



Traditional Fish Processing and Economic Status of Fishermen of Central India with Special reference to Rajnandgaon, Chhattisgarh, India

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Abstract

Traditional fishing and fish processing are very significant activity in Chhattisgarh. The fishing and fish processing in Chhattisgarh is related with the culture, employment and protection of food. This present study was done to find out the traditional methodology of fish processing in Rajnandgaon and also to recognize the economic status of fishermen involve in fish processing. Data was collected by a survey between July to December 2014 in five local markets and some colonies of fishermen. Personal interview and on sight observation was taken for the fish processing methodology, preservation technique and economic status of fishermen. A total of 15 species of processed fish was collected during the investigation period. Half burning and sun drying were found as a common traditional method for processing of fish. Bamboo stick made vessels and jhangi was founded as local technique adopted for the preservation of fish. The economic status was found not enough for the fishermen. The fishermen want to large scale production of processed fish to flouriest the business. The active involvement of females was found during the investigation. The processed fish obtained from the traditional methodology were found cheap and satisfactory to the customers.

Keywords: Economic status of fishermen, fish processing, Rajnandgaon, Sheonath River, traditional methodology.

Introduction

The fish processing is the process in which fishes are harvested and the final product is served to customers. Fish harvesting, processing, marketing and distribution are part of livelihood of millions of people worldwide¹⁻³. Fish is an important source of many types of animal proteins⁴ but it is extremely susceptible to the environment. The fish based products changes the flavor and texture rapidly during storage after death. Hence, they need preservation or processing measure to avoid spillage^{5,6}.

Coming era may face the crisis of food due to insufficiency of soil and low yield of crops by polluted soil. Hence, we need to trap other food resources which are not used properly now a daytime. In this light, therefore processed fish is important alternate, which offer not simply good nutrition but also meet the need of the larger population.

India is the second largest producer of food worldwide after the China. But the processing of food is only approximately 10%, which is really low as compared to developed nations. India only contributes 1.5% of export of processed food in world market⁷. Hence it is necessary to promote the food processing for the massive population of India. In the developing country advanced food processing industries are near to the ground and its establishment is also a challenge full job. Hence it is necessary to recognize the traditional methodology of food processing, its encouragement and exploration.

India is rich in coastline, rivers, canals, lakes and pond, which

make it remarkable potential for fisheries^{8,9}. Among different places in India, Rajnandgaon is one of them having rich in fisheries resource. It is one of the fastest developing towns of central India. It is a historical town and known for famous Bengal-Nagpur Cotton mill. The purpose of the present study is to recognize the traditional methodology of fish processing using by local fishermen of Rajnandgaon. It will also notify that whether the traditional methodology is desirable for large scale processing of fish or not. In point of horizon of economic position, it is important to find out whether the earning from this process is sufficient for their needs or not.

Materials and Methods

Study Site: Rajnandgaon is situated at 20.07" to 22.2"9 North latitude and 80.2 to 81.2"4 East longitudes. The location of Rajnandgaon in India is shown in figure-1. The Rajnandgaon is drained by Sheonath River, which is semi perennial and largest tributary of Mahanandi river system originated from Rajnandgaon district. The Sheonath River is around 8-10 km from the town. The district is rich in tribal population belonging to Mohla, Manpur and Chowki block. The total rural population of Rajnandgaon is 82.27% dominant with *Gond*, *Kanwar*, *Halba* and *Baiga* tribes.

Survey: A survey in local market of Rajnandgaon was done to find out the processed fish selling by local fishermen. The different market sites were noted as station and particular fishermen on the market were observed as a spot in the present study. To determine the economic status of fisherman and to

compile the methods of fish processing, personal interview and group discussion with fisherman was employed as a procedure. On site observation was carried out to study the traditional methodology of fish processing. The survey method was adopted from previous work¹⁰.

Data Compilation and Statistical Analysis: Collected data were tabulated using standard statistical methods. All calculations were worked out using Microsoft excel 2010. The data compilation and computation was done according to previous work¹¹. The point scale was taken measurement of many social science studies^{12,13}. Literacy and food quality were also examined with this method. Similarly, the point scale method was used to study the demanding of fish (1= income of rupees 25 in a day, 2= between 26 to 50, 3= 51 to 75, 4= 76 to 100 and 5= more than 100). Similar point scaling was also applied for methodology used by fisherman (1= sun drying, 2=

half burning and 3= deep frying) and literacy of fisherman (1=below 5th standard, 2= up to 10th standard, 3= up to 12th standard, 4= graduate and 5= post graduate). The mean of point scale was analyzed for regression and relationship between processing method with demanding of fish and literacy of fisherman was calculated.

Results and Discussion

Five different market area of Rajnandgaon was examined during the study period from where, seventeen fishermen are interviewed. A total of 15 species of processed fish was collected from local market of Rajnandgaon. These species belonged to 04 orders and 08 families (table-1). The outcome of fish processing methodology, preservation techniques and economic condition are explained in different subheads.



Figure-1
India Map showing the position of Rajnandgaon in Chhattisgarh state

Table-1
Processed fish obtained from local market of Rajnandgaon (India)

Local name	Scientific name	Family	Order
Mrigal	<i>Cirrhinus mrigala</i>	Cyprinidae	Cypriniformes
Butua	<i>Gara gotyla</i>		
Salangi	<i>Oxygaster bacaila</i>		
Dandi Salangi	<i>Oxygaster sp.</i>		
Kotra	<i>Puntius sarana</i>		
Kotri	<i>Puntius sophore</i>		
Tengna	<i>Mystus cavasius</i>	Bagridae	
Padina	<i>Wallago attu</i>	Siluridae	
Jat bami	<i>Macrognathus aculeatus</i>	Mastacembelidae	Mastacembeleformes
Bami	<i>Macrognathus pancalus</i>		
Khokshi	<i>Channa punctatus</i>	Ophiocephalidae	Ophiocephaliformes
Bijalwa	<i>Channa gachua</i>		
Loi	<i>Anabas testudineus</i>	Anabantidae	Perciformes
Chandeni	<i>Chanda nama</i>	Centropomidae	
Tilapia	<i>Oreochromis mossambicus</i>	Cichlidae	

Methodology of fish processing adopted by local fishermen:

Fish Handling: Fishes are washed; all fins are removed in medium and large fishes. The heads are also removed in some fishes. Complete body is processed in case of small size fishes. Extra large fishes are cut in small pieces and processed. The digestive systems are removed compulsorily in large fishes.

Deep frying: The fish like Tilapia (*Oreochromis mossambicus*) is deep fried in edible oil to get rid of moisture content (figure-2, P). Some spices combined with water to form a paste. The spice paste is then applied to body of fish and allow for the frying. Fishes are then preserved for several days and again fry with applying of salt and some more spices before serving.

Sun drying: The drying process is a physical process where fish are exposed to air and direct sunlight. Sun drying is used for small fishes as they are not suitable for frying. After harvesting fishes were washed with water for removal of sand and soils. The fishes are then allowed to sun drying for several days depending on sunlight. The simplest form of drying involves exposing the fish to sun light by placing products either directly on the ground, on mats placed on the ground or on racks. The removal of moisture content completed the drying of fishes (figure-2D and 2O).

Half burning of fishes: Small, medium and pieces of large fish are burned for the processing. Preliminary the fishes are clean with water, after air dry fishes were allowed in paddy straw for

burning. The fishes are set in a bed of straw and some extra straw are also employed to cover the fish. After this, straw burns for 10-20 minute to remove the water content of fishes. The fishes are collected and clean to remove the paddy waste. The fishes were then allowed for sun drying for several days if the fishes still having moisture content. The half burned fishes are represented in the figure-2 (A, B, C, E, f, G, H, I, J, K, L, M, N and Q).



Figure-2(A)
Processed fish of Rajnandgaon (India) collected from local market and processing sites (A) Half Burned *Cirrhinus mrigala*



Figure-2(B)
Half burned *Gara gotyla*



Figure-2(E)
Half burned *Puntius sarana*



Figure-2(C)
Half burned *Oxygaster bacaila*



Figure-2(F)
Half burned *Puntius sophore*



Figure-2(D)
Sun dried *Oxygaster* sp.



Figure-2(G)
Half burned *Mystus cavasius*



Figure-2(H)
Half burned *Wallago attu*



Figure-2(K)
Half burned *Channa punctatus*



Figure-2(I)
Half burned *Macrognathus aculeatus*



Figure-2(L)
Half burned *Channa gachua*



Figure-2(J)
Half burned *Macrognathus pancalus*



Figure-2(M)
Half burned *Anabas testudineus*



Figure-2(N)
Half burned *Chanda nama*



Figure-2(O)
Sun dried *Chanda nama*



Figure-2(P)
Oil fried *Oreochromis mossambicus*

The Rajnandgaon is rich in water resource. Many small and large ponds along with Sheonath River making opportunity of fishing and fish processing. A total of 45 species of fishes was collected from Rajnandgaon¹⁴. The collection of maximum fish was obtained from Sheonath River. Half burning and sun drying were found usual method of fish processing in the present

investigation. Sun drying and half burning were also found most adopted methodology of fish processing in Bastar, Chhattisgarh². Half burning is most preferred method of processing because it dries the fish, melts down some fat and reduces microbial growth. Sun drying is not alone the cheapest and easiest, but also it is most ecofriendly method to process the fish¹⁵. Apart from processing technique adopted by local fishermen of India, close to different processing strategies were too held up worldwide. It includes handling, washing, clearing, curing, sun drying, air drying, smoking, chilling, salting etc^{1,10,16}.



Figure-2(Q)
Half burned *Oreochromis mossambicus*

Processed fish of Rajnandgaon: Maximum processed fish were collected from Station 1 (Nandai Bazar) followed by Station 2 (Gol Bazar), Station 5 (Mohara Bazar) and Station 3 and 4 (Hospital Road and New Bus Station). The maximum fishermen were also found at Station 1 (Nandai Bazar), followed by Station 2 (Gol Bazar) and other. Maximum fishes were obtained from the Sheonath River followed by Ranisagar and Budasagar pond (figure-3). The maximum fishes were processed with complete body (87%) while close to large fishes were cut into small pieces (13%). The maximum fishes are small in size up to 6cm (60.00%) followed by medium size up to 10 cm (26.67%) and large fishes up to 16cm (26.67%). Maximum fishes were half burnt to sun dried for processing (80.00%) played along by only sun dried (13.33%) and deep fried (6.67%). The availability of particular fish species was also studied; *Oxygaster bacaila* was obtained from maximum fisherman followed by *Mystus cavasius* and *Channa punctatus* (figure 4). The maximum demanding processed fish is *Mystus cavasius* followed by *Channa punctatus* and *Macrognathus pancalus*.

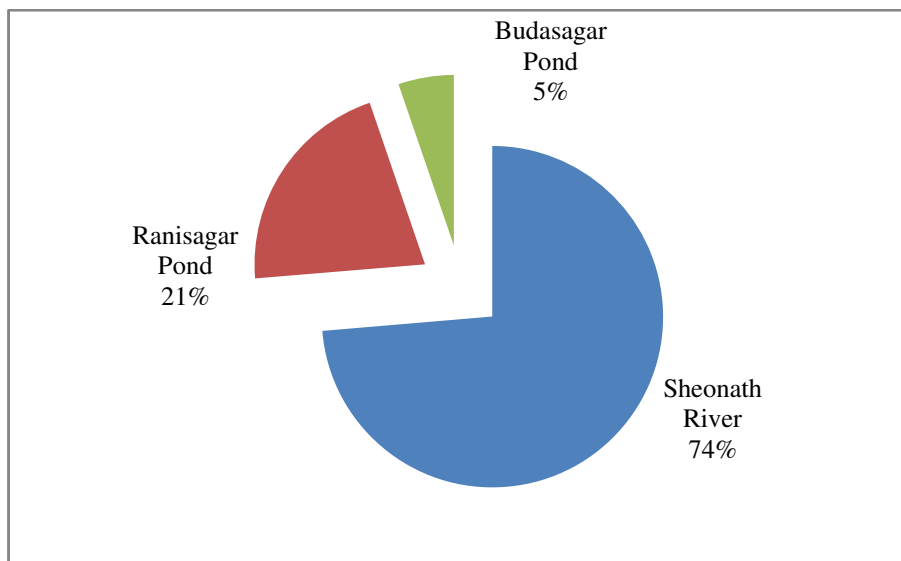


Figure-3
Source of Fish in Rajnandgaon utilizes for Processing of Fish

Preservation is another important step if the fishes need to use for long periods. Various traditional methods are taken for processing fish preservation by local fishermen of Rajnandgaon. Mostly processed fishes are stored in vessels made in the fine stick of bamboo locally known as *tukni* and *bauga*. The village's home cooking stove designed with the soil pest is known as *chulha*. It is the warmest place in the home so that; processed fishes were stored around it. In another method bamboo mat hanged over *chulha*, which is known as *Jhangi*. The processed fish are then put in a bamboo mat (Jhangi). During daily cooking it automatically dried the processed fish and does not allow moisture to spoil it. It keeps long time preservation of processed fish. Jhangi and bamboo based local container were found for storage and preservation of processed fish during investigation. Similar storage and preservation methodologies were also used in Bastar². Some advance preservation techniques like oven and freezing was also reported¹⁰.

Threat to the Processed Fish Product: Aside from different processing and preservation practices, there are some threats to the processed fish product that needs to protection measures. Almost all fishermen (93.33%), fronting the house flies and beetles as major pest attacks to the fish product. During investigation poor protection and lack of container, invites the fly and beetles during transport and storage. Microbial spoilage of processed fish was also obtained from some fishermen (46.67%) simply due to lack of scientific knowledge.

Economic status of fishermen: The fishermen living on the bank of the Sheonath River depend on catching and selling of fresh. But only few of them are involved in its processing. The processing methodology is primarily traditional in nature, hence the income from the fish processing is quite low. Price or demand of the processed fish was depended on the quality of

food product, species specific demand, size and labor. The poor economic condition of processed fish was found due to limited demand, lack of marketing skills, limited richness to customer and low quality of the product. The relation between processing methodology and demanding of processed fish is presented in figure-5. The value of R^2 (Coefficient of determination) for the relationship between processing method and demanding of fish ($R^2 = 0.991$) indicates that 99.1% of the demanding of fish is explained by use of the advance processing method. Similarly the value of R^2 (Coefficient of determination) for the relationship between literacy and use of processing methods of fishing ($R^2 = 0.914$) indicates that 91.4% of the use of the advance processing technique is explained by the literate fisherman.

Different strategies for selling of processed fish were utilized to maximize income. The fishes are sold either in single species or in mix form (2 to 4 small fishes are mixed). The maximum fishermen obtain 1,000 to 1,500 INR per week (58.52%) followed by 1,500 to 2,000 (23.53%), and 500 to 1,000 (17.65%). Merely a few fishermen are satisfied with the income while maximum fishermen are not satisfied and interested to produce processed fish in big scale. The maximum fisherman also wants support from the Govt. and Non Govt. agencies to floweriest their business. Almost all fishermen utilize the income in daily family need. Most of them also utilize the income in children's education (70.59%), while only 23.53% fishermen made their income as saving for the future. During the study, 64.70% female fishermen involved in the processing of fish while male belong to only 37.50%.

The developing country like India need for employment in each hand. The fish processing is a practice which is the source of income for many people. In the present work, income of processed fish was depending on the product size, specific

demand for particular species and quality of processes product. The similar finding was also taken in a dry fish market of West Bengal, India¹⁷. The cost of processed fish depends on size, quality of species, transportation, labor and season¹¹. Lacks of scientific temperament, infrastructure and transport facility are the major factor behind reduced cost of processed fish. Apart

from these, deficient knowledge of market information and instability of price of product also affected the economic status of processed fish^{11,17}. The active involvement of women's was recorded during the investigation and it was also recorded worldwide^{3,16}.

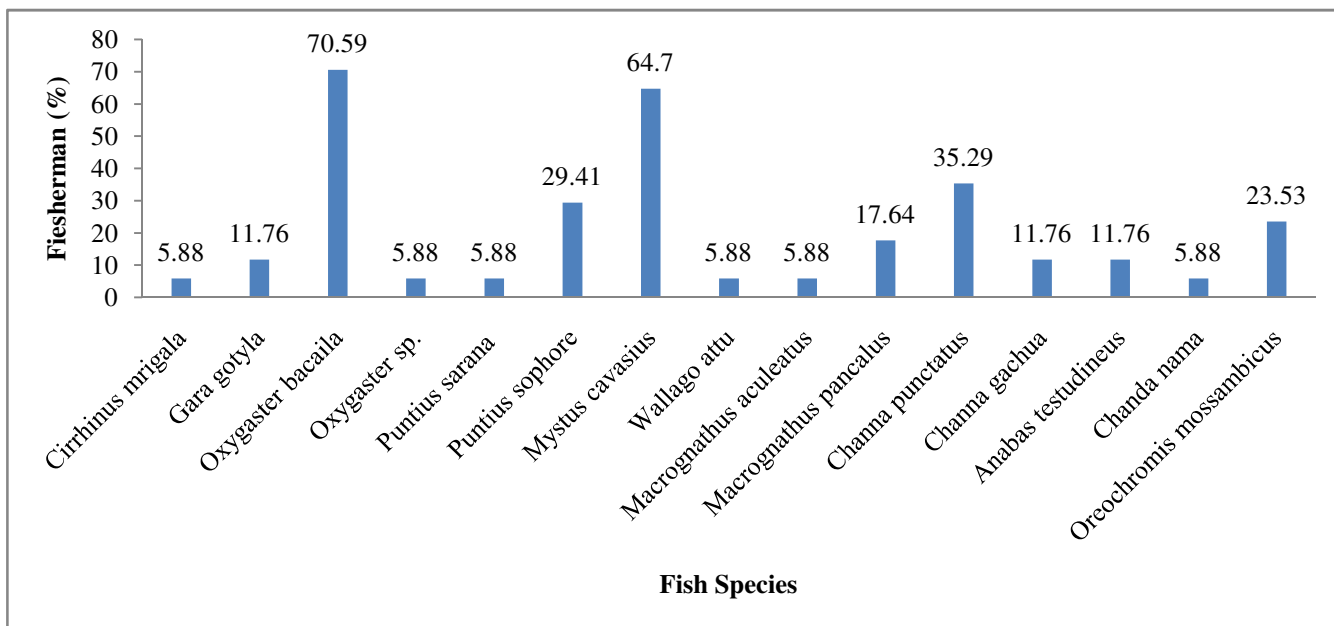


Figure-4
 Different Processed Fish species contained by Local fisherman of Rajnandgaon Preservation Methods

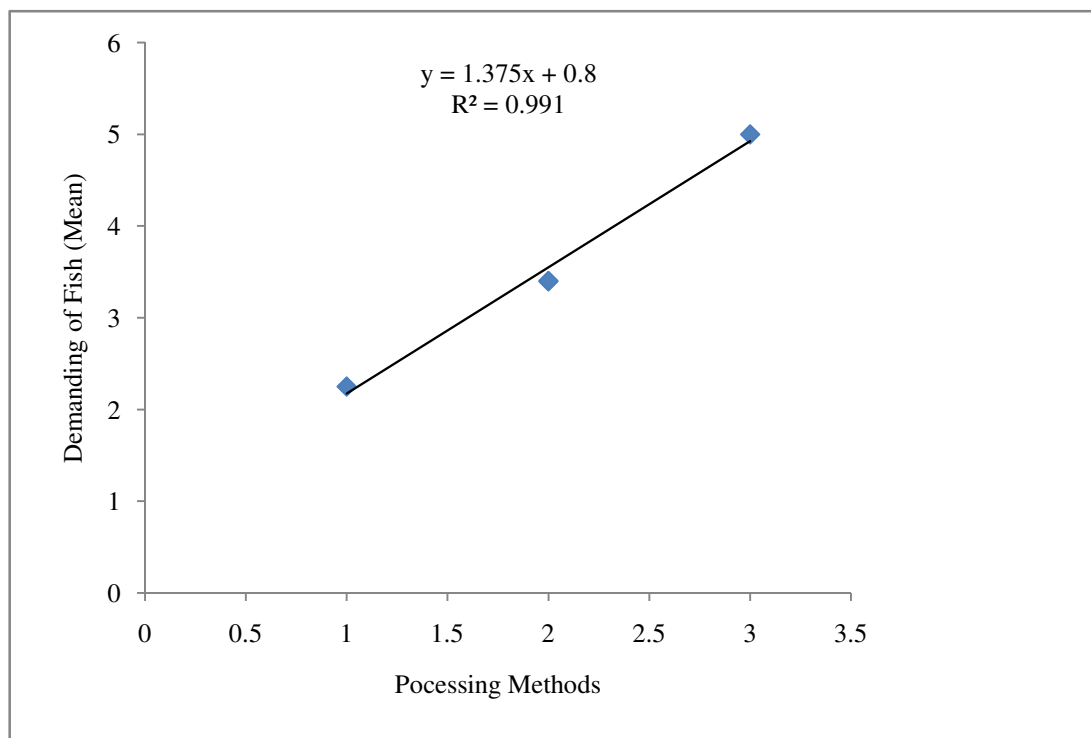


Figure-5
 Linear Regression analysis between processing method applied by fisherman and demanding of processed product

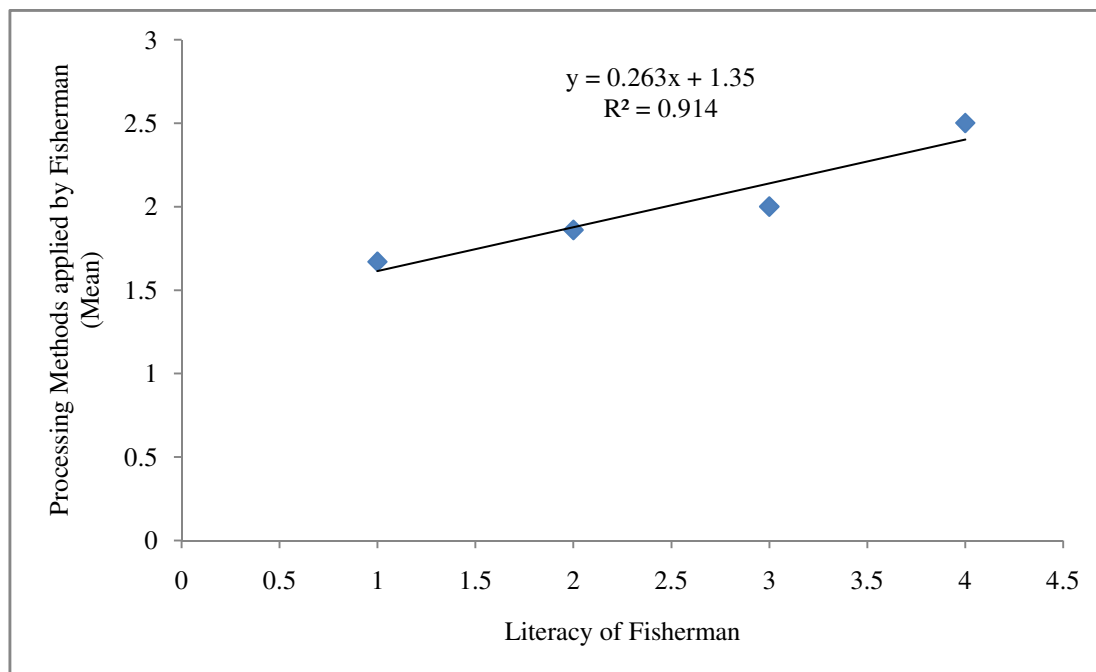


Figure-6

Linear Regression analysis between processing method applied by fisherman and literacy of fisherman

Conclusion

Many species of fish are processed in Rajnandgaon which are based on traditional methodology. The Sheonath River is the major source of fish in Rajandgaon. Selling strategies were adapted to better income for processed fish. The income from processed fish is poor; however fisherman wants to employ it in large scale with the aid of supporting authority. The females mainly involve in fish processing and they employ the income in daily needs, children's education and so forth. Thus the processing of fish is important source of income in a backward society living in ponds and river site of Ranjandgaon. The demanding of fish depends on the fish product processed with advanced method and the methodology is depending on the literacy of fisherman. So, the processing of fish in Rajnandgaon will definitely become a source of employment as well as a high richness to the clients if the skills of fishermen and processing methodology motivated.

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