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Processing of Murmura in North Karnataka - An Economic Study

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ABSTRACT: Rice (*Oryza sativa*) commonly known as Asian rice. Rice belongs to family Poaceae and serve as a good source of vitamin B-6, thiamin, riboflavin, niacin, fiber and iron. This research article is focused on processing aspects of murmura which would help the start ups and entrepreneurs for establishing processing units. Based on the highest production of paddy, Raichur and Ballari districts were selected. From both the districts 20 processing units were selected for the study. The total cost of processing of paddy to one quintal of murmura was ₹2499.61, out of which the total variable cost was ₹2,392 per quintal and total fixed cost was ₹107 per quintal. The gross returns and net returns realized from processing of one quintal of paddy into murmura was accounted to be ₹4,073 and ₹1,355 per quintal respectively. The returns to scale (Σbi) in murmura was 1.34 per cent indicating increasing returns to scale. Regression coefficients of cost of soda, telephone and miscellaneous charges, market fee and commission and wages to labour were positive and significant at ten per cent level of significance. The major problems faced by murmura processing units was found to be the lack of availability of sufficient raw material followed by high price of raw material, high moisture content of the raw material and improper quality of raw material.

Keywords: Murmura, cost of processing, gross returns, net returns, returns to scale, constraints.

INTRODUCTION

Rice (*Oryza sativa*) commonly known as Asian rice. It is originated in the Indo – Burma region. Rice belongs to family Poaceae or Gramineae and it is grown in India from over 4000 years. Rice can serve as a good source of vitamin B-6, thiamin, riboflavin, niacin, fiber and iron. Rice is also an excellent source of manganese and magnesium. Protein is present in aleron and endosperm to the extent of 6 to 9 percent, rice husk is used as animal feed, for paper making, as fuel source and rice bran oil is used in soap industry. Important varieties of rice that are grown in North Karnataka are Sona masuri, IR-20, IR-64, IR-30864, RNR, Kaveri Sona, Jaya *etc*. Puffed rice is a type of puffed grain from the Indian subcontinent, made from rice, commonly used in breakfast cereal or snack foods, and served as a popular street food in India, Bangladesh and Nepal. It is usually made by heating rice kernels under high pressure in the presence of steam, though the method of manufacture varies widely. It is widely consumed in countries like India. Paddy occupies the 1st position among all food grains production in the country accounting for 35.39 per cent of total food grains area and 40.84 per cent total food grain production. Uttar Pradesh stands first with highest rice area of about 57.4 lakh hectares contributing about 13.00 per cent of the total rice area of the country. In case of rice production, West Bengal stands first with a production of 162.42 lakh tons contributing about 13.94 per cent of the total rice production in the country followed by Uttar Pradesh (13.35 %), Punjab (11.01 %), Andhra Pradesh (7.07 %) and Karnataka (2.95 %). (Anonymous, 2019). In Karnataka, Raichur district stands first with highest area of about 1,41,534 hectares contributing about 22.73 per cent of total rice area and Bellary district stands first with production of 8,14,529 tons contributing about 29.06 per cent of the total rice production in North Karnataka during 2018-19.

In India, puffed rice is known as muri. Other regional names includes puri, mudhi, murmuri and pori. It is a staple food in Odisha and West Bengal. Puffed rice is an ingredient of bhel puri, a popular Indian chaat (snack). It is offered to Hindu gods and goddesses in all poojas in the southern Indian states. In Karnataka, puffed rice is mixed with carrots, tomatoes, spices and coriander leaves to make churumuri, a popular evening snack. Health benefits of murmura are relieves constipation, promotes digestion, boosts immunity, regulates blood pressure, aids in weight loss, strengthens bone and enhances the skin. Hence the study was taken up to estimate the economics of processing of murmura in North Karnataka.

METHODOLOGY

Based on the highest production of paddy in the state, two districts namely Raichur and Ballari were selected for the study. Based on the number of processing units involved in production of murmura, proportionate sampling procedure was followed to select the production units in the study area. From both the districts 20 processing units were selected for the study. For evaluating the objective of the study, the required data were collected through personal interview method using well-structured and pre-tested schedule. The secondary data relating to costs and returns involved in production of value added products were obtained from processing units. These data were collected from the respective processing units situated in the study area from the books of accounts of those processing units.

A. Analytical Techniques Employed

Production function analysis: The Cobb – Douglas type of production function was used to study the effect of various inputs on murmura output. So they are presented in the tabular form.

On account of its well – known property of its computational simplicity, justifies its wide application in analyzing production relations. It being a homogeneous function, provide a scale factor enabling one to measure the returns to scale. The estimated regression coefficients represented the production elasticities.

The form of Cobb – Douglas type of production function used in the present study is as follows

$$Y = a\, X_0^{b0} X_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} X_5^{b5} X_6^{b6} X_7^{b7} X_8^{b8} X_9^{b9} X_{10}^{b10} X_{11}^{b11} X_{12}^{b12} e^{u} \quad (1)$$

where,

Y = Gross Returns

a = Intercept term

X_1 = Cost of raw material (₹/qtl)

X_2 = Cost of sand

X_3 = Cost of soda

X_4 = Cost of salt

X_5 = Cost of gunny bags

X_6 = Electricity and fuel charges (₹/qtl)

X_7 = Loading and unloading charges (₹/qtl)

X_8 = Transportation charges (₹/qtl)

X_9 = Wages to labour (hours)

X_{10} = Telephone and Miscellaneous charges

X_{11} = Market fee and commission

X_{12} = Repair and maintenance

e^u = Error term

b_i's = Output elasticity's of respective factor inputs, i = 1,2,3……. and

The Cobb – Douglas type of production function was converted into log linear form as given below and parameters (coefficients) were estimated by employing Ordinary Least Square Technique (OLS) as given below.

$$\log Y = \log a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + b_6 \log X_6 + b_7 \log X_7 + b_8 \log X_8 + b_9 \log X_9 + b_{10} \log X_{10} + b_{11} \log X_{11} + b_{12} \log X_{12} + u \log_e \quad (2)$$

Allocative efficiency: Given the technology, allocative efficiency exists when resources are allocated within the farm according to quantity which implies the proper level of input use in production. To decide whether a particular input is used rationally or irrationally, its marginal value products were computed. If the marginal value product (MVP) of an input just covers its acquisition quantity, it is said that the input is used efficiently.

The MVP was calculated at the geometric mean levels of variables by using the following formula.

$$\text{MVP } i^{th} \text{ resource} = b_i^{*} \frac{GM(\overline{Y})}{GM(\overline{X})}$$

where, $GM(\overline{Y})$ = Geometric mean of the output

$GM(\overline{X})$ = Geometric mean of i^{th} input

b_i = The regression coefficient of the i^{th} input

A ratio of the value of marginal product (MVP) to the factor price (MFC) was compared and if it is more than unity implied that the resources are advantageously employed. If the ratio is less than one, it suggested that the resource was over utilized.

Rank Based Quotient: RBQ technique was adopted for studying the severity of problems faced by the respondents in production of murmura. The respondents were asked to give ranks for the problems, based on severity. The data thus collected were tabulated and statistically analysed to interpret the results. The processors were asked to list the constraints faced by them in production of murmura. Later on respondents were asked to rank the constraints individually. These were compiled together and Rank Based Quotient (RBQ) technique was used to quantify the data collected by Preferential Ranking Technique. For calculating the Rank Based Quotient (RBQ), the following formula was used:

$$RBQ = \frac{\Sigma\, fi\, (n + 1 - i)}{N * n}$$

Wherein, *fi* = number of processors and market intermediaries reporting a particular constraint under i^{th} rank

N = number of processors
N = number of constraints identified

RESULTS AND DISCUSSION

The average total cost of processing of paddy into one quintal of murmura is presented in the Table 1. From the table, the total cost of processing was observed to be ₹2,500 per quintal, in which the total variable cost of ₹2,392 formed the major component (95.70%). The total fixed cost being ₹107 per quintal, accounted only for 4.29 per cent of the total cost of processing. Out of the total variable costs, the cost of raw materials (₹1,838.53/qtl) was found to be maximum and accounted for 73.55 per cent of the total cost of processing, followed by interest on working capital (8.70%), wages for labour (2.94%) and market fee and commission charges (2.57%). The other items altogether accounted for 7.89 per cent of the total cost of processing. The cost of raw materials was high because only few varieties like IR 64 and 10010 varieties are used for preparation of murmura and raw materials was purchased from different places of North Karnataka, which directly influences on high transportation costs and commission charges.

Table 1: Cost of processing of paddy into murmura (₹/q).

Sr. No.	Particulars	Unit	Murmura		
			Price (₹/unit)	Quantity	Total (₹)
A	**Variable Cost**				
1.	Cost of raw material (Paddy)	q	–	1	1,838.53 (73.55)
2.	Cost of sand	kg	2.85	10	28.50 (1.14)
3.	Cost of salt	kg	5.5	4	22.00 (0.88)
4.	Cost of soda	kg	40.72	0.2	8.14 (0.32)
5.	Cost of fuel	kg	4	4.25	17.00 (0.68)
6.	Cost of gunny bags	Rupees	5.28	1.42	7.50 (0.30)
7.	Electricity and water charges	Rupees	–	–	16.83 (0.67)
8.	Loading and unloading	Rupees	9.64	1.42	13.70 (0.54)
9.	Transportation charges	Rupees	29.61	1.42	42.05 (1.68)
10.	Wages for labours	Rupees	26.80	2.75	73.70 (2.94)
11.	Telephone charges	Rupees	–	–	1.03 (0.04)
12.	Market fee and commission	Rupees	–	–	64.33 (2.57)
13.	Repair and maintenance	Rupees	–	–	39.13 (1.56)
14.	Miscellaneous	Rupees	–	–	2.24 (0.08)
15.	Interest on working capital @10%		–	–	217.47 (8.70)
	Total Variable Cost		–	–	**2,392.14 (95.70)**
B	**Fixed Cost**				
1.	Depreciation on building	Rupees	–	–	1.69 (0.06)
2.	Depreciation on machinery	Rupees	–	–	13.29 (0.53)
3.	Insurance and license fee	Rupees	–	–	9.86 (0.39)
4.	Salary to permanent employees	Rupees	–	–	69.44 (2.77)
5.	Interest on fixed capital @14%	Rupees	–	–	13.20 (0.52)
	Total Fixed Cost		–	–	**107.47 (4.29)**
	Total processing cost (A+B)				**2,499.61 (100.00)**

Note: Figures in parentheses indicate percentage to total

Out of the total fixed cost (₹107.47), salaries to permanent employees (2.77%) and depreciation on machinery (0.53%) was found to be the major component in the total cost of processing. Murmura processing unit is extensively labour oriented. It is completely labour oriented because at each stage of the processing from dipping the paddy in the boiling water, placing the dipped paddy to the platform for sun drying till the process of packing the murmura, manual labour is required. The murmura processing industries should get update by adopting new technologies, equipments and machineries to improve the efficiency in the processing. In Karnataka majority of the murmura processing units are using traditional method and there is a need to shift from traditional to modern processing. A similar pattern of results was reported by Avinash (2014); Shwetha, (2016); Renuka (2019).

The details of returns from processing of paddy into murmura is presented in Table 2. The total quantity of main product obtained was found to be 3,183.80 quintals out of 4,540.20 quintals of total paddy processed. The total processing cost was observed to be ₹2,717 per quintal. The gross returns realized from processing of one quintal of paddy into murmura was accounted to be ₹4,073 per quintal, out of that ₹3,493 per quintal was from main product (murmura) indicating 70 per cent of recovery and ₹580 per quintal was from byproduct of paddy indicating 30 per cent of recovery and net returns was observed to be ₹1,355 per quintal.

The results presented in Table 3 revealed that the variables included in the function explained 98 per cent variation in the dependent variable. The returns to scale (Σbi) in murmura was 1.34 respectively, which indicates increasing returns to scale (more than unity). A one per cent increase in all inputs used in production simultaneously would increase output by 1.34 per cent in murmura. It could be seen from the table that in

murmura production, the regression coefficient of cost of sand (0.000), cost of gunny bags (0.000), power and fuel charges (0.029), repair and maintenance (0.008) were positive but non-significant. Regression coefficients of cost of soda (0.621), telephone and miscellaneous charges (0.149) market fee and commission (16.971) were positive and significant at ten per cent level of significance which implied the increased usage of these inputs added to the gross returns. Regression coefficient of wages to labour (0.182) was positive and significant at one per cent level of significance which implied the increased usage of these inputs added to the gross returns.

Table 2: Returns from value addition process of paddy processing units

Sr.No.	Particulars	Murmura		
1.	Total quantity of raw material processed (q/annum)	4,540.20		
2.	Total quantity of main product obtained (q/annum)	3,183.80		
3.	Total quantity of by product obtained (q/annum)	1,356.40		
.	a. Bran	1,356.40		
4.	Total value of main product (₹ lakh/annum)	159.11		
5.	Total value of by products (₹ lakh/ annum)	26.14		
6.	Total returns (4+5)	185.25		
A	Total processing cost (₹/q)	2,717.47		
	Particulars	Quantity (kgs)*	Price (₹/kg)	Value (₹)
B	Returns from main product			
	a. Murmura	69.9	49.97	3,492.90
	Sub total	69.9		3,492.90
C	Returns from by product			
	a. Bran	30.1	19.27	580.02
	Sub total	30.1		580.02
	Total (B + C)			4,072.93
D	Gross returns (₹/q)	4,072.93		
E	Net returns (₹/q)	1,355.46		

Note: *Quantity obtained by processing one quintal of paddy Total processing cost includes processing cost, storage cost and marketing cost of processor

Table 3: Resource use efficiency in murmura processing unit.

Sr. No.	Explanatory variables	Parameters	Murmura
1.	Intercept	**A**	54.030 **(24.236)**
2.	Cost of raw materials	$\mathbf{b_1}$	-15.860@ **(7.202)**
3.	Cost of sand	$\mathbf{b_2}$	0.000 **(0.000)**
4.	Cost of soda	$\mathbf{b_3}$	0.621@ **(0.332)**
5.	Cost of salt	$\mathbf{b_4}$	-0.533 **(0.511)**
6.	Cost of gunny bags	$\mathbf{b_5}$	0.000 **(0.000)**
7.	Power and fuel charges	$\mathbf{b_6}$	0.029 **(0.125)**
8.	Loading and unloading charges	$\mathbf{b_7}$	-0.076 **(0.056)**
9.	Transportation charges	$\mathbf{b_8}$	-0.143** **(0.040)**
10.	Wages to labour	$\mathbf{b_9}$	0.182** **(0.052)**
11.	Telephone and Miscellineous charges	$\mathbf{b_{10}}$	0.149@ **(0.073)**
12.	Market fee and commission	$\mathbf{b_{11}}$	16.971@ **(7.146)**
13.	Repair and maintanence	$\mathbf{b_{12}}$	0.008 **(0.041)**
14.	Coefficient of multiple determination	$\mathbf{R^2}$	**0.988**
15.	Returns to scale	$\mathbf{(\Sigma b_i)}$	**1.348**

Note: Figures in the parentheses indicates their respective standard errors; *Significant at five per cent probability level; ** Significant at one per cent probability level; @ Significant at ten per cent probability level

The ratio of Marginal Value Product (MVP) to Marginal Factor Cost (MFC), presented in the Table 4. In murmura production the MVP and MFC ratios for electricity and fuel charges (3.49), wages to labour (10.13), telephone and miscellaneous charges (184.62), market fee and commission (1081.28) were positive and more than unity indicating that the resources were underutilized, increasing the quantity of these resources would increase the returns and hence maximize their profit in murmura production. The MVP and MFC ratios for cost of sand (0.00), cost of gunny bag (0.00) repair and maintenance (0.79) were positive and less than unity indicating that resources are over utilized, increasing the quantity of these resources will decrease the returns and maximize the profit. The MVP and MFC ratios for cost of raw materials (-35.35), cost of salt (-79.36), loading and unloading charges (-22.84) and transportation charges (-15.19) were negative and less than unity indicating that the resources were in excessive use i.e., decrease of the use of these inputs would enhance the gross returns.

Table 4: Allocative efficiency in murmura processing units.

Sr. No.	Explanatory variable	Parameters	Murmura
1.	Cost of raw materials	b_1	-35.357
2.	Cost of sand	b_2	0.000
3.	Cost of soda	b_3	306.951
4.	Cost of salt	b_4	-79.361
5.	Cost of gunny bags	b_5	0.000
6.	Power and fuel charges	b_6	3.497
7.	Loading and unloading charges	b_7	-22.843
8.	Transportation charges	b_8	-15.199
9.	Wages	b_9	10.130
10.	Telephone and Miscellaneous charges	b_{10}	184.629
11.	Market fee and commission	b_{11}	1081.280
12.	Repair and maintenance	b_{12}	0.797

Note: MVP – Marginal Value Product; MFC – Marginal Factor Cost

The annual quantity of murmura stored was 9.30 quintals for period of 5 days with a storage cost of ₹22.86 per quintal (Table 5). The constraints faced by processors in production murmura with their RBQ scores are presented in the Table 6. The most important problem in case of murmura processing units was found to be the lack of availability of sufficient raw material (I rank), followed by high price of raw material (II), high moisture content of the raw material (III), improper quality of raw material (IV), scarcity of skilled labour (V) and high transportation cost (VI). The similar results were witnessed by Lal (2008); Naik (2009); Xess (2010); Bhagwat & Shelke (2013) in their respective study regarding the problems faced by processing units.

Table 5: Storage cost of value added products of murmura.

Sr. No.	Particulars	Murmura
1.	Quantity of value added product stored (q)	9.30
2.	Period of storage (days)	5
3.	Storage cost (Rent ₹/q)	5.22
4.	Cost of stock maintenance (₹/q)	17.64
	Total storage cost (3 + 4)	22.86

Table 6: Constraints faced by processors in production of murmura.

Sr. No.	Constraints	Murmura	
		RBQ score	Rank
1.	Lack of availability of sufficient raw material	90.83	I
2.	High price of raw material	85.83	II
3.	High moisture content of the raw material	60.00	III
4.	Improper quality of raw material	53.33	IV
5.	Scarcity of skilled labour	35.00	V
6.	High transportation cost	25.00	VI

CONCLUSION

The variables included in the function explained 98 per cent variation in the dependent variable. The returns to scale (Σbi) was 1.34 respectively, which indicates increasing returns to scale. The MVP and MFC ratios for electricity and fuel charges, wages to labour, telephone and miscellaneous charges, market fee and commission were positive and more than unity indicating that the resources were underutilized, increasing the quantity of these resources would increase the returns and hence maximize their profit in murmura production. The MVP and MFC ratios for cost of sand, cost of gunny bag, repair and maintenance were positive and less than unity indicating that resources are over utilized, increasing the quantity of these resources will decrease the returns and maximize the profit. High price of raw materials, lack of availability of sufficient raw materials, high moisture content and improper quality of raw materials were the major problems faced by the processors in production of murmura. The availability of raw materials was less because the production of raw materials in the study area for that respective year was low. In order to earn more money by showing higher weight the farmers did not maintain the required moisture content in the raw materials which they sold to the processors. To overcome this problem, the processors have to advice the farmers to maintain the minimum required moisture content and assure them that they would get better price. The exact days required for processing of murmura by traditional method was 6–7 days and it is highly labour intensive. There is need to shift from traditional to modern method of murmura processing with upgraded technologies.

Conflict of Interest. None.

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