

Economics of Sugar Production of Cooperative Sugar factories in North Eastern Karnataka

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ABSTRACT

Economics of sugar production was measured by considering the three cooperative sugar factories using different parameters like costs and returns from sugar production, sugar sales and revenue, by-products sales and revenue in Bidar district of North-Eastern Karnataka (NEK) region. Thus, the calculated sugar sales, revenue accrued and price of sugar revealed that, the average total sugar sales under both open and levy quota was 3722 metric tonnes, while average revenue of sugar sales under levy quota was ₹ 163 lakh, but the average price of sugar was ₹ 2275 per quintal over the study period. In order to reduce the losses in the factory, an effort towards the integration and coordination of various sections of the factory must be converged so that the factories can run on a profit basis.

Keywords: Economics, cooperative, production, sugarcane, North-Eastern Karnataka

In the early stages of economic development, agro-based industries occupied a prominent position in the industrial sector. As the real national income increases, the relative share in the value added from all manufacturing industries declines (Devaraja, 2011). This should not be considered as declining opportunities for development of these industries. This is because acceleration growth and in per capita income and its more equitable distribution beyond threshold will respectively relax the constraints of availability of primary agricultural commodities as raw materials and demand for product of these industries. This would in turn facilitate the absolute size of their output and value added in real terms to grow over a time (Abdul Kalam, 2010)

In India, sugarcane was grown over an area of 3.82 million hectares with a production of 280.49 million tonnes during 1994-95 and it is increased to 5.37 million hectares with the increased production of 350 million tonnes in 2013-14. Uttar Pradesh ranked first in terms of area under sugarcane with 1.98 million hectares (47.01%) with the production

of 93.10 million tonnes (37.05%), followed by Maharashtra, Tamil Nadu, Karnataka and Andhra Pradesh constitute about 16.01 million hectares with production of 126.30 million tonnes during 2013-14. (www.indiastat.com).

In Karnataka state, sugarcane was grown on 0.34 million hectares with a production of 33.09 million tonnes during 1994-95 increased to 0.43 million hectares with production of 35.73 million tonnes in 2013-14. The major producing districts are Belgaum, Bidar, Bagalkot and Mandya constitute 59.34 and 74.14 per cent of the total area and production, respectively.

Bidar district is one of the major sugarcane and sugar producers of Karnataka state. The district has three cooperative sugar factories. The average crushing of all these sugar factories put together is around 18 lakh tonnes for the past three years (Richard, 2014). The three major cooperative sugar factories of the district are:

1. Bidar Sahakari Sakkare Karkhane, Bidar (BSSK Ltd.) Estd-1970-71

2. Naranja Sahakari Sakkare Karkhane, Bidar (NSSK Ltd.) Estd-2001-02
3. Mahatma Gandhi Sahakari Sakkare Karkhane, Bidar (MGSSK Ltd.) Estd-2003-04

Considering the preceding discussion as a backdrop, the present study analyzes the economics of all the three cooperative sugar factories BSSK, NSSK and MGSSK, Bidar district of Karnataka. The purpose of the study is to examine the economics of sugar production of cooperative sugar factories in north eastern Karnataka.

Data and Methodology

The research was conducted in Bidar district of North-Eastern Karnataka (NEK) region. In NEK region, Bidar is one of the sugarcane producing area wherein sugar factories have been established in cooperative sectors and also *khandsari* in private sector. But in the recent year's *khandsari* have been closed due to their poor performance. Hence, in the present study the economic analysis of basic information of the sugar factory, relating to procurement and processing of cane in sugar factory is taken up.

Analytical tools

The analysis was carried out with tabular analysis and growth rate analysis.

Tabular analysis

The technique of tabular presentation was used to estimate the costs and returns from sugar production, sugar sales and revenue, by-products sales and revenue etc. The percentages and averages were computed and compared to obtain meaningful results.

Compound growth rate analysis

The exponential function of the following type was employed to estimate the growth rates.

$$Y = ab^t \quad \dots(1)$$

Where,

- Y = indicator
- a = constant
- b = regression coefficient (rate of change of Y per unit of time)
- t = years (time)

Annual average compound growth rate in percentage was calculated as follows:

$$r = (b-1)*100 \quad \dots(2)$$

The above said function was employed to estimate the compound growth rates of physical and financial indicators of the BSSK, NSSK and MGSSK cooperative sugar factories as a whole.

RESULTS AND DISCUSSION

Cost and returns from sugar production in MGSSK, NSSK and BSSK Ltd., Bidar

The relevant data relating to cost and returns from sugar production of all the three factories is presented in Table 1. The total cost of sugar production per quintal showed varying trend over the study period. The total cost of production in MGSSK was ₹ 509 per quintal in 2003-04 and ₹ 901 per quintal in 2013-14, the highest cost was seen as ₹ 1000 in 2012-13. The average cost of production per quintal of sugar was ₹ 802. Whereas, in case of NSSK the total cost was ₹ 423 in 2001-02 and the highest cost was ₹ 1418 in 2013-14 with the average cost of ₹ 820. In case of BSSK the total cost was ₹ 237 per quintal in 1993-94 and it increased gradually, with the maximum cost of ₹ 1565 per quintal in 2013-14.

The price of by-product of all the three sugar factories was studied. In MGSSK the price has increased gradually from ₹ 41 per quintal in 2003-04 to ₹ 1288 in 2013-14. The average price of by-product sales was ₹ 505 per quintal. Whereas in case of NSSK the price was ₹ 35 in 2001-02 increased to ₹ 1280 in 2013-14 and the average price realised was ₹ 520 per quintal.

The price of sugar in MGSSK was ₹ 1052 per quintal in 2003-04 and it increased to ₹ 2986 during 2013-14. The average price of sugar was ₹ 2275. In NSSK the price of sugar was ₹ 1246 in 2001-02 and ₹ 2885 in 2013-14 with average price of ₹ 1860. Whereas in case of BSSK the price was seen as ₹ 745 in 1993-94 and ₹ 2980 in 2013-14 with average of ₹ 1535 per quintal over the study period.

The total returns in case of MGSSK increased from ₹ 1093 per quintal in 2003-04 to ₹ 3155 in 2013-14. The average returns of sugar over the study period was ₹ 2543 per quintal. In case of NSSK the total returns increased from ₹ 1282 per quintal in

Table 1: Cost and returns from sugar production in MGSSK, NSSK and BSSK Ltd., Bidar (₹ Per quintal)

| Years | Total costs | | | By-products sales | | | Price of sugar sales | | | Total returns | | |
|-----------------|---------------|------------|------------|-------------------|-------------|-------------|----------------------|---------------|-------------|---------------|-------------|---------------|
| | M | N | B | M | N | B | M | N | B | M | N | B |
| 1993-94 | — | — | 237 | — | — | 21 | — | — | 745 | — | — | 672 |
| 1994-95 | — | — | 272 | — | — | 35 | — | — | 796 | — | — | 650 |
| 1995-96 | — | — | 306 | — | — | 46 | — | — | 800 | — | — | 701 |
| 1996-97 | — | — | 329 | — | — | 51 | — | — | 841 | — | — | 746 |
| 1997-98 | — | — | 337 | — | — | 66 | — | — | 910 | — | — | 800 |
| 1998-99 | — | — | 372 | — | — | 99 | — | — | 987 | — | — | 1200 |
| 1999-00 | — | — | 395 | — | — | 105 | — | — | 1001 | — | — | 940 |
| 2000-01 | — | — | 415 | — | — | 115 | — | — | 1051 | — | — | 980 |
| 2001-02 | — | 423 | 401 | — | 35 | 181 | — | 1246 | 1287 | — | 1282 | 1025 |
| 2002-03 | — | 488 | 472 | — | 56 | 242 | — | 1377 | 1160 | — | 1433 | 1214 |
| 2003-04 | 509 | 565 | 511 | 41 | 64 | 360 | 1052 | 1641 | 1269 | 1093 | 1705 | 1357 |
| 2004-05 | 683 | 683 | 650 | 51 | 107 | 450 | 1123 | 1644 | 1456 | 1435 | 1751 | 1575 |
| 2005-06 | 537 | 611 | 617 | 91 | 191 | 476 | 1588 | 1538 | 1587 | 1694 | 1729 | 1635 |
| 2006-07 | 471 | 706 | 661 | 122 | 352 | 581 | 2135 | 1236 | 1632 | 2544 | 1588 | 1941 |
| 2007-08 | 654 | 792 | 754 | 183 | 448 | 610 | 3654 | 1547 | 2076 | 3960 | 1995 | 2404 |
| 2008-09 | 1206 | 901 | 912 | 323 | 595 | 700 | 3105 | 1624 | 1966 | 3525 | 2219 | 3051 |
| 2009-10 | 867 | 832 | 1087 | 547 | 671 | 750 | 2757 | 2063 | 2094 | 2964 | 2734 | 2963 |
| 2010-11 | 1010 | 965 | 1147 | 865 | 837 | 814 | 1865 | 1976 | 2396 | 2055 | 2813 | 3021 |
| 2011-12 | 985 | 1073 | 1216 | 944 | 982 | 980 | 2199 | 2392 | 2548 | 2564 | 3374 | 3456 |
| 2012-13 | 1000 | 1201 | 1441 | 1095 | 1138 | 1051 | 2564 | 2306 | 2654 | 2985 | 3444 | 4014 |
| 2013-14 | 901 | 1418 | 1565 | 1288 | 1280 | 1190 | 2986 | 2885 | 2980 | 3155 | 4165 | 4561 |
| Average | 802 | 820 | 671 | 505 | 520 | 425 | 2275 | 1860 | 1535 | 2543 | 2326 | 1853 |
| CAGR (%) | 7.5*** | 9.3 | 9.5 | 25.8 | 26.5 | 22.1 | 8.4** | 5.9*** | 7.3 | 8.2** | 9.7 | 10.6** |

Note: Data not available, M=MGSSK, N=NSSK and B=BSSK; *Source:* Sales department, Co-operative sugar factories, Bidar; ***Significant at 1% level, **Significant at 5% level

2001-02 to ₹ 4165 in 2013-14. The average returns of sugar was ₹ 2326. Whereas, in BSSK the total return increased from ₹ 672 per quintal in 2003-04 to ₹ 4561 in 2013-14. The average returns of sugar over the study period was ₹ 1853 per quintal. The CAGR was worked out wherein, total cost (7.5%) and returns (8.2%) were significant at 1 and 5 per cent respectively. Similarly the price of sugar sales was significant at 1 and 5 per cent, in NSSK (5.9%) and MGSSK (8.4%) respectively.

These factors implied that the sugarcane prices, other variable costs and fixed costs have increased both in absolute terms as well as in relation to the total returns compared to other costs during the period under review.

Sugar sales and revenue in MGSSK Ltd., Bidar

Sugar sales, revenue accrued and price of sugar is presented Table 2 and those showed a varying trend over the study period. Sugar sale under open

market increased gradually from 1328 metric tonnes in 2003-04 to 5145 metric tonnes in 2013-14. The average sale under open market was 3423 metric tonnes over the study period. Sugar sale under levy quota was nil up to 2006-07 and it did not show a definite trend. It was 717 metric tonnes in 2007-08, and it increased to 652 metric tonnes in 2008-09 and further decreased to 300 metric tonnes in 2009-10, and showed an increasing trend to 569 metric tonnes during 2012-13. An average sale under levy quota was 299 metric tonnes over the study period.

The total sugar sale which includes both open and levy showed the increasing trend over the study period. It increased from 1328 metric tonnes in 2003-04 to 5617 metric tonnes in 2013-14. The average total sugar sales under both open and levy quota was 3722 metric tonnes. The revenue of sugar sale under open market showed increasing trend. It was ₹ 1139 lakhs in 2003-04, increased to ₹ 13726 lakhs in 2013-14. The average revenue from open market sales was ₹ 6859 lakhs over the period.

Table 2: Sugar sales and revenue of MGSSK Ltd., Bidar

| Years | Sales | | | | Total sugar sales (MT) | Value of open sales (₹ in lakh) | Value of levy sales (₹ in lakh) |
|----------|-----------|-----------|--------------------------|--------------------------|------------------------|---------------------------------|---------------------------------|
| | Open (MT) | Levy (MT) | Percentage of open sales | Percentage of levy sales | | | |
| 2003-04 | 1328 | 0 | 100.0 | 0.0 | 1328 | 1139 | 0 |
| 2004-05 | 1592 | 0 | 100.0 | 0.0 | 1592 | 2100 | 0 |
| 2005-06 | 4762 | 0 | 100.0 | 0.0 | 4762 | 4835 | 0 |
| 2006-07 | 2629 | 0 | 100.0 | 0.0 | 2629 | 4064 | 0 |
| 2007-08 | 2843 | 717 | 79.9 | 20.1 | 3560 | 3605 | 296 |
| 2008-09 | 3147 | 652 | 82.8 | 17.2 | 3799 | 4805 | 315 |
| 2009-10 | 2267 | 300 | 88.3 | 11.7 | 2567 | 6277 | 141 |
| 2010-11 | 4455 | 115 | 97.5 | 02.5 | 4570 | 11868 | 200 |
| 2011-12 | 4517 | 461 | 90.7 | 09.3 | 4978 | 11874 | 250 |
| 2012-13 | 4974 | 569 | 89.7 | 10.3 | 5543 | 11156 | 300 |
| 2013-14 | 5145 | 471 | 91.6 | 08.4 | 5617 | 13726 | 287 |
| Average | 3423 | 299 | 92.8 | 07.2 | 3722 | 6859 | 163 |
| CAGR (%) | 11.5*** | 4.9 | — | — | 12.6** | 14.9 | 5.9 |

Source: Annual reports, MGSSK Ltd., Bidar; ***Significant at 1% level, ** Significant at 5% level

The revenue from sale of sugar under levy quota showed varying trend over the study period. It increased from ₹ 296 lakhs in 2007-08, and decreased to ₹ 141 lakhs in 2009-10 and again it increased to ₹ 300 lakhs during 2012-13. Average revenue of sugar sales under levy quota was ₹ 163 lakhs, over the study period. The CAGR was worked out wherein, open sales (11.5%) and total sugar (12.6%) was significant at 1 and 5 per cent respectively.

Sugar sales and revenue in NSSK Ltd., Bidar

Sugar sales, revenue accrued and price of sugar is presented Table 3 and those showed a varying trend over the study period. Sugar sale under open market increased gradually from 11542 metric tonnes in 2001-02 to 48446 metric tonnes in 2013-14. An average sale under open market was 30772 metric tonnes over the study period. Sugar sale under levy quota was nil up to 2002-03 and it did not show a definite trend. It was 485 metric tonnes in 2003-04 and further decreased to 304 metric tonnes in 2004-05, then it showed an increasing trend to 2129 metric tonnes during 2013-14. An average sale under levy quota was 2458 metric tonne over the study period.

The total sugar sale which includes both open and levy showed the increasing trend over the study period. It increased from 11542 metric tonnes in 2001-02 to 50575 metric tonnes in 2013-14. The

average total sugar sales under both open and levy quota was 33229 metric tonnes. The revenue of sugar sale under open market showed increasing trend. It was ₹ 1124 lakhs in 2001-02 increased to ₹ 12858 lakhs in 2013-14. The average revenue from open market sales was ₹ 6797 lakhs over the period. The revenue from sale of sugar under levy quota showed varying trend over the study period. It was ₹ 59 lakhs in 2003-04 and it decreased to ₹ 31 lakhs in 2004-05 and it again showed the increasing trend to ₹ 1295 lakhs during 2011-12. Average revenue of sugar sales under levy quota was ₹ 404 lakhs, over the study period. The CAGR was worked out wherein, open sales (12.2%) and total sugar sales (13.2%) were significant at 1 per cent and levy sales was significant at 5 per cent respectively.

Sugar sales and revenue in BSSK Ltd., Bidar

Sugar sales, revenue accrued and price of sugar is presented Table 4. Sugar sale under open market increased gradually from 4360 metric tonnes in 1993-94 to 21896 metric tonnes in 2013-14. An average sale under open market was 14608 metric tonnes over the study period. Sugar sale under levy quota was 4996 metric tonnes in 1993-94, and it increased to 9056 metric tonnes in 2000-01 and further decreased to 1075 metric tonnes in 2002-03, it again showed an increasing trend to 2153 metric tonnes during 2011-12. An average sale under levy

Table 3: Sugar sales and revenue of NSSK Ltd., Bidar

| Years | Sales | | | | Total sugar sales (MT) | Value of open sales (₹ in lakh) | Value of levy sales (₹ in lakh) |
|----------|-----------|-----------|--------------------------|--------------------------|------------------------|---------------------------------|---------------------------------|
| | Open (MT) | Levy (MT) | Percentage of open sales | Percentage of levy sales | | | |
| 2001-02 | 11542 | 0 | 100.0 | 00.0 | 11542 | 1124 | 0 |
| 2002-03 | 15077 | 0 | 100.0 | 00.0 | 15077 | 1474 | 0 |
| 2003-04 | 19981 | 485 | 97.6 | 02.4 | 20466 | 5346 | 59 |
| 2004-05 | 14301 | 304 | 97.9 | 02.1 | 14605 | 2041 | 31 |
| 2005-06 | 12660 | 517 | 96.1 | 03.9 | 13177 | 2179 | 97 |
| 2006-07 | 34383 | 4853 | 87.6 | 12.4 | 39236 | 6519 | 527 |
| 2007-08 | 59263 | 1601 | 97.4 | 02.6 | 60864 | 10707 | 207 |
| 2008-09 | 35998 | 3166 | 91.9 | 08.1 | 39164 | 6550 | 409 |
| 2009-10 | 29474 | 5399 | 84.5 | 15.5 | 34872 | 7767 | 955 |
| 2010-11 | 40661 | 3661 | 91.7 | 08.3 | 44322 | 10316 | 533 |
| 2011-12 | 37740 | 5383 | 87.5 | 12.5 | 43122 | 9777 | 1295 |
| 2012-13 | 40507 | 4455 | 90.1 | 09.9 | 44962 | 11697 | 819 |
| 2013-14 | 48446 | 2129 | 95.8 | 04.2 | 50575 | 12858 | 227 |
| Average | 30772 | 2458 | 93.7 | 06.3 | 33229 | 6797 | 404 |
| CAGR (%) | 12.2*** | 24.2** | — | — | 13.2*** | 21.7 | 28.2** |

Source: Annual reports, NSSK Ltd., Bidar; ***Significant at 1% level, ** Significant at 5% level

Table 4: Sugar sales and revenue in BSSK Ltd., Bidar

| Years | Sales | | | | Total sugar sales (MT) | Value of open sales (₹ in lakh) | Value of levy sales (₹ in lakh) |
|----------|-----------|-----------|--------------------------|--------------------------|------------------------|---------------------------------|---------------------------------|
| | Open (MT) | Levy (MT) | Percentage of open sales | Percentage of levy sales | | | |
| 1993-94 | 4360 | 4996 | 46.6 | 53.4 | 9356 | 1043 | 902 |
| 1994-95 | 7014 | 4140 | 62.9 | 37.1 | 11154 | 1640 | 896 |
| 1995-96 | 8819 | 5503 | 61.6 | 38.4 | 14322 | 1959 | 930 |
| 1996-97 | 7382 | 5274 | 58.3 | 41.7 | 12656 | 1754 | 936 |
| 1997-98 | 10241 | 7923 | 56.4 | 43.6 | 18165 | 2768 | 1099 |
| 1998-99 | 11440 | 8707 | 56.8 | 43.2 | 20147 | 3101 | 1059 |
| 1999-00 | 12263 | 8896 | 58.0 | 42.0 | 21159 | 3209 | 1152 |
| 2000-01 | 15714 | 9056 | 63.4 | 36.6 | 24771 | 4186 | 1457 |
| 2001-02 | 17513 | 2133 | 89.1 | 10.9 | 19646 | 4623 | 715 |
| 2002-03 | 15349 | 1075 | 93.5 | 06.5 | 16424 | 5561 | 198 |
| 2003-04 | 18547 | 1166 | 94.1 | 05.9 | 19713 | 8061 | 112 |
| 2004-05 | 15366 | 1544 | 90.9 | 09.1 | 16910 | 6628 | 390 |
| 2005-06 | 18371 | 1652 | 91.8 | 08.2 | 20023 | 7929 | 436 |
| 2006-07 | 21389 | 2199 | 90.7 | 09.3 | 23588 | 8416 | 559 |
| 2007-08 | 18556 | 1031 | 94.7 | 05.3 | 19586 | 7393 | 193 |
| 2008-09 | 18956 | 1267 | 93.7 | 06.3 | 20223 | 8868 | 374 |
| 2009-10 | 13797 | 1965 | 87.5 | 12.5 | 15762 | 7605 | 733 |
| 2010-11 | 13455 | 2267 | 85.6 | 14.4 | 15721 | 7004 | 785 |
| 2011-12 | 18422 | 2153 | 89.5 | 10.5 | 20575 | 10069 | 785 |
| 2012-13 | 17913 | 1962 | 90.1 | 09.9 | 19875 | 9638 | 630 |
| 2013-14 | 21896 | 1573 | 93.3 | 06.7 | 23469 | 13267 | 417 |
| Average | 14608 | 3642 | 78.5 | 21.5 | 18250 | 5939 | 703 |
| CAGR (%) | 5.5 | -7.8*** | — | — | 2.3*** | 11.2 | -4.0** |

Source: Annual reports, BSSK Ltd., Bidar; ***Significant at 1% level, ** Significant at 5% level

quota was 3642 metric tonnes over the study period. The total sugar sale which includes both open and levy showed the increasing trend over the study period. It increased from 9356 metric tonnes in 1993-94 to 23469 metric tonnes in 2013-14. The average total sugar sales under both open and levy quota was 18250 metric tonnes. The revenue of sugar sale under open market showed increasing trend. It was ₹ 1043 lakhs in 1993-94, increased to ₹ 13267 lakhs in 2013-14. The average revenue from open market sales was ₹ 5939 lakhs over the period.

The revenue from sale of sugar under levy quota showed varying trend over the study period. It is increased from ₹ 901 lakhs in 1993-94 and further decreased to ₹ 715 and ₹ 112 lakhs in 2001-02 and 2003-04 respectively, and it showed an increasing trend from 2004-05 with ₹ 390. Average revenue of sugar sales under levy quota was ₹ 703 lakhs over the study period. The CAGR was worked out wherein, levy sales (7.8%) and value of levy sales (4.0%) was negatively significant at 1 and 5 per cent respectively.

CONCLUSION

The performance of all the three sugar factories varied significantly due to difference in ownership, size and location of the factories. In order to utilize its capacity fully and run efficiently, the sugar factories within the industry should get uninterrupted supply of raw sugarcane uniformly throughout the seasons and the government should ensure the supply of raw inputs. There is a need of

coordinated and concerted effort for appreciation and consolidation of the needs of the consumer, farmer, processor and to address to various above issues if India has to attain the glory of self-sufficiency and attain the status of net exporter and an important significant player in the international market.

There is an urgent need to improve in productivity both in terms of yield as well as sugar contents and recovery by adopting better harvesting practices and close coordination of sugar mills with farmers. It has been estimated that, better farming and harvesting practices could result up to 1.0 per cent improvement in extraction which can lead to 10 per cent increase in production. Therefore, mills and farmers to work together to improve yield and extraction through better harvesting in order to become internationally competitive *i.e.*, cost effective and quality producer.

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