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Economic analysis of commercial processing of fermented fish product *(Matka shidal)* and its marketing in North-East region of India

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ABSTRACT

Shidal is a traditional fermented value added fish product highly demanded by the people of NE region. This study aimed to highlight commercial processing methods, cost and margin in processing of *Matka shidal* and constraints faced by the processors of Sidal. This study was conducted by collecting information of 28 processors of Tripura and 8 processors of Manipur through focussed Group Discussion (FGD). Commercial *shidal* processing includes procurement of dry fish, sorting and grading, curing of *Matka*, filling, sealing and marking of *Matka*, storage of for fermentation and trading of *Shidal*. The cost-benefit analysis of *shidal* indicated net return of ₹ 77065.31/t and ₹ 52593.8/t in case of puthi *shidal* in Manipur and Tripura, respectively. Whereas, the net return in Baspati in Tripura was ₹ 59616.17/t. The percentage shares of producer in consumer's rupee were ranged between 55-64%. The small scale processing units of fermented value added fish product *shidal* in Tripura and Manipur have greater potential and employment opportunities which can be exploited through development of better financial, technical and input support system.

Keywords: *Shidal*, commercial processing, cost and margins, marketing, North-East region

Fermentation is one of the oldest and most economical methods for preserving food. In addition to preservation, fermented foods can also have added benefits of enhancing flavour, increasing digestibility, improving nutritional and pharmacological values. *Shidal* is a fermented value added fish product very popular in NE region. It is a indigenous fish product highly demanded in NE region of India, because of its typical flavour and aroma it is liked for its strong flavour (Majumdar *et al.*, 2009). This product is popular with different local names such as *Shidal*, Sepaa and Hidal in Assam, Tripura, Arunanchal Pradesh and Nagaland and Ngari in Manipur (Muzaddadi and Basu, 2012). The production and consumption of this product is mainly confined to NE region, however small proportion of *Shidal* is also imported from Bangladesh. The technology of its preparation is very old. It is originated in the erstwhile

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undivided India (now Bangladesh). A good number of research studies have been highlighted various aspects related to *shidal* and other fermented fish products of NE region such as assessment of nutritional quality of *shidal* (Majumdar *et al.,* 2009); indigenous processing method and quality control of *shidal*, Comparative study of fermented fish products of Northeast India (Seedal and *Shidal*); extension of shelf life of *shidal* (Muzaddadi and Basu 2012; Muzaddadi, 2013, Mahanta and Muzaddadi, 2013), Microbial profile of starter culture fermented fish product 'Ngari' (Sarojnalini and suchitra 2009), Indigenous knowledge on processing of 'Godak'-a delicacy of the tribal population in Tripura and its nutritional quality (Dhar *et al.,* 2012), Production process, nutritional composition, microbiology and quality issues of *shidal* (Ahmed *et al.,* 2016); micro-organisms and the nutritive value of traditional fermented fish products of Northeast India (Kokati and Goswami, 2013). Traditional fermented foods of Manipur (Jeyaram *et al.,* 2009), (*Ngari*: an indigenous fermented fish product from Manipur(Singh *et al.,* 2010), Phassya *Shidal* (Anon, 2007). However the information on commercial aspect of this highly demanded indigenous fermented fish products of NE region are scanty, therefore a study on Commercial production Fermented Fish Product (*Shidal*) and its marketing in NE Region has been attempted and findings of the study are presented in this paper.

Methodology

This study has been conducted including two states such as Tripura and Manipur. From Tripura altogether 28 processors and from Manipur altogether 8 processors of *Matka Shidal* have been selected. The processors were interview for collecting information on scale of processing, processing method, varieties/qualities of *shidal* processed sources of raw material, quality control, marketing etc. Further the Information from wholesalers, retailers who engaged in trading were interviewed for collected the information on varieties of *Matka shidal*, their prices and socioeconomic conditions of the Labourers engaged in *shidal* processing and also the problems and prospects of *shidal* processing have been gathered through personal interview.

Average revenue of *Shidal* Processor (₹/month) =

$$\sum (Qij \times Pij)/n \quad \ldots(1)$$

Where,

Qi quantities of i^{th} qualities *Shidal* sold by j^{th} processor in a month

Pi is the price received by j^{th} processor for *i* quality of *Matka shidal*

Average operational cost of *Shidal* processing (₹/month)=

$$\sum(Cij \times IPij) \quad \ldots(2)$$

Cij = physical quantities of ith item by jth processor

IPij = Input price of i^{th} item for jth processor

Further the monthly average revenue and average cost for *shidal* processing have been converted into per tonnes basis and net income and percentage margin of the processor was calculated as-

Net income (₹/t) =

$$\text{total revenue} - \text{total cost} \quad \ldots(3)$$

Percentage Net income =

$$(\text{Net income} / \text{Total revenue}) \times 100 \quad \ldots(4)$$

Results and Discussion

Varieties of *Matka Shidal*

In the dry fish markets of Tripura two major categories of *Matka shidal* were found to be marketed with the trade name punti *shidal* and Physsa *Shidal*/Baspati *Shidal*. Both products differs in terms of fish species utiled for preparing these products. Punti *shidal* is prepared with small size freshwater fish *Puntius sp* (Muzzaddadi, 2012). Whereas, the Baspati *shidal* is prepared with low priced fish *Setipina phasa*. Both products differ in quality and price.

However it was recorded that within these two products range of grades which varies in terms of quality and price are processed and traded in the market.

Purchase of Raw material

The two types of fishes utilized for preparation of *Matka shidal* such as *Puntius species and Setipina phasa* which are abundantly available during *mansoon and post mansoon.* The raw materials generally procured from various source markets of Bangladesh or Jagiraod dry fish market of Assam and also in some cases processors directly import from the production and drying centres located in Orissa, West Bengal and Utter Pradesh. During the season these fishes are procured in bulk quantity and stored for utilizing in regular processing of *Shidal*.

Method of *Shidal* Processing

To make "*Matka shaidal*" processors need several infrastructural facilities like storage for raw material and sorting and grading space, Processing shed and shed for putting *Matka* for fermentation etc. as well as some basic items like earthen pot (*Matka*), Fish (Telesh and Puthi), Oil, Salt, Labor, baskets etc. In addition to this there should availability of regular availability of raw materials, availability of clean water and any source of water and market for *shidal*. The processing of *shidal* is mainly confined to six months (November to April) in a year. However the fermentation, procurement of raw material and sale of *shidal* are continued to whole year.

Step 1: Sorting and Grading: The cleaning, sorting, grading are important value addition activities performed before processing, packing and storage for fermentation (Fig. 1). At this stage fishes are cleaned from broken, scales and dusts and further graded based on size, colour, moisture content and appearance etc. *Puntius* species in uniform and relative bigger size with no insect infection is desirable quality of raw material for preparation of p*unti sihdal* (Arman 2012). However, it is observed that fishes are graded according to size and other quality parameters for preparing different grades of *Shidal*. The daily paid women are engaged for the purpose of sorting and grading of fishes.

Step 2. Preperation of Oil processed *Matka*: Processing of earthen pot (*Matka*) is essential and important for *shidal* preparation (Fig. 2). The new earthen pot *Matka* purchased from the market and each *Matka* cost ₹ 300. The edible oil is used for smearing inside and outside. Though the fish oil is recommended for better quality of *shidal* (Muzaddadi and Basu, 2012) but it was found that *shidal* processors of Tripura and Manipur used Mustard oil for processing of *shidal* at commercial scale may be because of low cost involved in it. The oil is polish on both side of *Matka* is repeated three times and allowed to sun drying for five days so that *Matka* get fully saturated. The pot thus prepared does not allow any air or moisture to pass through the pores of earthen wall.

Fig. 1: Sorting of dry fish for *shidal* preparation in Tripura

Fig. 2: Oil treatment of *Matka* for *Shidal* preparation

Fig. 3: Water soaking of fishes for *shidal* preparation

Approximately 700gm oil is needed for curing of *Matka* with oil. During discussion with the processors it was opined that the oil polish close the pores and make it more air tight further it helps in retaining the required moisture of fishes inside the *Matka*.

Step 3: Water soaking of Dry Fish: In commercial processing of *shidal* it is an important step. The sorted and graded fishes used for water soaking. Soaking eliminates wastes, reabsorbs water, softens up the fishes and it provides optimum moisture for the fermentation. In this method bamboo basket filled with fishes dipped into clean water for about 2-3 minute and evening period was reported most suitable because low temperature and filling of the *Matka* in early morning (Fig. 3). After soaking in water these fishes are spread on bamboo mat for whole night so that excess water drained. The time period for water soaking is critical, and excess water soaked fishes are considered to be

Fig. 4: Filling of *Matka* with fishes

unsuitable for fermentation hence they are discarded during processing.

Step 4: Filling of *Matka*: After soaking at evening next early morning oil treated *Matka* filled with soaked fishes. Morning is more suitable because of lower temperature. The processor, had special shed for filling of *Matka*, for preparing *shidal* makta has to be filled with maximum possible quantity of fish, hence while filling it, after each layer it covered with cloth and pressed with leg (Fig. 4). However during this process precautions are taken so that shape of fish should be remain intact but the each layer pressed by applying uniform pressure by hand or leg. Further for this process as it is observed from the picture that the half portion of earthen pot (*Matka*) is buried underground in order to avoid breaking of *Matka* due to packing presure. Such spreading of fish and subsequent manual compaction is continued until the layers reach the neck region. The gunny bags layed surrounding the *Matka* to avoid wastage of fishes. All these are skilful tasks performed by highly skilled labourers on contract basis.

Step 5: Preparation of Cover paste and Sealing of *Matka*: One paste are prepared with mixture of dry fish (*Telash Kanti*) which contains relatively more oil, salt and edible oil. The total quantities of these ingredients for filling of 10 *Matka* are 7 Kg of dry fish, 500ml of mustard oil and 500gm of salt. These ingredients are mixed together prepared a paste. Thickness of paste in at the neck of *Matka* maintained 1" or about 500 gm paste is used in *Matka*. It is also important that this paste is to be prepared during filling of *Matka* with fishes otherwise its quality gets deteriorated and is not suitable for sealing of *Matka* (Fig. 5).

Step 6: Sealing of *Matka* with Clay: After completion of first step of sealing of *Matka* by paste, the paste is covered with polythene. Thereafter a thick layer of clay used sealing of *Matka*.

Step 7: Storage of *Matka* for fermentation: Once the *Matka* is completely sealed with clay, it is coded/marked with paint to indicate trademarks, quality/grades, expected period for opening of *Matka*. These codes help to the processors in signalling the trade name, deciding prices and salting whole *Matka* without opening it. It was also noticed that the in case of some big processors of *shidal*, typical shape and size of matkta indicates their trade marks. The *Matka* are stored under shed in cool place and during storage sometimes the half of the *Matka* buried underground for fermentation (Fig. 4). The

Fig. 5: Sealing of *Matka* with paste

Fig. 6: Storage of Sealed *Matka* for fermentation

average period for fermentation is about 4-6 months. However the processor was reported that they store it for minimum 1.5 months to maximum 1.5 years, it all depends on quality of *shidal* processors' desired to prepare. The processors perceived that longer storage for fermentation leads to better quality of *shidal*. However it is also to be mentioned that during sorting, grading and filling of *Matka*, duration of fermentation and quality of *shidal* to be prepared is decided by the processors. The processors were found to be charged different prices for different grades of *shidal* based on their quality.

Cost and margins of processors in *Matka shidal*: Since *shidal* is widely demanded fish product in the North East Region, therefore processors, process it in bulk quantity to meet out the market demand. In Tripura two varieties of *shidal* such as *puthi shidal* and *bashpati shidal* are processed and marketed. Both value added products are differs in raw materials and *baspati shidal* is low priced value added products which is becoming popular and close substitute of puthi *shidal* particularly for the consumers having lower affordability.

The cost and margin in processing of *Matka shidal* has been worked out and it was found that calculated for the processors of Tripura and Manipur (Table 1). The total variable cost processing of *puthi shidal* in case of Tripura was ₹ 213647.5/t where as it was ₹ 285129.99/t in Manipur. Further the cost of processing of Baspati *shidal* in *shidal* was worked out to be ₹ 231344.43/t. The

cost of processing of Baspati is lower because of lower purchased price of fishes used for processing Baspati *Shidal*. Out of total variable cost, cost of raw material or dry fish utilized for processing was accounted about 90 % and remaining 10% was accounted by transportation cost of raw material, loading and unloading, cost of mustard oils used for curing the *Matka* and preparation of paste and labour cost. The gross returns in puthi *shidal* in Tripura was ₹ 266241.3/t in Manipur it was ₹ 3,62,195.30/t whereas in case of Baspati in Tripura it was ₹ 231344.43/t. The net return in processing of puthi *shidal* in Manipur was ₹ 77065.31/t whereas it was ₹ 52593.8/t in Tripura. However, net return in Baspati in Tripura was ₹ 59616.17/t. The net returns over variable cost in processing of two varieties of *shidal* in the two states turned out to be 20-26 % of Total revenue. These results clearly indicates that the *shidal* processing is economically viable. The commercial processing of shidla also provides gainful employment to the women and rural youth.

Marketing of *Shidal*: The fermented value added fish products are traded in whole North East region. This product is traded through the channels of Dry fish products. Hence the *Shidal* and Dry fish products are having the similar marking chains and trading centres in the NE region. It is observed that in some cases the processors are also functions in the market as wholesalers/traders. The processors sell their produce the wholesalers, retailers and in some cases they trade it

Table 1: Cost and margin of processors of *Matka shidal* in Tripura and Manipur

Head of expenditure and return	Cost/return (₹/t)		
	Tripura		Manipur
	Puti *shidal*	Baspati *shidal*	Puti *shidal*
	Variable cost items		
Cost of dry fish (₹/t)	192053.4 (89.89)	152676.06 (88.91)	264375.00 (92.72)
Earthen pot (₹/t))	5000 (2.34)	5006.40 (2.92)	4001.18 (1.4)
Mustard oil (₹/t)	4500 (2.11)	4505.76 (2.62)	4284.64 (1.5)
Transportation cost (₹/t)	5767.98 (2.70)	4686.3 (2.73)	7749.95 (2.72)
Loading unloading cost (₹/t)	301.97 (0.14)	325.19 (0.19)	3579.16 (1.26)
Labour cost (₹/t)	6024.13 (2.82)	4528.55 (2.64)	1140.06 (0.40)
Total variable cost (₹/t)	213647.5 (100)	171728.27 (100)	285129.99 (100)
Gross Return (₹/t)	266241.3	231344.43	3,62,195.30
Net return (₹/t)	52593.8 (19.75)	59616.17 (25.77)	77065.31 (21.28)

Figures in parentheses indicate percentage or total

to the wholesalers of the distant markets within the state or outside the state. Since the processors are also acts as wholesalers so they are better informed about market prices and market demand for the products. The price formation in marketing channel of *Shidal* is presented in the Fig. 7. It is indicated by the figure that the prices of the Baspati *shidal*/physsa *shidal* is lower as comparision to the puthi *shidal*. It is also reflected that the percentage shares of processor in consumer's rupee was 55% in case of puthi *shidal* whereas it was 64% in case of Baspati *shidal*. Remaining 36-45% is distributed as gross market margin of wholesalers and retailers of *shidal*.

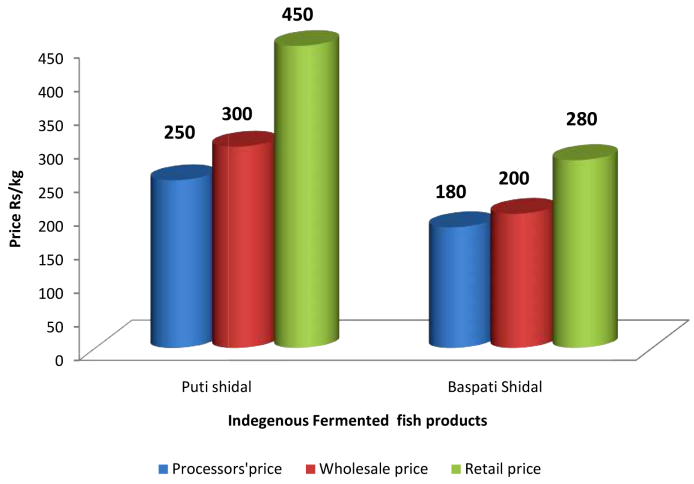

Fig. 7: Average price (₹/Kg) of fermented products different level of market chain in Tripura

Constraints: Though the processing of *shidal* at commercial scale is found to be economical but several issues were recorded during the study. The *shidal* processing involved initial investment for creating infrastructures such as storage of dry fish, shorting and grading shed, processing sheds, fermentation shed, trading shop. It also required regular fund for procuring inputs such as dry fish, *Matka*, oil, salt, bags, and payment of labourers. Therefore financial support and micro financing services are considered to be crucial for processors of *Matka shidal*. However it was noticed that even the processors had better transactions with banks, they are not having credit facilities suited to them such as short term credit with minimum formalities and easy repayment plan. This is a major impediment in increasing scale of processing of *shidal*. Further the lack of regular supply of dry fish as their demand is also found to be constraint in processing of *Matka shidal*. The availability of skilled labourers for processing, increasing cost of *Matka*, lack of cost effective technologies like reduction quantity of oil used for curing of *Matka*, low cost fermentation pot, reduction in fermentation period etc. are some of the barriers in increasing processing and trading of *shidal* at large scale.

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Conclusion

The *Matka shidal*, a traditional fermented fish product quite popular among the fish consumers of North East Region of the country. The typical method of processing of *shidal* required alot of caution and it required highly skilled personnel for making *Matka shidal*. The processing of *shidal* at commercial level is confined to only few places of Tripura, Assam and Manipur and it is traded to almost every remote corners of the whole NE region. The cost and benefit analysis of commercial processing of *shidal* was indicated as profitable venture and it also provide gainful employment to the poor people. The small scale processing units of Tripura and Manipur have greater potential for production as well as trade of *Shidal* provided they receive better financial, technical and input support system.

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