FACTORS AFFECTING SUGAR RECOVERY OF BANGLADESH SUGAR INDUSTRY

By

*M. Mahmudul Alam, *G. M. Monirul Alam, *M. A. Samad Miah and **S. M. Khalilur Rahman

*Bangladesh Sugarcane Research Institute, Bangladesh

**Bangladesh Agricultural Research Council, Dhaka, Bangladesh

ABSTRACT

There is a wide variation in sugar recovery per cent between research station and sugar mills of Bangladesh. The sugar mills of Bangladesh obtained around 7.57% of sugar recovery during the 1971-72 to 2005-06 crushing seasons. The industry got higher recovery of 8.40%, and the lowest 6.61% as against higher capacity utilization of 92.79% and 72.70% in the year 1992-93 and 1998-99 respectively. Growth rate analysis indicates that recovery growth was negative (-0.87) during the period where as growth rate of sugarcane cultivation area, sugarcane production, yield per hectare, sugarcane crushing and sugar production were 1.20, 2.90, 1.60, 2.70 and 2.60% respectively. Mean capacity utilization of all the sugar mills was 77.51 per cent and production was 0.16 million ton during the period and the highest sugar production was 0.27 million ton in the year 1994-95 by using capacity of 139.16 per cent. Break-even analysis showed that average 8.91% recovery was required to make the industry viable during aforementioned time. Low per hectare sugarcane and sugar yield, high processing loss, low capacity utilization, post harvest losses and inefficient management are the main causes for low recovery in Bangladesh. Environmental factors were also responsible for low recovery. Sugar recovery rate can be increased through overall proper management, efficient sugarcane cultivation management and ensuring proper technology transfer and extension services towards the farmers

Key words: Capacity utilization, gur, sugar recovery, management, efficiency.

INTRODUCTION

Sugar recovery largely depends on quality sugarcane milling and efficient factory management. High sugar content varieties of sugarcane and post harvest management are the important factors for attaining high recovery of sugar (Alam *et al.*, 2006). At present, 15 sugar mills are in operation under Bangladesh Sugar and Food Industries Corporation (BSFIC) with a capacity of 0.20 million tons of sugar production per year (BSFIC, 2004). Bangladesh Sugarcane Research Institute (BSRI) has evolved several high sugar content varieties viz.; Isd-16, Isd-20, Isd-26, Isd-31, Isd-33, Isd-35, Isd-36, Isd-37 etc. In these varieties 11-12% sugar recovery has found in the laboratory. But wide variation obtained in sugar recovery per cent between laboratory analysis and sugar mills' sugar recovery in Bangladesh. The sugar mills of Bangladesh obtained around 6.5-8.4% of sugar recovery during 1971-72 to 2005-06 crushing seasons. This is due to post harvest losses, delay in crushing, inefficient procurement policy, poor factory performance and diversion of quality sugarcane for jaggery (locally called gur) production. Besides, weather condition of Bangladesh also limiting cultivation of high sugar varieties. Prevailing environmental condition is much congenial for red rot disease infection in Bangladesh. During Pakistan period (1947-1971) recovery was 7.0-9.99% and now sugar recovery is 6.50-8.4%. This slow down of sugar recovery resulted higher production cost, low sugar production and attributes major cause of losses of sugar industry in Bangladesh. Due to the losses of the industry every year the existence of the industry is now questionable. So, proper attention should be given to increase recovery per cent in mills in order to make the industry viable. The finding of the study is expected to help all kind of stakeholders related to sugarcane and sugar industry to make the industry viable.

MATERIALS AND METHOD

All the sugar mills (15) of Bangladesh were selected for the study. Data were generally collected from published sources like annual report/MIS report of Bangladesh Sugar and Food Industries Corporation (BSFIC), Bangladesh Sugarcane Research Institute (BSRI), Directorate of Agricultural Extension (DAE), Bangladesh Bank (BB) and Bangladesh Bureau of Statistics (BBS). Descriptive statistics and time series data used to analyse the data of the study. For growth analysis exponential growth rate model was used. Break-even analysis was also done to calculate break-even recovery percent and production.

RESULTS AND DISCUSSION

Growth rate of recovery

Growth rate of sugar recovery, sugarcane cultivation area, sugarcane production, yield per hectare, sugarcane crushing and sugar production were estimated by using exponential growth rate model for the period of 1971-72 to 2005-06. It is observed that growth rate of sugarcane cultivation area, sugarcane production, yield per hectare, sugarcane crushing and sugar production were -0.87, 1.20, 2.90, 1.60, 2.70 and 2.60% respectively (Table-1). The study shows negative growth rate (-0.87) of sugar recovery during the period.

Factors affecting lower sugar recovery

Per hectare yield of sugarcane in Bangladesh is 48 tons only where as on an average 70 tons/ha in other sugar producing countries. Recovery per cent in Bangladesh is 6.61-8.4% while 8.5-11.0% in other countries viz.; Brazil, Australia, Thailand and Mauritius and even in some provinces of neighbouring country like India and Pakistan are also higher substantially. This low yield and recovery caused mainly for management factors in production level. Process loss is 2.25 to 4.00%, processing cost and manpower per TCD is 1.25 and capacity utilization is low about 77.51% in Bangladesh (Table 2). Time schedule of harvesting are not followed and price of sugarcane is paid on the basis of weight rather than quality. However, quality sugarcane in the mills zone usually diverted for gur production due to higher price of it in the market. Environmental factors like weather of Bangladesh and sunshine period are not favourable for cultivation of high recoverable sugar varieties as Bangladesh lies in the subtropical zone but others high sugar producing countries are located in the temperate zone. Government policies like investment, taxes and VAT, sugarcane development, sugar and sugarcane price are not helpful to the development of the sugar industries in Bangladesh.

Although BSRI evolved high recovery (11-12%) varieties but in the mills it stands at 6.51-8.4% and last few years it is almost near to 7%. Sugar recovery rate can be increased through overall proper management, efficient sugarcane cultivation management and ensuring proper technology transfer and extension services towards the farmers. In present context, minimum 9% recovery is required to make the industry profitable in Bangladesh.

Recovery and management factors

Sugar mills were under private management before liberation in 1971. The crushing seasons from 1957-58 to 1969-70 were considered to measure the efficiency between private and public management. It is observed that private management was more efficient than public management in respect of capacity utilization, sugar production and recovery rate. During 1957-58 to 1969-70, it was observed that private sugar industries mean annual production of sugar was 0.28 lake tons as against installed capacity of 0.30 lake tons and utilization capacity was 91.01% while public sugar industries mean annual production of sugar was 0.45 tons as against installed capacity of 0.74 tons and utilization capacity was 55.77%. But during private sector period 8.01% recovery was achieved while public sector period achieved 7.45% of sugar recovery. It indicates that public sector is less efficient than private sector (Table-3). So, management factor is an important aspect for attaining higher recovery.

Comparison of sugar recovery per cent between Bangladesh and Indian state

During 1988-89 to 2003-04, mean sugar recovery of Bangladesh was 7.72%, while in West Bengal and Nagaland of India it were 7.38 and 7.59% respectively, which was lower than Bangladesh. But, in Assam, Bihar and Moharastra it were 8.04, 9.07 and 11.14% respectively, which was higher than Bangladesh (Table-5). This indicates that due to the same environmental factors recovery per cent of Bangladesh sugar industries was closer to the boarder state of India West Bengal and Nagaland. But Moharastra, Bihar are far from Bangladesh and environmental conditions are different hence their recovery per cent were substantially higher than Bangladesh.

Break-even analysis

Break-even is the point at which sale price is equal to production cost and there is no loss no profit situation (Total revenue = Total cost). Break-even point of sale price, recovery and sugar production of 16 crushing season (1990-91 to 2005-06) were estimated. Table 4 shows that in most of the year sale price of sugar was less than cost of production that incurred loss to industries. Break-even for sale price represents price that makes no loss no profit situation with a given recovery and production. Similarly break-even recovery represents recovery rate that makes no loss no profit situation with given sale price and production and break-even production represents production level which makes no loss no profit situation with a given sale price and recovery rate.

It is observed that in the most crushing seasons recovery was more than 8.0%. But in the season 1999-00, 2000-01 and 2003-04 break-even recovery were 10.37, 11.79 and 10.12% respectively. This means that the sugar industry did not gain profit until the recovery rate rose to 10.37, 11.79 and 10.12% in those crushing seasons respectively. Break-even analysis showed that average 8.91% recovery was required to make the industry viable during aforementioned time.

Strategies for attaining higher sugar recovery

Increase per hectare sugar yield

In Bangladesh per hectare yield of sugarcane is low (about 48 ton/hectare in the mills zone) compared to other countries so per hectare yield will be increased. High sugar contains varieties so far evolved by Bangladesh Sugarcane Research Institute could be cultivated at farm level with recommended input use. Many farmers cultivate traditional varieties in the mills zone and those cultivate high yielding sugarcane varieties; usually do not take proper nursing and do not use recommended input which resulted low sugar yield. Besides, sugarcane is now gradually being pushed to low-lying marginal lands prone to waterlogging, flooding, drought and salinity stresses due to increase demand of cereals, vegetables and high value crops. However, Bangladesh is expecting to increase its sugarcane yield from 46 to 60 ton/hectare within 2010 by using BSRI package of technologies through proper demonstration and technology transfer towards farmer. Although, there are limitations of cultivating high yielding, high sugar varieties due to environmental factors hope to increase yield through proper management practices. In fact, ideal agricultural region for high sugar recovery is temperate zone but Bangladesh falls in sub-tropical zone.

Reduce processing loss

Processing loss is high in Bangladesh about 2.50-4.00 per cent. Through efficient factory management, processing loss can be reduced to 1.00-1.50 per cent like other countries. If it is possible recovery percent will be increased at expected level. Many steps have been taken to reduce processing loss that will help to increase recovery percent in future.

Minimize post harvest loss

In Bangladesh post harvest losses is also high. At times, due to lack of proper management sugarcane crushed in the mills after 48 h of harvest which usually reduces sugar recovery per cent.

Harvesting of sugarcane is done without considering maturity of sugarcane and without maintaining schedule. Price of sugarcane is given on the basis of weight rather quality. Through effective management, maturity based harvesting, scheduling and minimizing of time lag in between sugar industry and sugarcane crushing in the mills; sugar recovery can be increased.

Capacity utilization

Low sugar recovery also caused for low capacity utilization of the sugar industries in Bangladesh. For attaining high sugar recovery full capacity utilization is required. For full capacity utilization the supply of sugarcane the main raw materials of sugar industries would be ensured. Supply of sugarcane to the mills is subjected to area under sugarcane cultivation and price of sugarcane given to the farmers for sugar production in comparison to gur and juice production. As for many reasons we are not able to increase our present sugarcane land so to increase sugarcane supply to mills yield per hectare will be increased and incentive price should be paid to the farmers so that they supply sugarcane to the mills. As price of sugarcane is high in the market than government price farmers diverted quality sugarcane for juice and gur purposes that also a cause for low sugar recovery.

Table-1 Recovery growth trend of sugar industries in Bangladesh (1971-72 to 2005-06)

Crushing Season	Total Sugarcane Cultivation (ha.)	Total Production (ton)	Sugarcane Yield (Ton/ha.)	Total Sugar Production (ton)	Capacity Utilization (%)	Recovery (%)
1971-81	65932	2149361	32.07	101356	60.93	7.49
1981-91	91098	3814229	41.95	160575	86.02	8.09
1991-92	95501	4491122	47.03	195587	98.16	8.18
1992-93	87966	4246613	48.28	187483	92.79	8.40
1993-94	92250	4576394	49.61	221547	108.05	8.21
1994-95	99004	5030449	50.81	270196	136.16	7.76
1995-96	95942	4340890	45.25	183934	93.63	7.71
1996-97	86575	4097854	47.33	135320	64.30	7.67
1998-98	88130	4191153	47.56	166457	79.10	7.84
1998-99	94352	4123740	43.71	152979	72.70	6.61
1999-00	86397	3526498	40.82	123498	58.69	7.66
2000-01	74873	3361867	44.90	98355	46.74	7.18
2001-02	88274	4475990	50.71	204329	97.10	7.27
2002-03	105417	4595268	43.59	177398	84.30	6.73
2003-04	84866	3948244	46.52	119146	56.62	7.26
2004-05	78177	3516972	44.99	106645	50.68	7.53
2005-06	75426	3458042	45.84	133283	63.34	7.19
Growth Rate (%)	1.20	2.90	1.60	2.70	2.60	-0.87

Source: BSFIC Annual Reports (1971-72 to 2005-06) and BBS (2005)

Table-2 Factors affecting sugar recovery of sugar industries in Bangladesh

Factors	Bangladesh	Other Countries
A. Management Factors		
a) Per hectare yield (MT)	48.00	70.00+
b) Recovery (%)	6.61 - 8.40	8.50 - 11.00
c) Processing Loss (%)	2.25 - 4.00	1.50 - 2.00
d) Fertilization	Not follow	Recommended doze
e) Quality Cane Diversion for Gur	70% sugarcane use for gur	100% Sugarcane are used for sugar
f) Capacity Utilization	77.51%	100%+
g) Factory Performance	Inefficient	Moderate
h) Low TCD Plant	1000-1500	25000-above
B. Environmental Factors		
a) Weather	Limitation for high sugar	Suitable for high sugar variety
b) Sunshine	6 Hrs.	8-12 Hrs.
c) Precipitation	Uneven rainfall	Evenly distributed rainfall throughout

Source: BSFIC Annual Report (2004) and USDA (2004)

Table-3 Management gap between private and public industries.

Year	Installed Capacity (ton)		Production (ton)		Capacity Utilization (%)		Recovery (%)	
	Private	Public	Private	Public	Private	Public	Private	Public
1957-58	39000	15000	31917	797	81.84	5.31	9.06	5.72
1958-59	39000	40000	43908	10792	112.58	26.98	8.61	7.17
1959-60	39000	40000	39253	22307	100.64	55.77	7.87	7.84
1960-61	39000	40000	33579	20537	86.10	51.34	8.64	8.55
1961-62	39000	40000	37731	28914	96.75	72.28	8.37	8.52
1962-63	39000	60000	39968	32618	102.48	54.36	8.18	8.04
1963-64	39000	60000	43125	44605	110.58	74.34	8.04	7.77
1964-65	39000	60000	37607	36541	96.43	60.90	7.56	7.04
1965-66	17000	112000	16625	67864	97.79	60.58	8.17	7.71
1966-67	17000	112000	16510	96456	97.12	86.12	7.74	7.54
1967-68	17000	122000	15288	94701	89.93	77.62	7.67	7.62
1968-69	17000	122000	5716	52334	33.62	42.90	7.04	6.64
1969-70	17000	142000	13142	80255	77.31	56.52	7.25	6.70
Mean	30538	74230	28798	45286	91.01	55.77	8.01	7.45

Source: Australian Sugar Industry Mission Report (1976)

Table-4 Break-even analysis of sugar industries (1988-89 to 2005-06)

Year	Sugar production (ton)	Recovery (%)	Sugar production Cost (Tk./kg)	Sale price (Tk./kg)	Break-even point		
					Sale price (Tk./kg	Recovery (%)	Production (ton)
1990-91	246493	7.93	26.48	27.18	26.48	7.49	240145
1991-92	195587	8.18	28.59	25.00	28.59	9.35	223673
1992-93	187483	8.40	28.86	25.10	28.86	9.66	215568
1993-94	221547	8.21	27.74	26.50	27.74	8.59	231914
1994-95	270196	7.76	26.77	27.00	26.77	7.69	267894
1995-96	183934	7.71	30.41	27.00	30.41	8.68	207164
1996-97	135320	7.67	33.79	27.00	33.79	9.60	169350
1997-98	166457	7.84	31.65	27.47	31.65	9.03	191786
1998-99	152979	6.61	36.57	27.47	36.57	8.80	203656
1999-00	123498	7.66	37.19	27.47	37.19	10.37	167197
2000-01	98355	7.18	45.09	27.47	45.09	11.79	161443
2001-02	204329	7.27	34.29	27.47	34.29	9.07	255058
2002-03	177398	6.73	32.92	26.50	32.92	8.36	220375
2003-04	119146	7.26	37.65	27.00	37.65	10.12	166142
2004-05	106645	7.53	35.32	32.00	35.32	8.31	117709
2005-06	133283	7.19	32.50	42.00	32.50	5.56	103136

Source: BSFIC Annual Reports (1971-72 to 2005-06) and BBS (2005)

Table-5: Mean recovery per cent of sugar of Bangladesh and comparable to Indian state

Year	Bangladesh	India				
		West Bengal	Assam	Nagaland	Bihar	Moharastra
1988-1989	8.27	6.83	7.93	7.61	9.16	11.04
1989-1990	8.77	4.17	8.10	8.30	8.99	10.71
1990-1991	7.93	7.62	8.35	7.80	9.07	10.76
1991-1992	8.18	7.44	8.41	8.37	8.72	11.19
1992-1993	8.40	7.98	8.40	7.90	9.37	11.32
1993-1994	8.21	7.29	6.99	6.65	9.19	11.12
1994-1995	7.76	7.40	8.12	7.22	9.10	10.92
1995-1996	7.71	6.04	8.15	6.87	8.81	10.48
1996-1997	7.67	7.97	8.36	-	9.23	11.11
1997-1998	7.84	8.35	7.95	-	9.49	11.13
1998-1999	6.61	7.14	7.79	-	8.54	11.16
1999-2000	7.66	7.48	8.25	-	9.20	11.39
2000-2001	7.18	7.10	7.75	-	9.11	11.64
2001-2002	7.27	8.32	-	-	8.78	11.64
2002-2003	6.73	8.44	-	-	9.00	11.65
2003-2004	7.26	8.45	-	-	9.33	10.93
Mean	7.72	7.38	8.04	7.59	9.07	11.14

Source: Indian Sugar (2005)

REFERENCES

1. Alam, M.M., M.I Haque, and G.M.M. Alam. 2006. Economics of sugar industries performance in Bangladesh, Bangladesh J. Sugarcane., Vol, 24-27.
2. Anonymous. 2005. Indian Sugar, Complete Sugar Journal, Vol. LIV, New Delhi, India.
3. ASIM, 1976. Development of the Bangladesh Sugar Industry, Australian Sugar Industry Mission Report, Canberra, A.C.T., Australia.
4. BBS. 2005. Bangladesh Economic Survey, Bangladesh Bureau of Statistics, Finance Division, Ministry of Finance, Dhaka, Bangladesh.
5. BB. 2005. Economic Trends, Bangladesh Bank Statistical Department, Bangladesh Bank, Dhaka, Bangladesh.
6. BSFIC. 2006. Annual Report 1972-2006. Bangladesh Sugar and Food Industries Corporation, 115-120, Motijhill C/A, Dhaka-1000, Bangladesh.
7. KA. 1996. Bench Mark Survey on Sugarcane, Kranti Associates, Dhaka, Bangladesh.
8. USDA. 2004. Sugar: World Markets and Trade, USA.