Comparative economic efficiency of modern and traditional redgram processing mills in Karnataka

C. S . Avinash *[1] and B. S. Reddy[2]

[1.2]*Department of Agricultural economics, UAS, Raichur. 584104*
*avinashnaik808@gmail.com

Abstract

Background: The study is conducted with keeping the objective of economics efficiency of modernized and traditional redgram processing mills. .
Methods: To analyse the objective the business ratios, Break-Even ratio, and financial feasibility ratio like NPV, BCR and IRR techniques are worked out.
Result: The benefit cost ratio worked to be 1.13 for modern dal mills and 1.06 for traditional dal mills. The internal rate of returns is very high at 33.22 per cent in modern dal mills compared to traditional dal mills (16.48%). The quantity of output required to achieve break–even point were 10,863 and 9,136 quintals of output (dal) in modern and traditional dal mills respectively and have produced more than the break-even volume of output, indicating both were running under profitable lines. Estimated values of NPV, BCR, IRR and PBP indicated that, irrespective size of the dal mills, investment in redgram milling units was economically feasible and financial sound. The magnitude of financial feasibility analysis indicated the priority to be assigned for investment in modern redgram processing units.
Application: The present losses can be minimized by adopting improved machineries and equipments including *Buller* and *Sortex grading* machines to increase recovery percentage and produce better quality *dal* for enjoying larger profit through economics of large scale production

Key words: Business ratio analysis, Break even volume analysis, Financial feasibility analysis

1. Introduction

Redgram (*Cajanus cajan* (L.) Millsp.) is one of the major pulse crops of semi arid tropics, endowed with several unique characteristics. It finds an important place in the farming system adopted by small holding peasants in many developing countries. In India redgram ranks second among important pulse crops next to bengalgram. Redgram is mainly consumed in the form of split pulse as *dal*, which is an essential supplement of cereal based diet. The major part of pulse produced in India is converted into *dal.* Many products are made from whole or dehusked pulses. Roasted pulses, pulses flour, 'sattu', sprouts, fermented product *etc.,* are quite commonly produced in domestic market on commercial basis to cater the requirement of consumer.

India accounts for 90 per cent of world output with an area of 4.42 million hectares and production of 3.07 million tonnes of redgram. In Karnataka, it was grown in an area of 6.66 lakh hectares with a production of 4.69 lakh tonnes during 2012-13. Redgram is largely grown in the northern part of the state especially in Gulbarga district, which is called as *"Pulse bowl"* of Karnataka. Gulbarga district occupied an area of 3,70,523 hectares with a production of 1,80,222 tonnes during 2012-13 (Anon., 2013)[1].

In India many Agricultural Universities, ICAR institutions and other scientific institution in the country have developed modern improved *dal* mills. Recent establishment of several large units with latest import machinery like buller and sortex, although they have not started working of full capacity. More than 15,000 *dal* mills are located in different part of country out of which 308 are in Gulbarga district of Karnataka operating across different scales. Keeping this in mind study was conducted to evaluate economic efficiency of modern and traditional redgram processing units.

2. Data and Methodology

2.1 Sampling area

Gulbarga is one of the leading tur producing district and it is called as "*Tur Bowl"* of Karnataka. It is industrially backward district, but presently showing signs of growth in the cement, textile, leather, chemical and *dal* industries. Long history of pulses processing exist in and around Gulbarga town with 308 registered units in the district operating across different scales.

2.2 Primary data and Secondary Data

For evaluating the specific objectives designed for the study, primary data was collected from *dal* millers on procurement of redgram and disposal of final products, inventory cost, processing cost, management issues in procurement, returns from the sale of main products and by-products, marketing cost incurred and problems encountered in *dal* milling operations, *etc.* Secondary data were collected from the records maintained by the *dal* millers. The information pertained to the assets and liabilities position, extent of investment made on building, machinery, equipments, permanent labour, cash inflows and outflows, etc.

2.3 Sampling Size

Around 300 *dal* processing unis are established in Gulbarga district and majority (254) of them are in Gulbarga city. Therefore, selection of processing units was confined to Gulbarga city only. Further, 40 units were selected randomly for the study and classification of processing unit was done based on per day quantity processed. The processing unit with a capacity of 300 and above quintals per day and having a Buller and Sortex machine were consider as modern units, while those units with a capacity of 200-300 quintal per day were considered as large units 150 to 200 quintals per day processing capacity were considered as medium size units and between 100 to 150 quintals per day processing capacity were considered as small units. Totally 10 *dal* mills in each category of small medium large and modern constituting 40 sample *dal* millers were selected. For evaluating the objectives of the study, the required data were collected through personal interview method with the help of a structured and pre tested schedule and the following business ratio analysis were performed techniques described by Talathi *et.al.* [2]

2.4 Analytical Tools

Business ratios

I. Profitability Ratio

$$\text{i. Net profits to total assets} = \frac{\text{Net returns}}{\text{Total Assets}}$$

$$\text{ii. Net profit to total sales (\%)} = \frac{\text{Net returns}}{\text{Total Sales}} \times 100$$

$$\text{iii. Returns on total capital employed} = \frac{\text{Net returns}}{\text{Total capital employed}}$$

$$\text{iv. Net returns per rupee of investment} = \frac{\text{Gross returns}}{\text{Total cost}}$$

II. Turnover Ratio

$$\text{i. Working capital turnover} = \frac{\text{Gross returns}}{\text{Total working capital}}$$

$$\text{ii. Total asset turnover} = \frac{\text{Gross returns}}{\text{Fixed assets}}$$

III. Efficiency Ratio

$$\text{i. Gross ratio (\%)} = \frac{\text{Total expenses}}{\text{Gross income}} \times 100$$

$$\text{ii. Operating ratio (\%)} = \frac{\text{Operating expenses}}{\text{Gross income}} \times 100$$

IV. Solvency ratio

$$\text{i. Total liability to owned funds} = \frac{\text{Total liabilities}}{\text{Owned fund}}$$

$$\text{ii. Fixed asset to owned fund} = \frac{\text{Fixed assets}}{\text{Owned fund}}$$

$$\text{iii. Net capital ratio} = \frac{\text{Total assets}}{\text{Total liabilities}}$$

Break Even Volume Analysis

The formula for calculating BEP in the study as follows.

$$Q = \frac{FC}{P - VC}$$

Where,

Q = Quintals at break-even point (Volume) production.

FC = Total annual fixed cost

P = Price per unit

VC = Variable cost per unit

Financial Feasibility Analysis

i) Net Present Value (NPV)

NPV of the project is estimated using the following equation.

$$NPV = \frac{P_1}{(1+i)^{t}_{1}} + \frac{P_2}{(1+i)^{t}_{2}} \text{ -------- } \text{----+} \frac{P_n}{(1+i)^{t}_{n}} \text{ — } C$$

Where, P_1 = Net cash flow in first year
i = Discount rate, t = Time period
c = Initial cost of the investment

ii) Benefit Cost Ratio (BCR)

The following formula depicts the estimation of B-C ratio.

$$\text{B-C ratio} = \frac{\sum_{t=1}^{n} \frac{B_t}{(1+r)^n}}{\sum_{t=1}^{n} \frac{C_t}{(1+r)^n}}$$

Where,

B_t = Benefit in each year

C_t = Cost in each year

n = Number of year

i = Discount rate

iii) Internal Rate of Return

The aforesaid discount rates are used to calculate IRR by using given below formula

$$\text{IRR} = \text{Lower discount rate} + \text{Difference between} \quad X \quad \left(\frac{\text{Present worth of cash flows at lower discount rate}}{\text{Absolute difference between present worth cash flows stream at the two discount rates}} \right)$$

iv) Payback Period (PBP)

The payback period was calculated by successively reducing the net cash flows from outstanding investments.

$$\text{Pay back period} = \frac{I}{E}$$

v) Profitability Index (PI)

The profitability index (PI) is as fallows.

$$\text{Profitability Index (PI)} = \frac{\text{Net present value of cash flow}}{\text{Original amount invested}}$$

3. Result and Discussion

The Total investment of ₹ 190.64 lakh were needed for establishing modern units and ₹ 78.47 lakh for traditional units (Table 1). Among the traditional *dal* mills, the capital required to establish small, medium and large size redgram processing units were ₹ 66.50, ₹ 78.57 and ₹ 90.35 lakh respectively. The capital investment on machinery and equipment was the major component with ₹ 125.31 lakh (65.75%) followed by building (18.88%), land (14.95%), bore well (0.21%), other fixtures (0.18%) and licence fee (0.05) in modern *dal* mills, the similar type of expenditure was found in Production, processing and marketing of *kokum* studied by Kshirsagar [4]. Whereas, the proportion of investment on machinery and equipment in traditional *dal* mills was ₹ 28.12 lakh (35.84%) followed by building (32.49%), land (30.95%) and other expenses (0.73%).

Among the traditional *dal* mills, the proportions of investment on land were 33.76, 31.97 and 28.51 per cent in small, medium and large *dal* mills respectively. Whereas, proportion of investment on machinery and equipment was higher in large size *dal* mills (₹ 32.56 lakh) compared to medium (₹ 28.45 lakh) and small (₹ 23.35 lakh) size *dal* mills. Similar pattern of investment on bore wells and other fixtures were noticed in both the categories of *dal* mills.

The business ratios were worked out to know the cost efficiencies and profitabilities of different categories of redgram processing units. As indicated in Table-2, the net profit to total asset in modern *dal* mills was 0.82. However, it was found to be 0.67 in case of traditional *dal* mills. The net profit to total sale in the traditional *dal* mills (4.05%) was relatively lower than the modern *dal* mills (7.25%). This clearly indicated that the percentage of net returns realized to total sale by the traditional *dal* mills were considerably low, mainly because of variation in product (*dal*) recovery. In the case of turnover ratio, the working capital turnover ratio in modern *dal* mills was found to be 1.16 which is relatively higher than traditional *dal* mills (1.08). The fixed asset turnover ratio in the case of modern *dal* mills was (11.33) also considerably lower than that of traditional *dal* mills (16.65), due to higher investment on machinery and equipments viz., Buller and Sortex machine in modern dal mills.

The efficiency ratio clearly revealed that more than 92 per cent of the return was consumed by the costs in modern *dal* mills (92.74 %) and was relatively low as compared to traditional *dal* mills (95.44%). There was no much difference in gross as well as operating ratio's in both modern and traditional *dal* mills. Thus, there is need to reduce the cost of processing to increase the income of the *dal* millers. The solvency ratio indicated that the total liability to owned fund and fixed asset to owned fund in modern *dal* mills worked out to be 1.25 and 0.19 respectively, which is marginally high compared to traditional *dal* mills (1.14 and 0.12). Whereas, the net capital ratio in modern *dal* mills (1.45) was relatively high compared to traditional *dal* mills (1.28). The net capital ratio of both the category dal mills was more than one indicating funds of the *dal* mills are safe and economically efficient.

Table 1. Pattern of investment in different categories of redgram processing units

(₹ in lakh)

Sl.No.	Particulars	Modern	Traditional			
			Small	Medium	Large	Over all
1	Land	28.50 (14.95)	22.45 (33.76)	24.65 (31.37)	25.75 (28.51)	24.28 (30.95)
2	Building	36.00 (18.88)	20.25 (30.45)	24.91 (31.70)	31.32 (34.67)	25.49 (32.49)
3	Machinery and equipment					
	a) Machinery	33.22 (17.43)	23.35 (31.11)	28.45 (36.21)	32.56 (36.05)	28.12 (35.84)
	b) Sortex machine	36.00 (18.88)	-	-	-	-
	c) Buller	56.09 (29.42)	-	-	-	-
4	Bore well	0.40 (0.21)	0.23 (8.35)	0.29 (0.37)	0.37 (0.41)	0.30 (0.38)
5	Licence fee	0.09 (0.05)	0.01 (0.02)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
6	Other fixture's	0.34 (0.18)	0.21 (0.32)	0.26 (0.33)	0.32 (0.35)	0.26 (0.34)
	Total	**190.64 (100.00)**	**66.50 (100.00)**	**78.57 (100.00)**	**90.35 (100.00)**	**78.47 (100.00)**

Note: Figures in parentheses indicate percentage to the total

Table 2. Business ratios under different categories of redgram processing unit

Sl.No	Particulars	Modern	Traditional			
			Small	Medium	Large	Over all
1.	**Profitability ratio**					
a)	Net profit to total asset	0.82	0.54	0.44	0.62	0.67
b)	Net profit to total sale (%)	7.25	3.25	3.64	3.87	4.05
c)	Returns on total capital employed	0.07	0.03	0.04	0.05	0.05
d)	Returns per rupee of investment	1.17	1.03	1.06	1.08	1.09
2.	**Turnover ratio**					
a)	Working capital turnover	1.16	1.02	1.05	1.07	1.08
b)	Total asset turnover	11.33	16.67	16.91	16.08	16.65
3.	**Efficiency Ratio**					
a)	Gross ratio (%)	92.74	96.74	96.35	96.12	95.44
b)	Operating ratio (%)	90.44	95.52	94.00	94.47	94.54
4.	**Solvency Ratio**					
a)	Total liability to owned fund	1.25	1.02	1.04	1.17	1.14
b)	Fixed asset to owned fund	0.19	0.11	0.12	0.14	0.12
c)	Net capital ratio	1.45	1.15	1.21	1.25	1.28

3.1 Break Even Volume Analysis

Break even volume (BEP) analysis was used to know the minimum level of production required to recover the total fixed capital employed in redgram processing unit. This concept is important in any business as it indicate minimum amount of business necessary for operating the enterprise in the short run without loss. The Break Even Volume Analysis indicated that (Table-3) the quantity of output required to reach break – even point were 10,863 and 9,136 quintal of output (*dal*) in modern and traditional *dal* mills. However, both modern and traditional *dal* mills have produced more than the break-even volume of output, indicating both modern and traditional *dal* mills were running under profitable zones. Further, the variation in break- even point output of these redgram processing units is because of variation in fixed cost and the quantity of output produced.

Table 3. Break -even point of production under different categories of redgram processing unit

Size of the processing unit	Fixed cost /annum (₹ lakh)	Variable cost / unit of output (₹)	Price /unit of output (₹)	Break-even volume of output (Annual basis)	Total output in quintal (Annual basis)	Margin of safety in quintal
Modern	40.30	4743.48	5112	10863	29665	18802
Small	13.27	4,643.89	4800	8500	17324	8824
Medium	17.65	4685.47	4813	13840	20702	6862
Large	23.30	4702.30	4892	12283	22277	9994
Over all	18.07	4677.22	4875	9136	21101	11965

3.2 Financial Feasibility Analysis

The financial feasibility analysis for redgram processing units was carried out through employing important tools viz., the Net Present Value (NPV), Benefit Cost Ratio (BCR), Internal Rate of Return (IRR), Payback Period (PBP) and profitability Index (PI) (Table-4). The net present value in modern units was (₹ 42.76 lakhs) higher than the traditional units (₹ 11.11 lakhs), mainly due to high returns and more recovery of different grades of *dal*.

The benefit cost ratio worked to be 1.13 in modern *dal* mills and 1.06 in traditional *dal* mills. This implied that for every one rupee invested in modern and traditional *dal* mills, there would be net returns of ₹ 1.13 and ₹ 1.06 in present value terms respectively. Among traditional *dal* mills, ratio was 1.02, 1.05 and 1.06 in small, medium and large *dal* mills. The results on for with the study conducted by Sedaghat [5] with use of same techniques in Economics of pistachio industry in Iran tropics. The magnitude of the ratio also indicated the priority to be assigned for investment in modern units. Since the ratios were greater than unity for both the types of mills, the investment in redgram milling units was financially sound and economically feasible.

The internal rate of returns was very high at 33.22 per cent in modern *dal* mills compared to traditional *dal* mills (16.48%). However, the ratio were 16.15, 16.80 and 17.76 per cent in small, medium and large size *dal* mills respectively. Since the values of internal rate of returns are considerable higher than the prevailing bank rate i.e more than 14.50 per cent would be financially feasible.

The payback period refers to the time required to recover the initial investment in the redgram processing units. The results pertaining to payback period were in line with the estimated values of NPV, B-C ratio and IRR. While the payback period worked out to be 3.45 years for modern *dal* mills and it was 5.65 years for traditional *dal* millsm. Among, traditional *dal* mills the payback period estimated to be 5.34, 5.70 and 5.91 year in small, medium and large size *dal* mills respectively, the similar techniques was used by Shwetha [3] in economics of paddy processing. Thus,

all the criteria of financial feasibility of the project indicated that, irrespective of the type of *dal* mills, investment in redgram milling units was economically feasible and financial sound in the study area.

The general inference of the findings was that, investment in modern *dal* mills was economically more profitable than that of traditional *dal* mills. This is obvious due to the adoption of advanced technology like, improved buller and sortex machine and also large scale of processing.

Table 4. Evaluation of investment in redgram processing unit

Sl. No.	Particulars	Modern	Traditional			
			Small	Medium	Large	Over all
1	Net Present Value (₹ lakh)	42.76	6.44	9.28	12.19	11.11
2	Benefit Cost Ratio	1.13	1.02	1.05	1.06	1.06
3	IRR (%)	33.22	16.15	16.80	17.76	16.48
4	Payback period (Years)	3.45	5.34	5.70	5.91	5.65
5	Profitability Index	2.10	1.04	1.06	1.09	1.11

Note: Discounted @ 14.50 per cent rate of interest

4. Conclusion

Overall the *dal* milling industry in India does need considerable growth and improvement. Easy availability of raw materials, opening up of exports, better packaging and marketing for finished products are some of the needs of the hour. However the most crucial step that needs to be taken is to maximize the use of improved *dal* mills to increase the yield & better output. It will take a conscious effort by all *Dal* milling associations & *Dal* mills across India to implement suggestions that will best work toward the uplifting of the *Dal* milling industry. Considering the importance of redgram processing industries in Indian agriculture the following policies are suggested

- The findings suggested that the traditional *dal* millers should use improved machineries and equipments including *Buller* and *Sortex grading* machines to increase recovery percentage and produce better quality *dal* for attaining larger profit through economics of large scale production.
- There is need to establish *Tur Park* with other basic infrastructure facilities for fuller capacity utilization of *dal* mills especially traditional one. This play important role in the food security of the country and also helps to minimize the import.
- *Dal* milling is a capital intensive industry, the rate of interest charged by the financial institutions were high. Hence, there is need to provide required working capital at a lower rate of interest to promote the growth of *dal* industry.

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