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Research Note

Impact of WTO on Potato Export from India

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Abstract

Attempts are being made to export potatoes from India since 1970s but the quantities exported have been negligible and variable in spite of the fact that Indian potatoes are technically excellent and moderately export competitive. With the liberalization of Indian economy and establishment of WTO it was expected that the WTO regime would increase the price level in the international market due to implementation of proposed heavy cut in agricultural subsidies by the developed countries and hence the export of potatoes from India may get a boost. Under this backdrop, the study has ascertained the effect of establishment of WTO on export of potatoes from India. The study has indicated a declining export competitiveness of Indian potatoes in the post-WTO era, which requires immediate attention of policymakers as well as researchers in India to improve the export competitiveness by increasing the productivity and decreasing the cost of production. A need has been emphasized on giving some export incentives and easing some of the major infrastructural bottlenecks. Frozen-potatoes export from India had depicted competitiveness in the post-WTO era which can be encouraged to capture the fast expanding market of the product. The potato export from India can be made stable by either encouraging big export houses in the potato export or establishing a "Potato Board" to look into various aspects of potato export from the country.

Introduction

Potato, a short-duration crop, is nutritionally superior and capable of producing high amount of food per unit area and time. It can be planted and harvested as per the requirement of cropping system(s) and therefore has

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high potential for inclusion in intensive cropping systems. It was introduced in India in the early seventeenth century and has been adopted throughout the country. Since independence, India has made great strides in potato production and at present India is the third largest potato producer in the world. The potato production has gone up from 1.6 million tonnes in 1949-50 to 22 million tonnes in 2000-01. Although, India has made tremendous progress in potato production, the country is not yet prepared to absorb the excess potato production. The excess production frequently leads to glut in the market, making potato cultivation uneconomical. The production of potatoes has reached a level where surplus potatoes would always be available (Ezekiel *et al*., 1999). One of the options for managing this situation is to export surplus potatoes to other countries. Attempts are being made to export potatoes since 1970 but the quantities exported have been negligible and variable mainly due to infrastructural bottlenecks, lack of definite policies for sustained potato exports and absence of proper exim trade setups (Khurana, 2003).

The previous decade witnessed two significant developments that had a profound impact on the Indian agriculture and trade. The first development relates to liberalization of economic policy which was initiated in 1991 and second relates to the formation of WTO. The WTO Agreement on Agriculture (AOA) strives to establish free and fair trade in agricultural commodities across the world. It is believed that once implementation phase (1995-2004) is over, countries having comparative advantage in producing a commodity will dominate the trade in that commodity. India enriched with varied climates and soils, produces potatoes throughout the year. Abundance of labour provides further opportunity to produce potatoes at low cost.

In India, the bulk of potatoes are grown during the winter season under short-day conditions and are harvested from January to March, when fresh potatoes are not available in most parts of northern hemisphere, making it a strategic crop from export point of view (Dahiya and Srinivas, 1994; Ezekiel *et al.*, 1999). The potatoes are cultivated in the sandy or sandy loam soils in the country. Such soil conditions result in good shape and provide luster to the tubers. Such a quality produce is preferred for the exports to those countries where mechanized processing is preferred (Nagaich, 1983). India has great economic feasibility (Dahiya and Bhati, 1992) and technical excellence (Ezekiel *et al.* 1999) for exporting potatoes but it lacks the desired policy framework and infrastructural support for this.

Identification of export commodities and enhancement of its export competitiveness is an essential ingredient of a successful trade strategy (James *et al*., 1987). Against this backdrop, Gulati *et al*. (1994) and Jha

(2000) worked out export competitiveness of the Indian crops, including potatoes, using different methodologies and observed that Indian potatoes were not competitive. However Dahiya (2001) has worked out the Nominal Protection Coefficient (NPC) using the average domestic prices for the period January to June instead of the annual average prices, as used by Gulati *et al*. (1994) and has concluded that Indian potatoes were, by and large, competitive, though moderately.

About seven years have passed since the establishment of WTO and therefore it is now appropriate to examine the post-WTO impact on the potato export by observing the pattern of potato trade in the world with reference to India. In this perspective, this paper has examined the status of potato exports from India, the magnitude of its growth and instability of potato trade *vis-à-vis* world, before and after WTO, besides suggesting suitable strategies to boost potato exports. The specific objectives of the study were to: (i) examine the present scenario of potato trade, (ii) ascertain the effect of establishment of WTO on export of potatoes from India, and, (iii) suggest suitable strategies to boost potato export from India in the liberalized trade regime.

Methodology

The secondary data on export of potatoes for the period 1988 to 2001 were obtained from the web-site of FAO, Rome. The study used before and after approach to analyze the impact of WTO on export performance of Indian potatoes. The total period was divided into two parts, viz. 1988 to 1994 (pre-WTO) and 1995 to 2001 (post-WTO) to find the impact of WTO on export of potatoes. The basic statistics, viz. arithmetic mean, standard deviation and coefficient of variation were estimated for each period and, overall period to know the average status and stability in the export of potatoes. Compound growth rates were estimated using the logarithmic function for comparing potato export before and after WTO. To study variability, the co-efficient of variation was usually used as an index of instability. The study has used the time series data and contains trend component. It has suggested to use the coefficient of variation around the trend line as suggested by Nadkarni (1969) and Cuddy and Della (1978), instead of simple co-efficient of variation. Thus, the sustainability in export of potato was estimated by computing the co-efficient of variation across the trend line as per Eq. (1):

$$TCV= CV*(1-R^2)^{1/2} \qquad \ldots(1)$$

where, TCV is the coefficient of variation around the trend line, and CV is the co-efficient of variation. R^2 is the co-efficient of determination of the trend (Eq. 2):

$$Y = a + bt \qquad \ldots(2)$$

wherein Y is potato export, t is the time, and a and b are coefficients of regression.

Results and Discussion

Potato Trade — Present Scenario

More than 137 countries are involved in potato production, while almost all the countries of the world are involved in the potato trade. Potato is mainly a crop of the developed world. The share of developed countries in world area and production of potatoe is estimated to be 57.8 per cent and 66.2 per cent, respectively with the average productivity of 19.4 t/ha. Out of 300 million tonnes of world potato production, only about 4 per cent is traded internationally, and the developed countries contribute about 90 per cent in the world potato trade (FAO, 2003). The export and import of potato mainly take place within European countries, viz. the Netherlands, Germany, Belgium, Spain, France, Italy and the UK (Tables 1 and 2). It is seen from Table 1 that 8.1 million tonnes potatoes and 3.5 million tonnes frozen potatoes were exported world over during the year 2001. The share of Netherlands in the export of potatoes was maximum (19.16%), followed by Germany (18.35%) and France (13.7%). The share of India was only

Table 1. Major exporting countries of potatoes and frozen-potatoes in the world: 2001

Potatoes				Frozen-potatoes			
Rank	Country	Quantity (1000' t)	Percentage	Rank	Country	Quantity (1000' t)	Percentage
1	Netherlands	1552	19.16	1	Netherlands	958	27.66
2	Germany	1486	18.35	2	Canada	690	19.94
3	France	1114	13.70	3	Belgium	573	16.55
4	Belgium	935	11.35	4	USA	520	15.02
5	Canada	356	4.40	5	Poland	231	6.68
6	Italy	294	3.63	6	France	152	4.40
7	USA	292	3.60	7	Germany	104	3.00
8	Spain	245	3.03	8	Argentina	60	1.73
9	Egypt	186	2.29	9	UK	42	1.21
10	UK	161	1.99	10	New Zealand	37	1.06
38	India	12	0.14	17	India	5	0.13
	World	8096	100.00		World	3462	100.00

Source: FAO Statistical Databases, June, 2003, http://apps.fao.org/page/collections?subset= agriculture

Table 2. Major importing countries of potatoes and frozen-potatoes in the world: 2001

Potatoes				Frozen-potatoes			
Rank	Country	Quantity (1000' t)	Percen-tage	Rank	Country	Quantity (1000' t)	Percen-tage
1	Netherlands	1490	18.08	1	USA	588	17.51
2	Belgium	1066	12.93	2	K	356	10.58
3	Spain	562	6.83	3	France	318	9.46
4	UK	560	6.80	4	Germany	276	8.22
5	Germany	516	6.26	5	Japan	274	8.16
6	Italy	498	60.4	6	Italy	147	4.36
7	France	400	4.85	7	Spain	146	4.34
8	US A	304	3.69	8	Netherlands	98	2.90
9	Portugal	288	3.49	9	Greece	90	2.68
10	Canada	239	2.90	10	Brazil	87	2.59
156	India	0.183	0.004	79	India	1	0.03
	World	8240	100.00		World	3360	100.0

Source: FAO Statistical Databases, June, 2003, http://apps.fao.org/page/collections?subset= agriculture

0.14 per cent and it ranked at 38th position during 2001. As regards the export of frozen potatoes, the share of Netherlands was highest (27.66%), followed by Canada (19.94%) and Belgium (16.55%). The share of India was only 0.13% with 17th rank.

In import of potatoes (Table 2), Netherlands ranked first, with about 18.08 per cent of total potato import, followed by Belgium (12.93%) and Spain (6.83%). The share of India was only 0.004 per cent and it ranked at 156th position. In the case of frozen potato imports, the USA ranked first with 17.51 per cent share followed by the UK (10.58%), France (9.46%), Germany (8.22%) and Japan (8.16%). The other importing countries were: Italy, Spain, Netherlands, Greece and Brazil. India's share was only 0.03 per cent and it ranked 79th in frozen potato import. It can be noted from Tables 1 and 2 that the countries like Netherlands, Belgium, Germany, France, Canada, USA and UK are the major exporters as well as importers of potatoes and frozen potatoes in the world. India has a very small share in world potato export and import which needs to be enhanced for earning foreign exchange and ensuring better price of potato to the potato farmers in the country.

WTO and Global Potato Trade

The total potato exports of the whole world, developed economies and India are presented in Table 3. The data indicate that potato (fresh + frozen)

Table 3. Potatoes export (fresh+frozen) from developed countries and India during pre- and post-WTO era

(Unit: Quantity in 1000' tonnes and value in 000000' US $)

Year	India		Developed countries		World		Share in world export (%)			
							India		Developed countries	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
					Pre-WTO					
1988	4.27	0.68	6583.17	1410	7347.3	1567	0.06	0.04	89.60	90.00
1989	4.36	0.71	6825.72	1684	7722.7	1872	0.06	0.04	88.38	89.92
1990	5.27	0.98	7081.15	2102	8006.8	2356	0.07	0.04	88.44	89.22
1991	7.96	1.00	7774.41	2368	9044.1	2686	0.09	0.04	85.96	88.11
1992	7.57	1.02	7826.31	2179	9246.4	2507	0.08	0.04	84.64	86.90
1993	9.55	1.29	7891.65	1935	9003.9	2172	0.11	0.06	87.65	89.11
1994	31.63	5.86	8399.30	2681	9720.1	2958	0.33	0.20	86.41	90.63
Avge	10.09	1.65	7483.1	2051	8584.5	2303	0.11	0.07	87.3	89.13
					Post-WTO					
1995	39.75	7.30	7767.77	3545	9231.7	3950	0.43	0.18	84.14	89.75
1996	29.75	6.12	7931.86	2817	9386.5	3143	0.32	0.19	84.50	89.64
1997	23.13	3.06	8349.00	2628	9362.6	2875	0.25	0.11	89.17	91.42
1998	9.26	1.66	9489.10	3172	10580.6	3444	0.09	0.05	89.68	92.11
1999	45.55	5.73	9475.46	3543	10754.1	3857	0.42	0.15	88.11	91.84
2000	37.13	4.93	9742.70	2945	10752.6	3220	0.35	0.15	90.61	91.45
2001	16.11	2.29	10426.8	3211	11557.8	3501	0.14	0.07	90.22	91.74
Avge	28.67	4.44	9026.1	3123	10232.3	3427	0.26	0.12	87.97	90.89

Source: FAO Statistical Databases, June, 2003, http://apps.fao.org/page/collections?subset= agriculture

exports of developed countries as well as whole world have been increasing in quantitative terms during post-WTO era, while that of India have been fluctuating and declining. The share of India in world potato export declined from 0.43 per cent in 1995 to 0.35 per cent in 2000 and further to 0.14 per cent in 2001, while the share of developed countries steadily increased from 84.14 per cent in 1995 to 90.22 per cent in 2001 in quantitative terms and from 89.75 per cent in 1995 to 91.74 per cent in 2001 in value terms. The share of India in value term declined from 0.18 per cent in 1995 to 0.07 per cent in 2001. The share of India during pre-WTO period had increased from 0.06 per cent in 1988 to 0.33 per cent in 1994. This shows a declining competitiveness of Indian potatoes in comparison to developed countries during the post-WTO period. This may be due to continuance of high support to potato in the developed countries during post-WTO era also. Chand and Phillip (2001) also found that developed countries have been maintaining high support to their agriculture by taking advantage of complex categorization of support in exempt and non-exempt categories under the WTO provisions.

A study by Organization for Economic Co-operation and Development (OECD) has compared the level of total support to agriculture in developed countries in the base period (1986-88) and recent period (1998-2000) and has shown that the recent level of support to agriculture by OECD countries in most cases is higher than what it was in the base period. This has led to the realization that implementation of Agreement on Agriculture (AOA) has not done much to reduce support to agriculture in developed countries. The level of support in developing countries like India is very low as compared to that in developed countries (Chand, 2002 a). WTO therefore has benefited developed countries rather than developing countries in expanding their export of potatoes.

Growth Rate of Potato Export

The annual compound growth rates for export of potatoes and frozen potatoes for world and India during pre- and post-WTO periods are presented in Table 4. The data indicated that potato production in India as well as the world increased during both the periods but the proportionate increase was more in India than the world during both the periods. The growth rate in production was more than 1.5-times during post-WTO than pre-WTO period in India.

India experienced a very high growth rate in potato export during the pre-WTO period. This was as high as 34.7 per cent in quantitative terms and 31.5 per cent in value terms in potatoes and, 20.32 per cent in

Table 4. Compound growth rates for potato production and export during pre- and post-WTO periods

Period	Potato production		Export of potatoes and its frozen-potatoes							
			World				India			
	World	India	Potatoes		Frozen potatoes		Potatoes		Frozen potato	
			Qty	Value	Qty	Value	Qty	Value	Qty	Value
Pre-WTO 1988-1994	0.83^{NS}	2.88***	3.62***	6.06***	11.63*	12.75***	34.72**	31.52*	20.32*	23.0**
	(0.856)	(3.782)	(4.223)	(14.733)	(2.289)	(14.419)	(3.425)	(2.042)	(2.436)	(3.382)
Post-WTO 1995-2001	1.24^{NS}	4.53^{NS}	1.69*	-5.43***	11.18*	5.41***	-9.70^{NS}	-18.78*	14.91^{NS}	8.87^{NS}
	(1.733)	(1.789)	(2.021)	(15.522)	(2.091)	(16.117)	(-0.949)	(-2.105)	(0.839)	(0.647)
Overall 1988-2001	1.44***	4.35***	1.0 **	1.14***	11.85***	11.41***	18.06***	17.82***	10.37**	9.92**
	(5.124)	(7.031)	(2.472)	(46.751)	(3.310)	(43.890)	(3.793)	(2.949)	(2.315)	(2.704)

Note: Figures within the parentheses indicate “estimated t” values
*** indicate significance at 1% level, ** indicate significance at 5% level,
* indicate significance at 10% level, NS indicates non-significance

Source: FAO Statistical Databases, June, 2003, http://apps.fao.org/page/collections?subset= agriculture

quantitative terms and 23.0 per cent in value terms in frozen potatoes. However, growth rate for potato export in the world was modest (about 3.6%) in quantitative terms and about 6.06 per cent in value terms. Frozen products witnessed growth rates of 11.63 per cent and 12.75 per cent in quantitative and value terms respectively. During the post-WTO era, India experienced a negative growth rate in both quantitative and value terms (-9.7% and –18.78%, respectively). However, world as a whole experienced a modest growth in potato export in quantitative terms (1.7%) but it also experienced a negative growth of -5.43 per cent in value terms. This indicates a decline in the price of potatoes world over. Due to this decline in prices, potato export experienced a negative growth rate in value terms in the world as a whole, while maintained a positive growth rate in quantitative terms. But, India experienced a high decline in potato export in quantitative terms and even higher decline in value terms which indicates a deteriorating competitiveness of Indian potatoes during post-WTO era in the world market. Therefore, efforts should be made to enhance the export competitiveness of Indian potatoes by increasing its productivity and decreasing the cost of production. The competitiveness can also be improved by removing /easing some of the infrastructural bottlenecks such as transport, establishment of cool chain, etc.

In the case of frozen potatoes, both India and world experienced a positive and high growth rate in quantitative terms during both pre- and post-WTO era but comparatively a lower rate of growth during the post-WTO period. The decline in growth rate was very steep in the case of India, from 20.32 per cent during pre-WTO period to 14.91 per cent during post-WTO period. But, when compared in value terms, the decline in growth rate became more steep, which again indicated a decline in price of frozen potatoes in the international market. This was just opposite of the expectation at the time of signing of the WTO. At that time, it was expected that the WTO regime would increase the price level of potatoes in the international market due to implementation of proposed heavy cut in the agricultural subsidies by developed countries. But on the contrary, general price level declined in the international market, which badly affected the potato export from India.

An impressive compound growth rate in export of frozen potatoes in both quantitative (14.91%) and value terms (8.87) provided the opportunity for expanding trade of frozen potatoes in the world. India is endowed with vast area suitable for growing the processing-grade potatoes and it is also equipped with suitable potato cultivars and technology for processing frozen potatoes (Singh, 2003; Khurana *et al*., 2003). Thus, India should concentrate on expanding export of frozen potatoes whose market is expanding, particularly in the developed and developing countries of Asia. At present, Asia is a large trade deficit region for frozen-potato trade; it exported only about 1 per cent but imported about 20 per cent of the globally traded frozen potatoes (Guenthner, 2001).

The factories of frozen-potato processing are expensive to establish and operate. This high cost is a barrier to the entry of those who want to build a domestic frozen-potato processing business. The most important issue in establishing a frozen-potato factory is a reliable supply of high-quality raw material for processing. Therefore, locating a factory in an area where the quality of raw product is questionable or unreliable can be very risky. In spite of problems with quality of raw material, potato-processing firms are interested in expanding around the globe (Guenthner, 2001). India with vast area suitable for growing potatoes for processing and availability of suitable processing variety has capability to seize the golden opportunity and become a major player in frozen potato trade. For this purpose, India has to learn a lesson from the experiences of other countries like China where a North American processing firm built a facility but found it difficult to acquire consistent high-quality raw material due to the fact that it had to deal with many small farmers who were reluctant to take advice from the foreigners (Guenthner, 2001). Therefore, there is a need to establish a consortium of potato growers, processors and exporters in India where small and marginal farmers are in majority. The consortium can plan in advance the requirement and get the raw material of desired quality produced by the farmers. It can be processed and exported as per demand in the international market.

Instability in the Potato Export

To know India's performance in export of potatoes and frozen potatoes during pre- and post-WTO era, arithmetic mean, standard deviation and coefficient of variation around the trend line were estimated for quantitative as well as value terms and are presented in Table 5. The data indicated that on an average, India exported about 7639.7 tonnes of potatoes and earned about 1047.7 thousand US $ every year during pre-WTO period. However, during the post-WTO period, it exported 15547.86 tonnes of potatoes and earned about 2177.2 thousand US $.

The coefficient of variation in the export of potatoes and frozen potatoes from India was found to be 72.8 per cent and 40.25 per cent, respectively during the pre-WTO period and 42.38 per cent and 64.84 per cent, respectively during the post-WTO period in quantitative terms. This indicates that coefficient of variation in export of potatoes was very high in

Table 5. Export of potato from India and coefficient of variation in export of potato in world and India during pre- and post-WTO periods

Period	India						World			
	Qty. exported per annum		Coefficient of variation (%)				Coefficient of variation (%)			
	Potatoes (fresh+frozen)		Potatoes		Frozen potato		Potatoes		Frozen potato	
	Qty*	Value *	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Pre-WTO 1988-1994	10.09	1649	72.80	105.33	40.25	43.65	4.07	16.35	5.85	7.76
Post-WTO 1995-2001	28.67	4440	42.38	38.66	64.84	47.44	3.90	17.01	2.46	6.21
1988-2001	19.38	3044.5	63.14	80.86	61.24	48.05	5.71	20.40	8.24	9.03

**Note*: Quantity in 1000' t and value in 1000' US $

Source: FAO Statistical Databases, June, 2003, http://apps.fao.org/page/collections?subset= agriculture

comparison to the world figure (4.07% and 5.85% for potatoes and frozen potatoes, respectively during pre-WTO period and 3.90% and 2.46%, respectively during post-WTO period) during both the periods (Table 5). This shows the existence of high level of instability in potato export from India during both the periods.

The existence of high level of instability in potato export has serious implications for promoting potato exports from India. In such a situation if potato export remains in the hands of small private traders having short-term interest in the business, there would be no export when the international prices are depressed and exports are possible when international prices are high enough to attract the attention of traders. This would not allow India to establish its permanent presence in the potato export market. As suggested by Chand (2002b), there are two ways to deal with such kind of situation. One, the firms having long-term interest in potato export should be encouraged to establish big export houses. These firms would like to maintain their hold over the global market even during the years of depressed international prices when they will suffer losses, if they find export in the long-term profitable. Two, the government should develop some mechanism to provide support the exporters in the years of depressed potato prices in the international market. A “Potato Board” may be established to help potato export from the country. A part of profit from potato export, particularly during the years of high international prices should form the income of the Board, while, during the period of depressed international prices, compensation may be provided to maintain the hold over the global potato market.

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Appendix I

Potatoes export of developed and developing countries and India during pre- and post-WTO periods

(Unit: Quantity in 1000 tonnes and value in 1000 US $)

Year	India		Developed countries		Least developed countries		World		Share in world potatoes export (%)					
									India		Developed countries		Least developed countries	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
1988	4.27	676	6583.17	1,410,007	12.74	3,436	7347.3	1566652	0.06	0.04	89.60	90.00	0.17	0.22
1989	4.36	713	6825.72	1,683,501	7.93	2,224	7722.7	1872215	0.06	0.04	88.38	89.92	0.10	0.12
1990	5.27	984	7081.15	2,102,227	7.81	1,922	8006.8	2356298	0.07	0.04	88.44	89.22	0.10	0.08
1991	7.96	1,001	7774.41	2,367,017	12.99	2,672	9044.1	2686410	0.09	0.04	85.96	88.11	0.14	0.10
1992	7.57	1,023	7826.31	2,178,741	11.92	2,467	9246.4	2507073	0.08	0.04	84.64	86.90	0.13	0.10
1993	9.55	1,286	7891.65	1,935,010	15.09	1,692	9003.9	2171532	0.11	0.06	87.65	89.11	0.17	0.08
1994	31.63	5,859	8399.30	2,680,503	12.84	1,271	9720.1	2957708	0.33	0.20	86.41	90.63	0.13	0.04
1995	39.75	7,298	7767.77	3,545,242	22.26	2,357	9231.7	3950012	0.43	0.18	84.14	89.75	0.24	0.06
1996	29.75	6,115	7931.86	2,817,302	22.36	2,411	9386.5	3142798	0.32	0.19	84.50	89.64	0.24	0.08
1997	23.13	3,058	8349.00	2,628,190	18.92	1,808	9362.6	2874793	0.25	0.11	89.17	91.42	0.20	0.06
1998	9.26	1,662	9489.10	3,171,953	15.08	1,896	10580.6	3443798	0.09	0.05	89.68	92.11	0.14	0.05
1999	45.55	5,730	9475.46	3,542,612	24.36	3,016	10754.1	3857291	0.42	0.15	88.11	91.84	0.23	0.08
2000	37.13	4,925	9742.70	2,944,634	21.17	3,577	10752.6	3219862	0.35	0.15	90.61	91.45	0.20	0.11
2001	16.11	2,293	10426.81	3,211,344	1519	2,445	11557.8	3500294	0.14	0.07	90.22	91.74	0.13	0.07