

<http://www.pjbs.org>

PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSI*net*

Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Growth and Instability of Frozen Food, Shrimp and Fish Export from Bangladesh

¹M.A. Awal, ²M.E. Haque and ²M.F. Imam

¹Department of Agricultural Economics, RARS, BARI, Rahmatupur, Barisal

²Department of Agricultural Statistics, BAU, Mymensingh-2202, Bangladesh

Abstract: The study estimates the growth rates of frozen food, shrimp and fish export and instability of export earnings. The study evaluates the export marketing of frozen food, shrimp and fish by using time series aggregated data from the year of 1972-73 to 2003-04. The growths of frozen food were 57, 14 and 9% during period I, II and III, respectively. The export growth rate of shrimp was 54% in period I and 14 and 10% in the period II and III, respectively. The overall estimated shrimp export growth was 22%. The growth rates of fish export earning during period I, II and III were 6, 26 and 7%, respectively. The negative fluctuations in frozen food were more deep during 1974-75 (-67%), 1977-78 (19%) and 1980-81 (14%). The large positive deviations were observed during 2002-03 (52%), 1973-74 (28%) and 1978-79 (13%). The negative fluctuation of shrimp export earnings more deep during 1974-75 (-65%), 1977-78 (-20%) and 2001-02 (-14%) and positive deviations were in 2002-03 (53%), 1973-74 (25), 1976-77 and 2000-01 (15%) and 1978-79 (13%). The positive fluctuations of fish export earnings were in 1973-74 (64%), 1985-86 (61%) and 1975-76 (54%) and negative fluctuations in the year 1976-77 (-85%), 1984-85 (-46%) and 2001-02 (-27%). The contribution of shrimp sector to our total export earnings was 5% in 2003-04 and insignificant share of only 0.84% in the year 1972-73. It was revealed that the present circumstances of this sector demands different institutional supports desperately from different angles to enhance the marketing activities and to strengthen the competitive position in the international market with a view to ensuring more contribution to our economy from the aforementioned.

Key words: Growth, instability, fluctuation, export

INTRODUCTION

Agriculture plays a crucial role in generating foreign exchange through increased agriculture export. Primary products and agricultural commodities are the major sources of foreign exchange for developing countries like Bangladesh. The trade experience of developing countries reveals that there has been a steady decline in their share of the world agriculture export. However, the reasons for such a decline can not be attributed to the trade policies of the developed countries alone, but also to their own policies. The policies of over-valued exchange rates, low producer prices, export taxation, excess industry protection and incentive for import substitution are mainly responsible for poor agricultural performance and retarded exports in most of the less Developed Countries (LDCs) (MacBean, 1989). Bangladesh, which has dominantly an agrarian economy, is no exception in this regard. In Bangladesh fisheries, an important sector of economy in Bangladesh, received due recognition only recently because of increasing role in nutrition, income, employment foreign exchange earning. More over main concern is that where the frozen food and shrimp is viable to go on or not due to its adverse effects on soil, local agricultural fields, local

atmosphere, sea level rise and conventional practices of the country. Economic development is often promoted by foreign trade with the help of exports. The export sector plays an imperative role in determining the rate and structural pattern of development of any country (Matin, 1992). Bangladesh with an agro-based economy is hardly trying to increase her export earnings for improving the balance of payment position in addition to its overall economic condition since eighties with a supportive export policy. But still the number of exportable items is not very significant (Sarker *et al.*, 1995) Shrimp, an agricultural product, can be recognized as a considerable one in our economy for its remarkable contribution in soaring the foreign exchange earnings and occupies the 4th import position among the export items from Bangladesh. The export earnings from shrimp increased to Taka 21394.60 million in 2003-04 from Taka 22.6 million in the year 1972-73 and its contribution to total export 4.77% from 0.84% in the same period. But still the performance and earnings from exporting shrimp are not expected level which should have been attained. Hossain *et al.* (1999) have been predicted that if Bangladesh is able to convert 25% of her existing shrimp cultivable land into semi-intensive farming, foreign exchange earnings by exporting shrimps would be

Tk 50000 million annually. Export sector appears to have a bright future both in employment opportunity and foreign exchange earnings in the years to come if necessary policies are taken for and appropriate supports are provided with the producer and exporters. Approximately 1.4 million people depends on fisheries as their primary sources of income and another 11 million people are engaged in seasonal or part time fishing and other ancillary activities and out of a total employment of 28 million in Bangladesh, approximately 7% is in fisheries (Nuruzaman, 1995). Shrimp production in Bangladesh is increasing gradually through horizontal expansion of the farming area not by the desired vertical expansion (Bhattacharjee and Bhuiyan, 1995). But shrimp farming need not require a heavy investment though it bears a bright and prospective future in the years to come. There exists a high potential of employment prospect and earning from exporting shrimp can be increased several times if only the existing problems relating to its production and marketing activities can be identified appropriately and essential procedures can be taken timely. While several studies have been done earlier to emphasize the prospects of shrimp cultivation and to show the socio-economic consequences of the same. But the study on the area of growth and exporting marketing performance of shrimp is very scant. So keeping in view the aforesaid facts, the present study was undertaken with the following main objectives as:

- To estimate export growth and instability of frozen food, shrimp and fish
- To estimate the contribution of frozen food shrimp to the total export earnings:

MATERIALS AND METHODS

To achieve the stipulated objectives, the present study has been carried out on the basis of shrimp export time series data from Bangladesh pertaining the period 1992-73 to 2003-04, which were collected from secondary sources (EPB, 2004). This is the only government level institute responsible for collecting and storing necessary data required for future export planning and development of the country. Both tabular and functional techniques were applied for the analysis and interpretation of data. To calculate growth rates of total export, frozen food export, shrimp export and fish export, the time period had been divided into different phase as :

- Period I (1972-73-82-83)
- Period II (1982-83-1992-93)

- Period III (1992-93-2003-04)
- Overall period IV (1992-93-2003-04)

To estimate the growth rates of total export, frozen food export, shrimp export and fish export the following model is used:

$$Y_t = Y_0(1+r)^t$$

$$\text{or } \ln Y_t = \ln Y_0 + t \ln(1+r)$$

$$\text{or } \ln Y_t = \beta_1 + \beta_2 t$$

Where,

$$\beta_1 = \ln Y_0$$

$$\beta_2 = \ln(1+r)$$

- Y_t = Total export /frozen food export/shrimp export/fish export earnings in year t
 Y_0 = Initial total export /frozen food export/shrimp export/fish export price and
 r = Compound growth rate = $(e^{\beta_2} - 1)$ and also t-test statistic is used for testing the significance of the estimates of the parameters.

Measures of instability in export: The measure of instability in time series data requires an explicit assumption of what constitute the acceptable and unacceptable components. A systematic component which can be predicted does not constitute instability and hence, it should be eliminated from data. The remaining unpredictable component represents the instability. Two methods, viz., moving average and trend fitting have been used in the literature to capture the predictable component. Here the preference is for three-year moving average since this form may more adequately keep in touch with influences on trend earnings, such as changing comparative advantage and policy changes. The estimate of the magnitude of instability in the time series data on exports has been attempted by computing the coefficient of variation (CV) and the percentage deviation from three-years moving average for each year.

$$CV = \frac{\sigma}{\bar{x}} \times 100$$

where,

$$\sigma = \sqrt{\left(\frac{\sum x_i^2}{N} - \left(\frac{\sum x_i}{N} \right)^2 \right)}$$

σ = Standard deviation, \bar{x}_t = Period mean of x_t
 N = Number of years in the period

$$\text{Percentage deviation} = \frac{x_t - \bar{x}}{\bar{x}} \times 100$$

X_t = observed value
 X_t^* = three years moving average

RESULTS AND DISCUSSION

Export growth in different phases: The annual compound growth of total export, frozen food export, shrimp export and fish export from Bangladesh was depicted in Table 1. The data revealed that the growth rate of frozen food account for 56.66% of export during period I was significantly higher as compared to their period II and period III and had decrease significantly at the rate of 13.50, 9.44%, respectively. Thus, it becomes necessary for policy makers to adopt further promotional activities for enhancing the frozen food exporting. The perusal of data indicated that the export growth rate of shrimp 54.43% in period I and it was significantly decreased 14.41 and 9.81% in the period of II and III, respectively. The overall shrimp export growth was 22.25%. Similarly export growth rate of fish during the period II (26.45%) was significantly higher as compared to their period I (6.36%) and III (7.32%). The total export growth was 17.77%. In the phase I the growth rate was 16.12% and statistically not significant. Shrimp account for roughly 25% of the total export during 2003-04. As these shrimp are high food value and are demanded not only at the national level but also globally, their growth trend (22.25%) was better than frozen food (20.64%) and fish (15.98%) for overall period consideration, which indicating that government has to think on present marketing strategy is to be redesigned in order to increase the market share of frozen food, shrimp and fish export to the world market.

Export instability: The percentage deviation from three-year moving averages, mean positive and negative deviations and coefficient of variation in export earning from frozen food, shrimp and fish are presented in Table 2. Table 2 reveals the year to year fluctuations in export earning from frozen food, shrimp and fish in terms of percent change from three year moving average. For the total time series, a very high coefficient of variation was found for frozen food, shrimp and fish export earnings as during the initial year of the time series i.e., in 1972-73 merely Tk 23.814 million of frozen food, Tk 22.649 million of shrimp and Tk 10.999 million of fish were exported which during the terminal year of the series (2003-04) increased Tk 2309.290 million of frozen food, Tk 2134.612 million shrimp and Tk 376.340 million fish export earnings, respectively. However, during the period the Frozen food export earning was observed to be relatively stable (CV being 134.51%) compared to the shrimp exporting earning (CV being 135.198%) and

Table 1: Compound growth rate of total export, frozen food export, shrimp export and fish export from Bangladesh from the period 1972-73- to 2003-04

Varibale	Period I (1972/73 to 82/83)	Period II (1982/83- 1992/93)	Period III (1992/93- 2003/04)	Overall period IV (1972/73- 2003/04)
Frozen food	56.66**	13.50**	9.44**	20.64**
SE	0.052	0.018	0.012	0.016
t	(8.57)	(6.98)	(7.07)	(11.198)
Shrimp	54.43**	14.41**	9.81**	22.25**
SE	0.050	0.014	0.011	0.012
t	(8.53)	(9.00)	(8.07)	(15.90)
Fish	6.36	26.456**	7.32	15.98**
SE	0.118	0.047	0.048	0.015
t	(0.518)	(4.980)	(1.453)	(9.832)
Total export	16.112	17.81**	5.58	17.77**
SE	0.080	0.006	0.054	0.011
t	(1.84)	(26.61)	(1.004)	(14.33)

** * Denote estimated co-efficient significant at 1 and 5% level of significance

Table 2: Instability in frozen food shrimps and fish export

Year	Change from 3 years moving average (%)		
	Frozen food export earning	Shrimp export earning	Fish export earning
1973-74	28.49	25.29	64.47
1974-75	-66.96	-64.66	-33.58
1975-76	6.48	4.82	54.11
1976-77	10.57	14.63	-84.64
1977-78	-18.67	-19.71	-36.78
1978-79	12.92	8.98	-8.89
1979-80	-1.62	4.11	35.08
1980-81	-14.25	-16.87	-2.95
1981-82	-6.82	-8.13	-18.20
1982-83	9.57	13.62	-19.49
1983-84	-2.78	-7.60	17.48
1984-85	-10.11	-4.15	-45.76
1985-86	4.08	-0.31	61.04
1986-87	4.05	5.45	-25.60
1987-88	0.59	-0.13	-9.82
1988-89	1.04	-0.98	-0.69
1989-90	-3.30	-0.37	19.29
1990-91	3.58	2.45	-1.65
1991-92	-9.05	-9.51	-18.81
1992-93	-2.58	-1.91	-17.65
1993-94	-7.03	-3.04	45.02
1994-95	9.85	6.70	-12.24
1995-96	-0.65	-0.65	-27.35
1996-97	2.89	2.58	-0.91
1997-98	-0.38	0.33	-2.30
1998-99	-9.68	-11.93	20.00
1999-2000	3.42	3.93	-10.08
2000-01	11.54	14.29	15.57
2001-02	-12.03	-14.04	-27.37
2002-03	51.92	52.60	-3.91
Mean positive Deviation (%)	10.58	11.41	36.90
Mean negative deviation (%)	-11.06	-10.25	-19.46
Mean of absolute value	10.90	10.79	24.69
CV(%)	134.51	135.19	85.15

earnings from (CV being 85.15%) the fish export. It is expected as over a long period of about 32 year lots of institutional and technologies change must have taken place which should have influenced the market situation of frozen food, shrimp and fish export policies.

The negative fluctuations in frozen food were more deep during 1974-75 (-66.96%), 1977-78 (18.67%) and 1980-81(14.25%). The large positive deviations were observed during 2002-2003 (51.92%), 1973-74 (28.49%) and 1978-79(12.92%). Deviation around minus 12% point was seen in 2001-2002 and around plus 12% point was recorded during 1978-79 (12.92%) and 2000-01 (11.54%). In other year the deviations were either small or moderate. In case of shrimp export earnings the negative fluctuation more deep during 1974-75 (-64.66%), 1977-78 (-19.71%) and 2001-2002(-14.04%), respectively. The large positive deviations were observed during 2002-2003 (52.60%), 1973-74 (25.29%), 1976-77 and 2000-01 (14.63%) and 1978-79 (12.92%). Fluctuations around minus 12% point were observed during 1998-99 where as around plus 12% point it was nil. In the other years deviations were either small or moderate. Again, the case of fish earnings the large positive fluctuations were observed during 1973-74 (64.47%), 1985-86 (%61.04%), 1975-76 (54.11%). The negative fluctuations in fish export earnings were more deep in the year 1976-77 (-84.64%), 1984-85 (-45.76%) and 2001-2002 (%-27.37%). Fluctuations around minus 12% point were observed during 1994-95 where as around plus 12% point it was nil. The positive and negative fluctuations in export earnings in frozen food and shrimp has more or less similar trend over the year. If a comparison is made between and mean negative and positive deviations of frozen food, shrimp and fish, it is seen that mean negative deviations is more deep in export earning fish (-19.46%) as compared to frozen food (-11.06%) and shrimp (-10.25%), respectively. The mean positive deviation is large in export earning of fish (36.90%) as compared to export earning frozen food (10.58%) and shrimp (11.41%), respectively. In the absence of decomposition analysis the causes of instability in export earnings may not be identified. However, the plausible explanation for the large fluctuations during 1974-75, 1976-77 and 1977-78 may be famine of Bangladesh, political changes and changes of exchange rate of Taka. It was observed that the in the post of 1977-78 period, leveling 2003-04, the fluctuations of frozen food, shrimp export and fish export were of small magnitude indicating thereby some sort of stabilization.

Export earning from frozen food: Bangladesh has achieved a remarkable progress in export marketing of frozen food. It occupies the 4th position in the list of exportable items in terms of their total export earning. The contribution of frozen food to Bangladesh total earnings increased to 92.98% in the year 2003-04 and the significant share of 95.11% in the year 1972-73 (Table 3).

The frozen food constitutes shrimp and fish. It is revealed that exporting earning from the frozen food items was increased to Taka 23009.20 million 2003-04 which was

Table 3: Export earnings ('000 taka) from frozen food (1972-73 to 2003-04)

Year	Total frozen food earning	Shrimp export earning	Contribution of shrimps on total frozen food
1972	23814	22649	95.11
1973	35755	33318	93.18
1974	23906	23808	99.59
1975	157428	145019	92.12
1976	262205	246203	93.90
1977	291724	253082	86.75
1978	522245	446438	86.48
1979	573402	529341	92.32
1980	652972	549544	84.16
1981	1058330	904396	85.46
1982	1696161	1499366	88.40
1983	1889239	1555009	82.31
1984	2244941	1994500	88.84
1985	3358734	2693147	80.18
1986	4077233	3417564	83.83
1987	4319407	3611730	83.62
1988	4484509	3820474	85.19
1989	4510830	4143130	91.85
1990	4999784	4512229	90.25
1991	4969142	4557332	91.71
1992	6423459	6040325	94.04
1993	8389092	7877254	93.90
1994	12259287	10456729	85.30
1995	12830096	11063900	86.23
1996	13656500	11889060	87.05
1997	13331321	11814757	88.62
1998	13161647	11622063	88.30
1999	17225293	16153895	93.78
2000	19577950	18851526	96.28
2001	15851480	14477614	91.33
2002	18632770	17198823	92.30
2003	23009290	21394612	92.98

only Taka 2.38 million in the year 1972-73. In the total exporting earning frozen food, the major portion is constitute by shrimp and the percentage of which and ranges from 80.18 to 99.59% in different years. Earnings from frozen food contribute 5.15% to our total export earnings in the fiscal year 2003-04 and the contribution of shrimp to the export earning from frozen food is about 92.39% in the same year.

Contribution of shrimp to the total export: Contribution of frozen food to the total exports earnings accelerative. The share of shrimp sector to the total export earnings was 0.84% during 1972-73 and it was stood at 4.77% in the year 2003-04 (Table 4).

So the contribution of this sector, occupying an important position in our total exports marketing, definitely helps to meet our need of foreign currency in addition to make certain our economic development. Bangladesh earned Taka 21394.60 million constituting 92.98% to the earning from frozen in the year 2003-04 by exporting shrimp. The export earnings from shrimp and its contribution on the total export are presented in Table 4. The above table indicated that growth rate of the export earnings from this sector fluctuated to a greater

Table 4: Export earnings from shrimp and its contribution to total export

Year	Total export	Shrimp export earnings	Contribution shrimp to total export	Increase than previous year (%)
1972	2710682	22649	0.84	-
1973	2974091	33318	1.12	47.10
1974	3061399	23808	0.77	-28.54
1975	5516760	145019	2.62	509.11
1976	6255015	246203	3.93	69.77
1977	7406115	253082	3.41	2.79
1978	9282240	446438	4.80	76.40
1979	11241639	529341	4.70	18.56
1980	11598974	549544	4.73	3.81
1981	12555375	904396	7.20	64.57
1982	16162463	1499366	9.27	65.78
1983	19901902	1555009	7.81	3.71
1984	24154920	1994500	8.25	28.26
1985	24314015	2693147	11.07	35.02
1986	32631987	3417564	10.47	26.89
1987	38081059	3611730	9.48	5.68
1988	40968398	3820474	9.32	5.77
1989	49764210	4143130	8.32	8.44
1990	60560881	4512229	7.45	8.90
1991	75908566	4557332	6.00	0.99
1992	92575400	6040325	6.52	32.54
1993	100975943	7877254	7.80	30.41
1994	139284577	10456729	7.50	32.74
1995	158790869	11063900	6.96	5.80
1996	188130420	11889060	6.31	7.45
1997	234163750	11814757	5.04	-0.62
1998	254911020	11622063	4.55	-1.63
1999	288188160	16153895	5.60	38.99
2000	348587430	18851526	5.40	16.69
2001	343661450	14477614	4.21	-23.20
2002	379154490	17198823	4.53	18.79
2003	448272220	21394612	4.77	24.39

extent over time. The share of shrimp (i.e., percentage) to total export earnings were upward from 1972-73 to 1985-86 and it started falling from the succeeding 1986-87 to 2003-04. The trend is in the same direction till now, through the amount is increasing.

In Bangladesh the improvement and exploitation of the potential of frozen food, shrimp and fish export manufacturing has been slow. So there are very profound demands for frozen food, shrimp and fish items in overseas markets but we have been unable to make any significant breakthrough in the marketing factors as well as structural weakness of the frozen food, shrimp and fish export policy in post-harvest areas. The frozen food, shrimp and fish has now been identified as an export focal point area in Bangladesh. This focal point

implies detection of export potential in the changing export market scenario. Therefore, a need of improved and a better export based industry for the production of these products for commercial purposes. To exploit the potentials need to undertake systematic planning, surveying, arranging for appropriate technology development, setting up demonstration projects and training of producer and other personnel related with the enlargement of the frozen food, shrimp and fish export policy.

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