Little known products such as bacteriological peptone prepared from trash fish are also important.

Of the export-oriented industries in India that have developed during the post independence period, the fish processing industry is of special significance. It made its beginning in 1954 and exclusively based on foreign market, within a span of about 19 years, it attained the status of a full-fledged industry—augmenting the national economy by way of foreign exchange to the tune of 450 million rupees, as in 1971-72. About 34100 tonnes of fish products were exported from India during this period. But almost all the developments in fishing and fish processing has been oriented towards a single commodity-shrimps-which constitutes only about 12% of the total landings of fish in the country. Easy market facilities for processed shrimp in foreign countries was the main reason for this rather one-sided development. More and more entrepreneur were attracted to the

*Dr. V. K. Pillai, Director of Central Institute of Fisheries Technology, Cochin passed away on 6th December 1972, following a heart-attack. This article was found in his files and the Marine Biological Association of India is very proud to publish his last article in this volume, for Dr. Pillai having yielded to my request, has fulfilled his promise.

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trade owing to this factor and as a result the need for processing facilities increased several folds than what the landed resources could sustain. Today the country as a whole has a daily freezing capacity of over 450 tonnes with cold storage facility of 8000 tonnes and a daily canning capacity of 95 tonnes. Considering that these plants operate for 200 days in a year, they are capable of processing 1,09,000 tonnes of food per year, which, in terms of the total raw material would amount to about 2,18,000 tonnes. As against this, the total production of processable varieties of prawns in 1971 has been 73,320 tonnes. Estimate shows that about 75% of the capacities of freezing plants and 82% of the capacities of canning plants are under-utilized. It is only natural that shore plants which depend on a seasonal raw material such as shrimps, which have glut and lean periods, have excess capacity so that they can handle most of the available material during the seasons of plenty. At the same time, it is very necessary that the average utilization should not fall below a minimum of say 50%, as accepted in some other nations, so as to safeguard the viability of the units.

With the unrestricted growth of processing establishments an intense competition has also emerged for the raw material. This has led to an increase in the cost of raw material. An analysis of the price during the past five years reveals that the cost of processable varieties of prawns has gone up by 200 to 300%. The total export, on the other hand, has remained more or less the same with fluctuations of about $\pm 10\%$. Critical analysis of the unit-value-realization for the different varieties of shrimp shows that a fair increase has occurred in bigger-sized shrimp prices, except in 1970, for the smaller sized prawns, which constitute the major portion of exports, the prices have been steadily falling except for the slight improvement in 1969. As the price of new material in the home market has been soaring high, the processing cost for frozen prawns showed a substantial increase from about Rs. 1.70 per kg in 1967 to over Rs. 2.70 per kg in 1971, mainly due to increase in labour charges, cost of packing materials and freight. Yet another factor that has affected the shrimp processing industry adversely is that the availability of raw material has not kept pace with the increased demands from the industry. The increase in the production of processable varieties of prawns in 1968 as compared to 1967, has been about 46,404 tonnes and in the years 1969, 1970 and 1971, the increase and decrease have been + 2619, + 17,492 and - 16,492 tonnes respectively, when compared to the previous year in each case. These figures clearly show that the production is on the decline. The catch per unit effort of the mechanised vessels, operating especially in the south-west coast has come down considerably during the past few years. A decrease in the quantity of shrimp landed by these vessels has affected the total cost of operation by the processing plants. All these have led to the inevitable conclusion that as far as shrimp processing and exports are concerned, a near saturation point has probably been reached.

It is evident from the foregoing comments that the future of the fish processing industry in India would depend on how best the fish component of the

total catch is utilised. Under normal fishing conditions about 70-80% of the catch of the vessels is composed of fish, the major portion of which belongs to lesser known varieties of bottom forms. The pelagic fish resources comprising mostly of sardines and mackerel include 25-30% and 6-10% respectively of the total fish production in the country. These offer promise for an expanding processing industry. It is estimated that by the end of the Fifth Plan period, i.e. by 1978-79, the total marine fish catch will increase to 1.954 million tonnes from its present level of 1.17 million tonnes. By that time about 0.35 million tonnes of oil sardines, 0.295 million tonnes of mackerel, 0.35 lakh tonnes of pomfrets, 0.114 million tonnes of Bombay duck, 0.94 lakh tonnes of tunnies and 6 lakh tonnes of miscellaneous types of fishes such as sole, cat-fishes, sciaenids, ribbon fish etc. would be available annually. It is under these circumstances that the need for working out ways and means for an effective utilisation of the fish component becomes necessary.

These problems have been anticipated by the Central Institute of Fisheries Technology, where investigations on both fundamental and applied problems have been going on for the past few years. Technical problems such as "belly bursting", development of rancidity and weight loss during preservation in ice or by freezing in the case of oil sardine can be successfully overcome. Suitable insulated containers have been developed for the transport of fish over long distances. Trial consignments could be successfully transported from Cochin to Calcutta and the fish could be marketed in excellent condition at the destination. The technical know-how available in this respect offers scope for the establishment of an industry for this transportation of fresh or frozen fish to distant markets in India. Yet another significant development has been made in the production of canned sardine products. Canning of the fish for export has not so far been attempted in large scale in this country. The efforts so far made has been to produce canned sardines mainly for the internal markets.

Recent investigations have shown that even with the high cost of the tin cans, sardine canning can be made economical by resorting to alternative methods. Of these, the most promising appears to be the "Sardine natural pack" in which the fish is packed in its own juice. This product has been found to be very attractive with excellent flavour, unparalleled in any other sardine pack. Methods have also been standardised for packing the fish in tomato and white sauces. There is growing demand in the world for sardine and sardine-products in view of the shortage caused either by a fall in the catches or because some of the areas used for sardine fishing have been declared unsuitable for fear of mercury contamination. There is thus immense scope for Indian sardine to enter the world market either in the frozen form to cater to the raw material requirements of the pet-food industry or canneries such as in Spain and Portugal which are reported to be lying idle.

Progress achieved in researches on the economic utilisation of several other varieties of fishes has also been very encouraging and sufficient information has been gathered on some of the important technological problems by the Central Institute of Fisheries Technology. The feasibility of transporting some of the selected varieties to distant inland markets in fresh, iced or frozen conditions, fillet or minced meat form, conversion of certain fishes into speciality products like fish sauce, fish paste, fish soup (in powder, tablet or frozen form), fish flake, high energy food preparations, etc. and conversion into commercially important products such as bacteriological peptone or conversion into ensiled feed materials for cattle and poultry, have been studied in great detail.

MARKETING OF THE WHOLE FISH

Certain species like *Nemipterus japonicus* (thread fin bream, locally called 'kilimin') have been found to lend themselves well to preservation by icing or freezing in the whole form and this can be transported to distant markets. At times this species constitutes more than 50% of the trawl catches. Icing in 1:1 proportion is suitable for transportation involving 24 hours journey by rail or by insulated or refrigerated trucks. For longer distances freezing and subsequent packing in insulated containers has been found to be more economical. As there is a shortage of refrigerated rail wagons in the country, the method of freezing and packing in insulated boxes becomes very handy for the large scale movement of the fish to such markets where it is most needed. Field trials conducted under an All India Co-ordinated Project on Transportation of Fresh Fish, sponsored by the Indian Council of Agricultural Research, have shown that the North Indian Markets react favourably to species like *Nemipterus*, offering an average price of Rs. 2,000/- per tonne. Considering an expenditure of approximately Rs. 900 per tonne on processing, packing and freight charges, the above price still leaves a minimum of Rs. 1,100/- per tonne to the sender to cover the price of the fish and profit.

FISH FILLET AND PICKED MEAT

Trials carried out by the Indo-Norwegian Project have indicated the possibility of marketing cat-fishes, ribbon-fish and some of the deep sea bottom fishes in frozen filleted form. The possibility of extracting the meat from cheaper varieties of miscellaneous fish by using meat picking machines and freezing into blocks has also been encouraging.

SPECIALITY PRODUCTS

(a) One of the effective means of utilising cheap fish is by the conversion into edible fish flour or fish protein concentrate (FPC) which can be blended, in suitable proportion with protein-deficient food materials such as cereals. India is among the few world countries which have perfected the preparation of FPC. The product has excellent colour, with an average protein content of 78.8%.

(b) Fish hydrolysate incorporated with high energy food

Another important product on which considerable work has been done at the Central Institute of Fisheries Technology is the malt and fish hydrolysate incorporated with high energy food. The product is readily soluble and can be consumed direct by mixing it with beverages, hot milk or water. Trials carried out by the Institute show that it has a consumer acceptability of 95%. It has great possibilities simply because it is highly acceptable and is free from fish-odour.

(c) Fish soup powder

Fish soup powder is another readily acceptable product which can be prepared from miscellaneous fish. The product can be readily mixed in boiling water to a consistency which is acceptable to more than 95% of the consumers, as revealed in a recent acceptability survey.

(d) Fish flake

Another product for which the method has been standardised is fish flake. It contains about 20% protein and has been found to have good cooking properties. The product has already become popular.

(e) Fish sausage

Experiments carried out have revealed the possibility of using jew fish, kilimin etc. for the preparation of fish sausages. Work is being undertaken at the Fisheries College, Mangalore, under the All India Co-ordinated Project on the utilisation of trash fish sponsored by the ICAR to evolve the most suitable synthetic casings for the product and to extend its shelf life.

(f) Other products from trash fish

Experimental studies have shown that good quality bacteriological peptone can be prepared from trash-fish-meat. The product is comparable in quality to imported peptone processed from several other sources. Yet another product that holds a good scope for commercial production is fish ensilage for cattle and poultry feeds. It is a good protein supplement.

As mentioned earlier, the future of the fish processing industry in India depends on an effective utilisation of all types of fish. With the available technology on a variety of products one can safely say that the industry will take the right step forwarding its various stages of development.