ASSESSMENT OF COTTON AVAILABILITY FOR DOMESTIC DEMAND IN INDIA FOR GENERATING VALUE ADDITION

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Abstract

Export is undoubtedly essential for any nation to strengthen economy. It leads to healthy competition in the market and maintains BOP (balance of payment). Agricultural exports contribute around 13% to India's total export earnings. Export of cotton can earn foreign exchange for India. But the other side of reality is that there is high demand for raw cotton in domestic industries. India should therefore emphasize on increasing cotton production for fulfilling cotton requirement to facilitate boost in value added product. Export of yarn, fabric, garment, home furnishing and other value added product from cotton will earn more revenue than raw cotton. It is imperative and advisable that raw cotton should be exported only after fulfilling domestic demand. An attempt has been made to analyze the relationship between different variables by using Karl Pearson's correlation coefficient and multiple correlation coefficient. For this purpose t and F tests have been used for correlation coefficient and multiple correlation coefficient respectively to examine the level of significance among the variables.

Key word cotton production, cotton consumption, cotton export value added product

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Introduction

Cotton is an essential agricultural commodity, both globally as well as domestically. India is the world's 2nd largest producer, 2nd largest exporter and 2nd largest consumer in cotton. Availability of raw cotton for domestic industries and its export is crucial for Indian economy. Production has been increasing at 6 percent year on year while consumption has been increasing at 8 percent year on year. Cotton is used as a raw material in different industries of national importance. In many developing and underdeveloped countries, cotton exports are not only a source of vital foreign exchange earnings, but also account for a substantial proportion of their GDP and tax income, leading to significant economic and social development. Besides providing cloth, one of the basic necessities of nation, it generates employment, provides saving, contributes to market of industrial goods and earns foreign exchange. Cotton is the only crop in India having genuine export surplus after meeting domestic needs. Significant contribution has been made by cotton and the textile industry to the Indian economy. The total consumption of cotton in India has increased by almost 46 percent from 2000-01 to 2010-11.

Cotton consumption has been increasing in India and since 2000 consumption of cotton has become more significant. The share is also further expected to increase with increase in the demand for value added product. India is the only country producing all four species of cotton. This gives India a comparative advantage over other countries in terms of domestic production, consumption and export for earning foreign exchange. The introduction of Bt cotton from the year 2002 has brought about a significant change in the productivity levels of cotton in some states. Production in 2011-12 cotton season touched an all time high of 6 million tons with 2.4 million tons of exports and 4.7 million tons of consumption. Our raw material policy has been determined by the need to meet the needs of domestic industry and have an adequate closing stock with the surplus quantities being available for exports. India's cotton exports touched an all time high in 2011-12 cotton season and the prospects of large trade volumes look good in the 2012-13 cotton season.

There is no doubt in it that India has increased production and export of value added product over the year but this quantity and quality is far below when it is compared to its major competitors. At this juncture India should come up with increase in cotton production and quality to survive in the global cotton textile market.

In this paper, the dynamics of changes have been measured in the export of raw cotton from India to different export markets. The study is carried out with the aim of emphasize on

- production and export of high valued cotton products rather than exporting raw cotton
- availability and fulfilling the demand of raw cotton for domestic industries at low prices
- export surplus cotton

Review of Literature

Cotton is very important and thus should be promoted as a cash crop (Kumar, 1997). India produces the widest range of cotton fiber quality suitable for spinning 6's to 120's counts yarn. So cotton is favourable for the largest agro-based national industry of the country (Santhanam and Sundaram, 1997). (Bigman et al., 2004) mentioned that restructuring of the entire textile industry worldwide during the post-WTO it was expected in the reduction of the costs of textile products and increase in the demand of raw cotton and thereby changing the directions of the trade in cotton. In India as a result of changes in the production which showed a significant increase, it was able to meet its domestic demand. (Mac Donald and Vollrath, 2005) stated that termination of the Multi Fibre Agreement (MFA) in 2004 has opened up the world market for the Indian textile industry and also affected the structure of the world trade in cotton. (Mahadevaiah et al., 2005) using Markov Chain – model explained the dimensions of cotton export. Export is not steady and reveals high deviation in volume and revenue earnings. Although China being the largest producer of cotton in the world it imports medium and long staple cotton from India for readymade garments and exports its low quality cotton to other countries maintaining its competitiveness. (Chacko and Toor, 2007) found that the cotton export elasticity co-efficient with respect to total production of cotton in India was positive. One per cent increase in the total production of cotton in India would raise the cotton export by 0.22 per cent. When production exceeds the domestic demand there exist an exportable surplus and it enhanced the export. The risk in exchange rate was a major factor in the world trade. (Ratna, 2009) declared that inspite of producing almost comparable quality of cotton by India and USA in 2007; cotton exported by India is approximately half of USA showing cotton goes for value addition.

Cotton production in India is sufficient to meet the demand originating from the domestic textile industry (Cotton Corporation of India, 2010). The average cotton yield in India is only 0.49 tons

per hectare compared to a world average of 0.73 tons per hectare (ICAC, 2010). (The Indian Textile Journal, 2010) declared that India has been rapidly gaining cotton export market share. It has been estimated that India would continue to expand its share of the global export market. Beside becoming self sufficient for own cotton requirement it also became a leading exporter of cotton globally. Devaraja (2011) explains the diversity and complexity of Indian textile industry. Now the textile has its wider application in industry as well as in household. Thus demand of more and more value added product increases day by day. (Kranthi et al., 2011) says though, India ranks second in the world in cotton production after China, even its best productivity of 566 kg/ha, places it at 24th rank in the list of 80 cotton producing countries. Despite the good progress made by public and private sector research and development, it is a matter of concern that productivity started to decline from 566 kg/ha in 2007 to 522 kg/ha in 2008, 486 kg/ha in 2009 and 475 kg/ha in 2010. According to (Kumari, 2012) textile has shown a steady rise in exports. Though India has shown a considerable rising trend in exports and has moved up in the list of world exports, yet its real growth is showing a very slow pace. During April- December 2011 cotton fabrics made ups and readymade garments showed a growth rate of 13 % and 23.7% respectively in export sector. (Textile Magazine, 2012) mentioned On cotton yields, USDA said that there is some concern within the industry as the yields had stagnated over the past few years even though crop productivity increased from an estimated 300 kg to 500 kg per hectare since the introduction of biotech cotton. India's cotton yields continue to be significantly lower than the global average of 740 kg per hectare. There is increasingly widespread opinion within the cotton industry that India's cotton area will stabilize within a range of 10-12 million hectares until there is another significant price or technology shift when the area is likely to change. (WWF report and Yes bank, 2012) says there is persistent increase in cotton consumption since 2003-04 onwards due to growing demand for Indian textiles and considerable expansion and modernisation of the textile mills where cotton value chain starts with fibre production and terminates in varieties of textile and garment products. (Mal and Pandey, 2013) by using coefficient of variation has shown that instability in area is less compared to production and productivity of cotton for the period 1980-2011. Study of compound growth rate reveals that during 1980-2000 there is no significant change in cotton production and from 1990-2000 no significant increase in productivity has been observed. (Sood, 2013) stated that cotton's relative drought tolerance gives it an edge over competing crops as 65 percent of India's cotton area is

rainfed. According to (Srinivas, 2013) fulfillment of domestic cotton demand and export of cotton is imperative.

Research Methodology

The present study is analytical in nature. The entire study is based on the data shown in table -1. The data is secondary and period covered is from 1980-81 to 2010-11. For analysis purpose four periods are taken. The first, second and third periods are considered from 1980-81 to 1990-91, 1991-92 to 2000-01, and 2001-02 to 2010-11 respectively. The entire period taken together from 1991-92 to 2010-11 is considered under period 4. Correlation coefficient and multiple correlation coefficient are used as a statistical tool to assess the impact of one economic variable due to the change in other. To show the relationship between two variables Karl Pearson's correlation coefficient is used. Multiple correlation is used to analyze the relation between the dependent variable and those independent variables which has the highest correlation.

Table-1 Cotton production, consumption, Quantity exported and export value in India

Year	Production (Mt)	Consumption (Mt)	Export	
			Quantity (M t)	Value (Rs. In crores)
1980-81	1.2	1.18	0.073	150.7
1981-82	1.34	1.356	0.109	91.1
1982-83	1.28	1.453	0.065	157
1983-84	1.08	1.544	0.033	103.6
1984-85	1.45	1.558	0.073	66.1
1985-86	1.48	1.716	0.221	102.5
1986-87	1.17	1.73	0.004	246.6
1987-88	1.08	1.767	0.032	21.7
1988-89	1.48	1.881	0.234	71.6
1989-90	1.94	1.951	0.154	610.5
1990-91	1.67	1.828	0.202	620.5
1991-92	1.64	2.135	0.215	38.7
1992-93	1.94	2.142	0.08	725.3
1993-94	1.83	2.295	0.022	238.2
1994-95	2.02	2.607	0.123	83.39
1995-96	2.19	2.856	0.258	961.16
1996-97	2.42	2.759	0.067	1655
1997-98	1.85	2.747	0.042	313.6
1998-99	2.09	2.474	0.017	86.72
1999-00	1.95	2.55	0.011	52.15
2000-01	1.62	2.539	0.01	51.43

2001-02	1.7	2.895	0.012	44.4
2002-03	1.47	2.421	0.014	66.31
2003-04	2.33	3.22	0.152	1089.15
2004-05	2.79	3.592	0.457	657.35
2005-06	3.15	3.723	0.799	3951.35
2006-07	3.56	3.944	0.986	5267.08
2007-08	4.13	4.026	1.504	8365.98
2008-09	4.93	3.893	0.595	3837.13
2009-10	5.18	5.102	1.41	10270.21
2010-11	5.52	5.222	1.3	13160.47

Source : United States Department of Agriculture, Cotton Advisory Board,
Directorate of Cotton Development, Mumbai
National Center for Integrated Pest Management, New Delhi
India Trade Statistics and India Export Import Statistics
United States Department of Agriculture, Cot

Karl Pearson's correlation coefficient is calculated using the formula

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2] * [n\sum y^2 - (\sum y)^2]}}$$

where n = number of pairs of scores, $\sum xy$ = sum of the products of paired scores, $\sum x$ = sum of x scores, $\sum y$ = sum of y scores, $\sum x^2$ = sum of squared x scores, $\sum y^2$ = sum of squared y scores

Student's t test is used to test significance level of correlation coefficient. Formula for t-test is

$t = r\sqrt{\frac{n-2}{1-r^2}}$ where (n - 2) is the degree of freedom and r is the correlation coefficient.

The formula for multiple correlation is $R_{z,\,xy} = \sqrt{\frac{r_{xz}^2 + r_{yz}^2 - 2r_{xz}\,r_{yz}\,r_{xy}}{1 - r_{xy}^2}}$

where x and y are independent variable and z is dependent variable, r is correlation coefficient.

Fisher's F test is used to test significance level of multiple correlation coefficient. Formula used for F-test is given as below:

$$F = \frac{R^2_{y.12\ldots k} / k}{(1 - R^2_{y.12\ldots k}) / (N - k - 1)}, \quad df = k,\ N - k - 1$$

Results and discussions

Table-2 Karl Pearson's correlation coefficient and t value for production, consumption and export of cotton in India

Year	value	Year & production	Year & Export	Production & Export	Year & consumption	Production & consumption
1980-81 to 1990-91	r	0.494	0.468	-0.078	0.956	0.544
	t	1.61	1.589	-0.235	9.776	1.945

Period 1		3.36*	3.36*	3.36*	3.36*	1.86**
1991-92 to 2000-01	r	0.555	-0.579	0.117	0.56	0.569
	t	1.89	-2.01	0.333	1.912	1.987
Period 2		1.86**	3.36*	3.36*	1.86**	1.86**
2001-02 to 2010-11	r	0.983	0.761	0.839	0.934	0.935
	t	16.06	4.944	4.361	7.394	7.457
Period 3		3.25*	3.25*	3.25*	3.25*	3.25*
1991-92 to 2010-11	r	0.808	0.868	0.89	0.885	0.94
	t	7.38	4.977	8.281	8.064	11.689
Period 4		2.76*	2.76*	2.76*	2.76*	2.76*
*(1% level of significance), **(10% level of significance)						

- During period 1 there is poor association between year and production at r being 0.494 and hence is not significant at 1% (1.61<3.36). Correlation coefficient between year and export is found to be non effective at 0.468 and is not statistically (t value 1.589) significant at 1% (1.589 < 3.36). There is no correlation exists between production and export at -0.078 and is not statistically significant at 1% (-0.235< 3.36). Correlation coefficient (r) between year and consumption is 0.956, which indicates a positive high degree of Correlation coefficient between year and consumption which is statistically (t value 9.776) significant at 1% (9.776>3.36). Correlation coefficient (r) between production and consumption at 0.544 shows a moderate degree of correlation between them. Being significant (t value 1.945) at 10% level of significance (1.945> 1.86) explains a significant relation between them.
- In period 2 there is moderate correlation between year and production at correlation coefficient 0.555 and is significant at 10% (1.89>1.86) level of significance. There is no association between year and export at correlation coefficient -0.579 at 1% (-2.01< 3.36) level of significance. Same condition holds for production and export with no correlation at 0.117 with 1% (0.333 < 3.36) level of significance. There is positive relation between year and consumption with correlation coefficient 0.56 at 10% (1.912> 1.86) level of significance. Correlation coefficient between production and consumption is moderate at 0.569 which is statistically (t value 1.987) significant at 10% (1.987> 1.86).
- In period 3 there is very high correlation between year and production at r being 0.983 and is statistically significant at 1% (16.06>3.25). The coefficient of correlation (r) between year and export is computed as 0.761, showing a high degree of correlation between them. The t value is computed as 4.944 being significant at 1% (4.944>3.25). As

observed the correlation coefficient (r) between production and export is 0.839 which says that a high degree of correlation exists between them. Value of t being 4.361 is significant at 1% (4.361>3.25) level of significance, which says that a significant association exists between them. The coefficient of correlation (r) between year and consumption is computed as 0.934, showing a very high degree of correlation between them. The t value is computed as 7.394 being significant at 1% (7.394>3.25) level of significance explaining a significant level of relation between export and consumption. The coefficient of correlation (r) between production and consumption is 0.935 explaining a high degree of correlation which is statistically (t value 7.457) significant at 1% (7.457>3.25) level of significance showing a significant association between the variables during the period of study.

- Period 4 is largely influenced by period 3. From the table it is clear that correlation coefficient between the variables is highly correlated.

Table- 3 Multiple-correlation coefficient and F value for different variables of cotton in India

Period	Value	$R_{Y.EV}$	$R_{Y.PE}$	$R_{Y.PC}$
1980-81 to 1990-91	R^2	0.439	0.344	0.920
	F	3.13	2.097	45.38
Period 1		4.74*	4.74*	4.74*
1991-92 to 2000-01	R^2	0.681	0.125	0.410
	F	7.472	0.5	2.422
Period 2		4.74*	4.74*	4.74*
2001-02 to 2010-11	R^2	0.833	0.966	0.976
	F	17.521	99.44	142.33
Period 3		4.46*	4.46*	4.46*
1991-92 to 2010-11	R^2	0.496	0.441	0.781
	F	8.35	6.706	30.313
Period 4		3.36*	3.36*	3.36*
*(5% level of significance)				

Y –year, E- export, V- value of export, P- production and C- consumption

- For period 1 multiple correlation among year, export quantity and export value is not relevant at 0.439. The F value is calculated as 3.13 which is not statistically significant at 5% (3.13<4.74) level of significance. Same case is observed for multiple correlations among year, production and export quantity where the variables are not statistically (F value 2.097) significant at 5 % (2.097 < 4.74) level of significance. There is a very high

degree of multiple correlations at 0.92 among year, production and consumption. The F value is 45.38 which is significant at 5% (45.38 > 4.74) level of significance.

- In period 2 the multiple correlation (R^2) among year, export quantity and export value is computed as 0.681, showing a good correlation between the variables. The F value is 7.472 being significant at 5% (7.472 > 4.74). As observed the multiple correlation among year, production and export quantity is 0.125 which says that there is no association among the variables. The F value is 0.5 and is not significant at 5% (0.5<4.74) level of significance. The multiple correlation (r) among year, production and consumption is found to be 0.410, showing no multiple correlation among them. The F value is computed as 2.422 not significant at 5% (2.422<4.74) level of significance.
- During period 3 the multiple correlation among year, export quantity and export value is 0.833 explaining a high degree of association which is statistically (F value 17.521) significant at 5% (17.521> 4.46) level of significance showing a significant association among the variables. There is extremely high multiple correlation among year, production and export quantity at 0.966. The F value is calculated at 99.44 which is statistically significant at 5% (99.44> 4.46) level of significance. Very high value (R^2 = 0.976) of multiple correlation among year, production and consumption reveals that high association among the variables. The F value is computed as 142.33 which is significant at 5% (142.33> 4.46) level of significance.
- In period 4 the value of multiple correlation among year, export quantity and value of export is 0.496. It is significant for F value 8.35 at 5% (8.35> 3.36) level of significance. There is moderate degree of multiple correlation among year, production and export quantity for the value 0.441. The F value is calculated as 6.706 and it is significant at 5% (6.706 > 3.36) level of significance. The multiple correlation among year, production and consumption is 0.781 explaining a high degree of correlation which is statistically (F value 30.313) significant at 5% (30.313>3.36) level of significance showing a significant association between the variables during the period of study.

It can be inferred from above analysis that cotton production in period 3 (2000-01 to 2010-11) is remarkable than any other period. This is attributed to the fact that introduction of Bt cotton in 2002 increased productivity. Besides this removal of multifibre agreements in 2005 also lead to increase in production. Development in irrigation facility and growth in domestic cotton textile

industry also forced to augment cotton production in India. With increase in production for the same period cotton was consumed in domestic industries for value addition and surplus was exported and valuable foreign exchange was earned. It is worth for India that it is exporting less cotton. It signifies that most of the cotton produced is consumed domestically in spinning industries and later stages for producing varieties of higher value added product. But the rate at which market for textile increases this production of cotton will not be sufficient for fulfilling the domestic demand. At this point India will not be able to compete with its competitors and it will be tough to survive in this competitive market. With increase in population, increase in income, change in life style demand of cloth increases at an exponential rate. India has to keep pace with the market trend so that it keeps on enhancing production and supplying it to the domestic market.

Conclusion

The globalisation of Indian trade has provided new and wider opportunities. Although there is increase in consumption of raw cotton in domestic industries but India is not able to keep pace with the existing as well as increasing textile demand in the market. The finding of the analysis reveals that existence of high instability in cotton production has an adverse effect on Indian consumption which should be controlled by policymakers to retain its position in the international market. Government's unsupportive policy and inappropriate pricing strategies have made the farmers reluctant from cotton production and hence productivity has not increased to the level when compared to its competitor and put the country at stake. Indian economists and policymakers need considerable participation to accelerate the cotton productivity in order to fulfill increasing domestic consumption. To meet the current demand as well as address the demand growth in the future, India has to keep pace with the market trend so that by increasing cotton production the value chain of cotton can be improved.

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