Asian Review of Social Sciences
ISSN: 2249-6319 Vol.8 No.1, 2019, pp. 123-131

Productivity of Indian Textile Industry in the Post Multi Fibre Agreement (MFA) Regime

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***Abstract* - The system of bilateral quotas which had governed the international trade in textiles and clothing under the Multi Fibre Agreement came to an end and has been replaced by the Agreement on Textiles and Clothing (ATC) from January 1, 2005. The ATC provided for a progressive elimination of quota in four stages during the transitional period which ended on 2005. This study is an attempt to understand the impact of trade liberalisation on the productivity of Indian textile industry. Estimation of labour productivity shows an improvement in the labour productivity during the post MFA period. Analysis of capital productivity reveals that average capital productivity was higher during the pre MFA period compared to post MFA period. Capital intensity estimate reveals that there has been an increase in the capital intensity for all product groups in the post MFA period compared to pre MFA.**
***Keywords:* Textiles, MFA, Partial Productivity, Capital and Labor, JEL Code: D 24, F 14 & L 67**

I. INTRODUCTION

The textile industry is one of the most prominent sectors in terms of India's economic development. The importance of this sector is evident from its contribution to GDP, industrial production, employment and foreign exchange earnings. Garments and textile production constitutes the second largest source of employment in India after agriculture. Indian textile industry employs around 40 million workers directly and 60 million indirectly. It also accounts for 14% of industrial production, 15% of the country's export basket, and 4% of GDP. The Indian textiles industry, currently estimated at around US$ 150 billion, is expected to reach US$ 223 billion by 2021 (IBEF, 2019).

Indian textile industry has been governed by a series of trade restrictions since 1960. The most important development in the history of Indian textile trade was the removal of the Multi-Fibre Agreement (MFA) which has governed the textile trade since 1974. MFA is the framework under which the developed countries imposed trade restrictions on the exports of textiles and clothing from the developing economies through the system of quotas. The MFA resulted in restricting the size of the textile industry in the exporting countries with a natural competitive advantage in the area, as no country could export more than the quota allocated to it. The MFA was conceived to provide breathing space for the domestic textile industries of the developed countries to adjust to competition from new sources of supplies. MFA exempted textiles and clothing trade from the GATT discipline. A decision was taken in the Uruguay Round of trade negotiations to phase out MFA in different stages through the implementation of the Agreement on Textiles and Clothing (ATC). The ATC provided for progressive elimination of quota in four stages during the transitional period which ended in 2005. From 1 January 2005 onwards textile trade become quota free and has been completely integrated into the GATT system.

Under the ATC, the US had the most restrictive quota system of all big importers, especially for clothing and of these India and China faced the maximum restrictions. It was believed that in the changed scenario India would be one of the biggest gainers in terms of the global textile trade. However, except in the first few years, India could not take advantage of the changed trade situation. Indian textile industry enjoys certain advantages compared to its competitors in terms of strong production base, the capacity advantage in spinning and ability to meet high-value niche orders and better designer resources. The competitive strength of the industry has been overshadowed due to the various weakness associated with the industry. Among the different factors, technological obsolescence which is pervading almost all the segments of the textile industry has placed it far behind its major competitors in the world textile economy and is threatening its very existence. Even though India is one of the major producers of cotton yarn and fabrics, the productivity of cotton is extremely low compared to the competitors and also confronting problems in the supply chain. The supply chain is not only fragmented but beset with bottlenecks in the form of lag in the delivery time. With the phasing out of quota and opening up of markets, Indian textile industry, especially the unorganized sector is facing severe competition from the domestic power loom, mill made fabrics as well as cheap imports (Kothari & Gupta, 2009). The survival of the Indian textile industry in the changed trade scenario depends upon its ability to enhance its overall international competitiveness through productivity and efficiency improvements. Government of India has already introduced several initiatives to enhance investment and restructure the industry to make it more competitive. In the given context, the present study tries to analyze the productivity performance of the Indian textile industry in the post-quota period.

II. REVIEW OF LITERATURE

There have been a plethora of studies to analyze the productivity aspect in Indian industry. Most of these studies have been at the organized manufacturing industry level. In the present paper, the reviews are limited to the impact of trade liberalization on productivity and productivity analysis conducted in the textile industry.

A. Trade Liberalization and Productivity: The empirical literature provides conflicting evidence about the relationship between trade liberalization and productivity. The general understanding was that liberalization of the trade from the trade barriers would lead to an improvement in efficiency since they are subject to change in market conditions. The hypothesis that trade opening had a positive impact on manufacturing's total factor productivity growth has been tested and found to be significant (Kim, 2000: Dongsuk 1992; Weiss, 1992: Tybout and Westbrook, 1995; Iscan, 1998; Weiss and Jayanthakumaran, 1995; Urata and Yokota, 1994; Harrison, 1994; Kristiono, 1997; Sjoholm, 1997; Krishna and Mitra, 1998). The reviewed studies tried to analyze the link between trade liberalization and productivity based on Verdoons law. Verdoorn's laws hypothesize that expansion of output results in a higher level of productivity. The argument behind this hypothesis is that expansion of output creates economies of scale, specialization and a favorable environment for innovation, and these factors eventually result in higher levels of growth and of productivity. The expectation is that liberalization will increase efficiency and thereby allow a sufficiently greater scale of production. In the Indian context, many studies {Das (1998); Krishna and Mitra (1998); Unel (2003); Banga and Goldar (2007)} have proved the positive relationship between trade liberalisation and productivity. While the studies of Trivedi *et al.*, (2000), Goldar (2000), Balakrishnan *et al.*, (2000), Goldar (2002), Goldar and Kumari (2003), Goldar (2004) and Prakash (2006) indicated a fall in the growth rate of TFP in Indian manufacturing in the post-reform period. The difference in the findings of these studies may be attributed to the difference in the methodology adopted by these studies.

B. Productivity in Indian Textiles: Subramanian (1992) examined the partial and total productivity growth of the cotton textile industry in Tamil Nadu for the period 1975-76 to 1985-86. The study found a decline in capital productivity as well as labor productivity during the study period. The decline in capital productivity is attributed to a decline in capacity utilization due to workers strike and severe power shortage. Total factor productivity indices show a decline in TFP. The decline in total factor productivity is attributed to workers' strike resulting in heavy loss of man-days, severe power cut, and increasing cost of raw cotton, labor and electricity.

Hashim (2004) analyzed the competitiveness of Indian textile industry in terms of unit cost and productivity for the three main textile industries, viz, cotton yarn, man-made textiles and readymade garments by using a panel data analysis for selected states during 1989-97. The study found an inverse relationship between the unit cost and productivity: Industry and states, which witnessed higher productivity (growth) experienced lower unit cost (growth) and vice-versa.

Sarma and Reddy (2006) examined the productivity trends of 14 major states and all India textile industry for pre and post-liberalization period. The results of Divisia total factor productivity index shows that for most of the states the TFP growth rates are relatively lower than the pre-liberalization period for the textiles and manufacture of textile products industries. For most of the states, the TFP growth rates are negative in post-reforms period in textile. The study also found that among the determinants of productivity, the coefficient of the relative degree concentration is a significant factor contributing to productivity in all the states.

Joshi and Singh (2010) analyzed the TFP in the Indian garment-manufacturing firms during 2002-2007 to identify sources of the TFP and also suggested measures for the firms to enhance their productivity. It was found that during the study period the Indian garment industry has achieved a moderate average TFP growth rate of 1.7 per cent per annum. The medium and large scale firms were found to be more productive than small scale firms. The study attributed productivity growth largely due to technical efficiency change rather than by technological change.

Murugeshwari (2011) analyzed the impact of the policy shift on total factor productivity in the Indian textile industry. The results indicate that the textile industry has shown total factor productivity (TFP) improvement and technological progress during the pre-liberalization period which reveals that competition has reduced the productivity performance and the technological progress of this industry.
Ghambir and Sharma (2015) probed into the sources of productivity gain for large and small scale manufacturing firms by using the firm-level panel data of 160 companies for the period 2007-2008 to 2012-2013. The results of Malmquist productivity index shows that technological change and scale efficiency are the major sources of productivity gain. Compared to the small firms, moderately large companies exhibited better productivity during the study period.

The above reviews throw light upon the changes in the productivity of the textile industry at the firm level and industry level. But no attempt has been made to analyze the impact of the removal of quota restrictions on the productivity of Indian textile industry. In the given context, the present study tries to understand the effect of quota removal restrictions on the productivity of Indian textiles.

III. METHODOLOGY AND DATA

For the analysis of productivity, the study considers a single output two input production technology for the textile

manufacturing units in India. The gross value of production has been taken as the proxy for output and the inputs considered in the study are capital and labor. The yearly input-output data has been collected from the Annual Survey of Industries (ASI) summary results for the 3-digit textile industry. For the analysis, the study considers three digit classifications of industries as given by the National Industrial Classification (NIC) Classification based on NIC 2008.

Four subsectors in the three digit classification, viz, NIC 131 (spinning, weaving and finishing of textiles). NIC 139 (Manufacture of other Textiles), NIC 143 (Manufacture of Knitted or Crocheted Fabrics and Articles) and NIC 141 (Manufacture of Wearing Apparel except fur apparel) have been included for the analysis. The ASI data has been analyzed for the period 1989-90 to 2011-12. The entire time period have been divided into pre-MFA and post MFA period. The former corresponds to the period 1989-90 to 2004-2005 and the latter corresponds to the period 2005-06 to 2011-12. All inputs, except labor input (which are measured by total no. of employees), are reported in the ASI in value terms (in Rs. Lakhs). All nominal values are deflated by appropriate wholesale price indexes to obtain real values.

Gross value added (net value added + depreciation) figures have been used to represent the output. To eliminate the price effect the gross value added figures have been deflated by using wholesale price indices (WPI) published by Office of the Economic Adviser, Ministry of Commerce and Industry, Government of India. WPI at 2005-06 prices for the textiles (Broad category) has been used as the price deflator. Since the values of WPI were expressed in three different bases (1980-81, 1993-94 and 2005-06), they have been arithmetically brought to a common base year (2005-06) through splicing method. To arrive at the fixed capital stock perpetual inventory method has been used. Capital is measured in terms of the real value of the capital stock (at 2005-06 prices) in the manufacturing process. The labor input has been measured in terms of the total persons engaged Employees include all workers and persons receiving wage/salary and holding supervisory or managerial positions engaged in administrative office, storekeeping and welfare sections, sales department as also those engaged in purchase of raw materials, etc or purchase of fixed assets for the factory and watch and ward staff.

Partial productivity has been calculated in terms of labor productivity, capital productivity and capital intensity.
Labor productivity has been calculated by the formula: Labor Productivity = Gross value added at constant prices / Total persons engaged

To understand the change in labour productivity, annual growth has been calculated by using the formula:
Labor Productivity Growth = [Labour Productivity_t – Labour productivity t / Labour Productivity t-1] x 100

Capital productivity has been estimated by using the formula: Capital Productivity = Gross Value Added at constant prices /Real capital stock
Capital productivity growth has been calculated by using the growth rate estimation formula:
Capital Productivity Growth = [Capital Productivity_t – Capital productivity t-1 / Capital Productivity t-1] x 100
To understand the efficiency of capital, the study has also calculated the capital intensity for the selected sectors. Capital intensity is measured as the ratio of real fixed assets to the total number of workers. It shows the extent of capital employed per unit of labour.

IV. EMPIRICAL RESULTS

This section explains the results of the empirical analysis related to labour productivity, capital productivity and capital intensity. Analysis of labour productivity in Table I shows an improvement in the average labour productivity in the post MFA period (Rs. 1667528.5) compared to pre MFA (Rs. 1428872.25). During the Pre MFA period, average labour productivity was highest for the manufacture of other textiles (NIC 139) followed by the manufacture of knitted and crocheted fabrics and articles (NIC 143). Lowest average labour productivity was recorded in the spinning, weaving and finishing of textiles (NIC 131). One of the reasons that can be attributed to the lowest labour productivity in the spinning, weaving and finishing of textiles is the composition of the workforce compared to the competing countries. Most of the cotton weaving clusters of India has a very high percentage of the male labour force compared to women labour force Women workforce, being more productive gives competing countries an advantage over India in labour productivity. Strict laws which stop women labour to work for late hours in the night even if they are willing to do so, further hits the productivity since the overall working hours of the factory are cut short ("Heuristic," n.d., PP 39-40). Increased labour productivity during the post MFA period can be attributed to the increased productivity achieved in three product groups, viz, spinning, weaving and finishing of textiles, manufacture of wearing apparel and manufacture of knitted and crocheted fabrics (NIC 131, 141 and 143).

During the post MFA period, lowest average labour productivity was recorded in Manufacture of Knitted and crocheted Fabrics and articles (NIC 143). One of the factors that can be attributed to the low labour productivity could be the strict labour laws which India follow compared to other competing countries. Because of the stringent labour laws, there are reported issues of long absenteeism from work, lower levels of efficiency in work and other uses which impact the productivity of the Indian labour force. Apart from this, there is a dearth of new skilled labour joining the industry and Indian workers are lagging behind the competing countries. Even though Indian firms are equipped with imported machinery there is unavailability of technical manpower for effectively running of such machinery. ("Heuristic," n.d., pp. 39-40).

TABLE I ESTIMATES OF LABOUR PRODUCTIVITY FOR INDIAN TEXTILE INDUSTRY – PRE AND POST MFA PERIOD (AT PER PERSON ENGAGED)

Year	Spinning, weaving and Finishing of textiles (NIC 131)	Manufacture Other Textiles (NIC 139)	Manufacture of Wearing Apparel except fur apparel (NIC 141)	Manufacture of Knitted and crocheted Fabrics and articles (NIC 143)	Mean
	Pre MFA Phase (1989-90 to 2004-05)				
1989-90	7,75,365	21,38,815	9,06,150	11,28,062	12,37,098
1990-91	6,72,346	25,04,569	9,63,825	9,96,990	12,84,433
1991-92	7,95,112	25,88,682	12,21,524	11,53,115	14,39,608
1992-93	10,21,146	24,41,231	11,50,931	11,59,134	14,43,111
1993-94	11,70,292	18,60,550	15,13,499	11,00,812	14,11,288
1994-95	8,05,147	18,06,097	13,96,655	11,21,012	12,82,228
1995-96	10,51,891	13,88,641	10,69,696	14,09,425	12,29,913
1996-97	9,46,361	17,67,523	10,31,919	14,82,866	13,07,167
1997-98	11,95,814	19,43,972	11,05,276	17,24,849	14,92,478
1998-99	12,52,905	15,51,451	12,94,309	12,30,992	13,32,414
1999-00	13,64,308	17,37,535	13,93,436	19,83,489	16,19,692
2000-01	12,52,910	20,50,757	13,65,820	18,04,585	16,18,518
2001-02	14,75,809	18,76,663	11,29,078	13,57,579	14,59,782
2002-03	15,06,611	18,82,025	13,60,010	16,51,134	15,99,945
2003-04	17,54,109	20,81,080	12,00,475	14,23,497	16,14,790
2004-05	19,26,482	17,22,571	10,99,789	12,09,115	14,89,489
Mean	1185413	1958885	1200150	1371041	1428872.25
S.D	358870	332803	173328	289404	
C.V	30.27	16.99	14.44	21.1	
	Post MFA (2005-06 to 2011-12)				
2005-06	21,06,458	18,06,690	35,30,950	12,12,471	21,64,142
2006-07	21,02,497	8,25,444	13,56,308	15,35,597	14,54,962
2007-08	18,69,375	20,04,239	13,24,889	16,04,749	17,00,813
2008-09	24,85,653	22,25,246	15,30,691	11,07,164	18,37,189
2009-10	31,15,177	23,52,260	15,13,840	15,30,741	21,28,005
2010-11	22,19,784	23,51,371	17,29,086	14,55,742	19,38,996
2011-12	22,60,464	20,18,075	15,95,334	13,89,384	18,15,814
Mean	1527218	1940475	1797300	1405121	1667528.5
S.D	641098	530845	776752	183193	
C.V	41.98	27.36	43.22	13	

Source: Computation based on ASI data

It is evident from Table II that the only sector which has recorded a positive CAGR during the four phases of MFA is the spinning, weaving and finishing sector and this sector recorded the highest CAGR during the III Phase while all other sectors recorded a negative growth rate in the same period. One of the reasons for this increased growth rate may be the rapid increase in investment in new spindles during this period. This would have led to a rise in the efficiency of the working spindles (Bedi & Cororation, 2008). A comparison of the post MFA growth rate shows that only two sectors, viz, spinning, weaving and finishing as well as the manufacture of knitted and crocheted fabrics, recorded a positive growth rate in the post MFA period.

The highest growth rate was recorded in the manufacture of knitted and crocheted fabrics during the post MFA period. High growth in labour productivity can be linked to increased investment and modernisation in the spinning sector (Oberoi, 2012).

TABLE II CAGR OF LABOUR PRODUCTIVITY IN INDIAN TEXTILE INDUSTRY – PHASE WISE COMPARISON

Sub Sector	Pre MFA			Post MFA
	I Phase	II Phase	III Phase	IV Phase
Spinning, Weaving and Finishing	4.4	4.18	8.54	1.01
Manufacture of Knitted & Crocheted Fabrics	6.96	2.48	-9.86	1.96
Manufacture of Wearing Apparels	1.1	-3.36	-6.83	-10.73
Manufacture of Other Textiles	11.87	4.87	-2.91	-0.25

I Phase – 1995, II phase- 1998, III phase -2001, IV Phase -2005
Source: Computation based on ASI data

The annual growth of labour productivity for different product groups of Indian textiles during the study period has been depicted in Fig.1. Except for the manufacture of knitted and crocheted fabrics (NIC 143), all other product groups show a wide fluctuation during the post MFA period Refer to Table I. The CV for these sectors is high during the post MFA compared to pre MFA. In the post MFA period, the maximum labour productivity growth was achieved in the manufacture of wearing apparels in 2005-06, ie, in the first year of quota removal. Among the different product groups, the only sector which has shown a positive labour productivity growth throughout the post MFA period is the spinning, weaving and finishing of textiles.

Table III shows the estimation of capital productivity shows that the mean capital productivity was higher (0.56) during the pre MFA period compared to post MFA period. The industry's average capital productivity ratio during pre MFA period is 0.56 which indicates that per unit of every rupee invested capital could produce Rs. 0.56 worth of output. Among the different product groups, the highest mean capital productivity was recorded in manufacture of wearing apparel except fur apparel (NIC 141) followed by the manufacture of other textiles (NIC 139) during the pre MFA period. Lowest capital productivity was recorded in the spinning, weaving and finishing of Textiles (NIC 131) during the pre MFA period. Across the product groups, maximum variation (59.8 percent) was recorded in the manufacture of other textiles (NIC 139) followed by the manufacture of knitted and crocheted fabrics and articles (NIC 143). Minimum variation (54.3 per cent) was recorded in the manufacture of wearing apparels (NIC 141).

TABLE III ESTIMATION OF CAPITAL PRODUCTIVITY FOR INDIAN TEXTILE INDUSTRY – PRE AND POST MFA PERIOD (AT PER RUPEE INVESTED)

Year	Spinning, weaving and Finishing of textiles	Manufacture of Other Textiles	Manufacture of Wearing Apparel except fur apparel	Manufacture of Knitted and crocheted Fabrics and articles	Mean
	NIC 131	NIC 139	NIC 141	NIC 143	
1989-90	0.78	1.161	2.21	1.65	1.45
1990-91	0.52	0.855	1.86	1.34	1.14
1991-92	0.5	0.718	1.87	1.13	1.05
1992-93	0.53	0.51	1.64	1.09	0.94
1993-94	0.5	0.421	1.79	0.97	0.92
1994-95	0.3	0.404	1.31	0.69	0.68
1995-96	0.31	0.285	0.86	0.57	0.51
1996-97	0.23	0.271	0.77	0.6	0.47
1997-98	0.25	0.312	0.68	0.49	0.43
1998-99	0.21	0.255	0.83	0.38	0.42
1999-00	0.19	0.283	0.7	0.42	0.40
2000-01	0.16	0.347	0.61	0.44	0.39
2001-02	0.17	0.273	0.52	0.34	0.33
2002-03	0.17	0.276	0.59	0.37	0.35
2003-04	0.18	0.333	0.54	0.39	0.36
2004-05	0.19	0.25	0.58	0.32	0.34
Mean	0.321	0.435	1.086	0.7	0.56
S.D	0.18	0.26	0.59	0.41	
C.V	57.1	59.8	54.3	58.4	
2005-06	0.19	0.271	1.3	0.31	0.52
2006-07	0.18	0.31	0.63	0.27	0.35
2007-08	0.15	0.295	0.63	0.3	0.34
2008-09	0.18	0.253	0.61	0.26	0.33
2009-10	0.2	0.294	0.6	0.31	0.35
2010-11	0.15	0.294	0.61	0.29	0.34
2011-12	0.14	0.234	0.59	0.25	0.30
Mean	0.17	0.30	0.71	0.29	0.29
S.D	0.03	0.03	0.26	0.02	
C.V	15.4	9.8	36.6	8.7	

Source: Computation based on ASI data

In the post MFA period, the industry recorded average capital productivity of 0.29 which is lower than the pre MFA period. One of the factors that can be ascribed to the low capital productivity could be the decrease in the productivity of the new firms who have entered into the market in the post MFA period. The new firms would

certainly require adequate time to adapt to the new (technology) environment to prove to be efficient and competitive. The same reason can be applied to this case as well where the phasing out of quota restrictions could have initiated more non-exporting firms to become exporters. Since those firms would have needed time to adapt to the new environment, there could have been a fall in their overall efficiency. Owing to rigidities in the form of stringent domestic regulations, the firms in the textile industry suffer from the lack of flexibility to cut down their inputs to an efficient level that would allow these firms to attain higher efficiency in terms of operating at the frontier (Sasidaran and Shanmugam, 2008). Apart from this, factors like unproductive assets (low capacity utilization), use of more capital intensive technology (capital per labour) and relative change in the price of output to capital stock are the factors which could explain the steep decline in capital productivity (Bedi & Cororation, 2008).

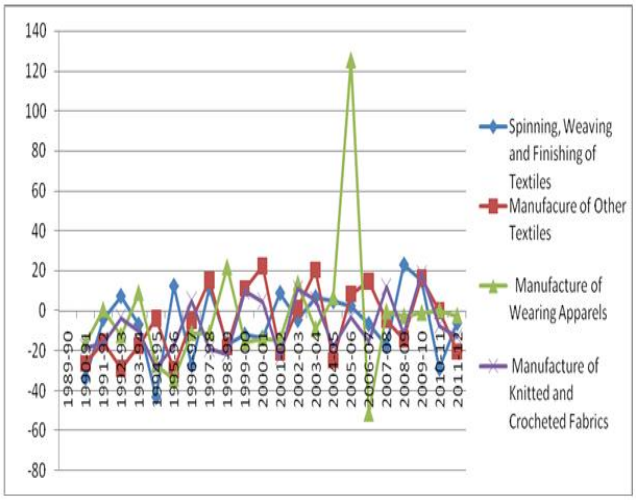
The manufacture of wearing apparels (NIC 141) continued to have the highest mean capital productivity (0.71) followed by the manufacture of other textiles (NIC 139) in the post MFA period. The lowest mean capital productivity was recorded in the spinning, weaving and finishing of textiles (NIC 131). This indicates that the capital productivity of this sector is decreasing over some time. In terms of the variation in productivity, maximum variation was reported in the manufacture of wearing apparels (36.6 percent) followed by spinning, weaving and finishing of Textiles (NIC 131). Lowest variation has been recorded in the manufacture of knitted and crocheted fabrics (8.7 percent). This analysis leads us to the conclusion that the capital productivity of the textile industry has been decreasing over the period, especially after the removal of MFA.

TABLE IV CAGR OF CAPITAL PRODUCTIVITY IN INDIAN TEXTILE INDUSTRY – PHASE WISE COMPARISON

Sub Sector	I Phase	II Phase	III Phase	IV Phase (Post MFA)
Spinning, Weaving and Finishing	-6.79	-4.72	3.74	-4.57
Manufacture of Knitted & Crocheted Fabrics	-5.27	-3.09	-4.63	-3.12
Manufacture of Wearing Apparels	-7.51	-11.08	-0.98	-10.62
Manufacture of Other Textiles	3.13	1.78	-3.27	-2.07

Source: Computation based on ASI data

Table IV shows the CAGR of capital productivity for different subsectors of the Indian textile industry during the different phases of MFA. It is evident that capital productivity recorded a negative CAGR during the post MFA period for all the product groups. There are two product groups, viz, manufacture of knitted and crocheted fabrics (NIC 141) as well as the manufacture of wearing apparels (NIC 143), which have recorded a negative CAGR during the four phases of MFA. This is a cause of worry for Indian textiles. In the case of manufacture of other textiles, a positive CAGR was recorded in the I and II phase and in the case of spinning, weaving and finishing of textiles, a positive CAGR was recorded in the III phase. The decline in capital productivity over the period 1990-91 to 2006-07 could be linked to a decline in capacity utilization. During this period, the prices of textile machinery increased much faster compared to yarn and fabric products. Most of the apparent decline in output-capital ratio could be attributed to the relative increase in the prices of plant and machinery (NCAER report, 2010).



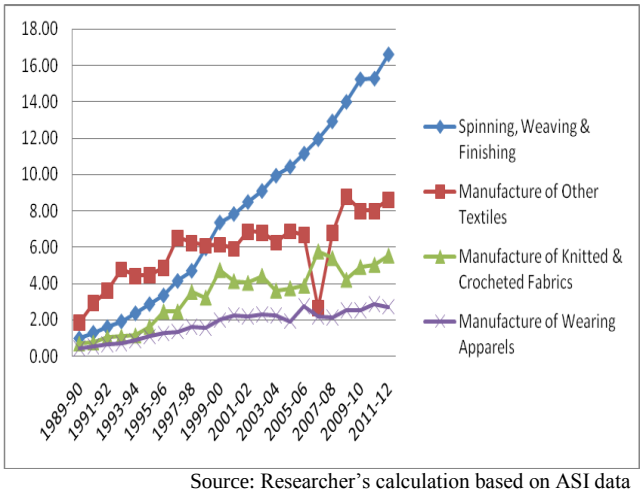
Source: Researcher's calculation based on ASI data

Fig. 1 Growth of Capital productivity for Indian Textiles

Fig.1 indicates the growth in the capital productivity of different product groups during the study period. It is evident from figure 2 that all the product groups show fluctuations in the growth of capital productivity during pre and post MFA period. Capital productivity showed the highest fluctuation for the manufacture of wearing apparels in the year 2005-06 as well as 2006-07. These fluctuations in productivity may be due to the change in the capital intensity associated with this sector during this period.

A comparison of the capital intensity for the different product group from 1989-90 to 2011-12 shows that the highest capital intensity has been associated with the spinning, weaving and finishing of textiles followed by the manufacture of other textiles. Spinning, weaving and finishing is a capital intensive sector, it is expected that this group would have the highest capital intensity and the lowest capital intensity is recorded for the manufacture of wearing apparels. The average capital intensity in the post MFA period is higher for all the product groups compared to the pre MFA period. It is highly noteworthy that the spinning, weaving and finishing of textiles recorded 169 percentage increases in capital intensity in the post MFA period compared to pre MFA. The increased capital intensity in this sector would have led to improved labour productivity in this sector during the post MFA period. Both neoclassical and new growth theories generally

explain that around one-third of labour productivity growth is due to capital intensity (Englander and Gurney, 1994).
A similar argument has been put forward by Ahulwalia (1991).



Source: Researcher's calculation based on ASI data
Fig. 2 Capital intensity of the Indian Textile Industry

Fig. 2 depicts the trend in the capital intensity of the different product groups of Indian textiles during the study period. Spinning, weaving and finishing of textiles show increased capital intensity throughout the study period. In the case of other product groups, capital intensity shows a more or less steady trend. In the case of manufacture of other textiles, the capital intensity shows a drastic fall in the year 2006-07. This may be due to fluctuation in the data. One of the reasons that can be attributed to the increased capital intensity is the progressive dereservation of the garment sector from the small scale sector until 2001; most of the textile and clothing sector was reserved for the small scale sector. The existence of many sectors under the SSI has precluded investment and modernization in the past. This reservation policy has also led to the fragmentation in the supply chain in the textiles and clothing industry In India only three and a half per cent of total cloth production is from the organised sector and 12,000 of the 14,500 are hand processing units. Apart from spinning, the rest of the activities like weaving, processing, made-ups and garmenting are all found to be fragmented in India with consequential impact on quality and standardization (Ananthakrishnan and Chandra, 2005).

Until the beginning of 2005, items in knitting and hosiery sectors continued to be reserved for the small scale sector. Along with this, the disbursement of credit under the Technological Up gradation Fund Scheme (TUFS) for the modernization and up gradation of the textile industry also would have led to increased capital intensity The TUF scheme provides a 5 percent interest reimbursement or 12 percent upfront subsidy on loans for investments in technology for specified sectors of the Indian textile industry.

The rise in capital intensity indicates the fact that modernization is taking place in the sector, which is ensuring a rise in output to the capital stock ratio (Anantakrishnan and Chandra, 2005). Another factor that can be attributed to the higher capital intensity is the rigid labour laws existing in India. Labour rigidities due to stringent labour regulation can lead countries to use more capital intensive techniques in production by imposing costs on the employment of labour (Hasan, Mitra and Sundaram, 2010).

Even after liberalization in 1991, the Indian government encouraged the use of imported capital inputs in manufacturing at low custom duty rates for export-oriented production and credit was subsidized for technology up gradation, especially for small and medium-sized firms In addition to stringent labour regulation, these government schemes would have incentivized the substitution of capital for labour by the Indian textile industry.

TABLE V COMPARISON OF AVERAGE LABOUR PRODUCTIVITY, CAPITAL PRODUCTIVITY AND CAPITAL INTENSITY OF INDIAN TEXTILE INDUSTRY – PRE AND POST MFA

Sub Sector	Labour Productivity (at per person engaged)		Capital Productivity (at per rupee invested)		Capital Intensity	
	Pre MFA	Post MFA	Pre MFA	Post MFA	Pre MFA	Post MFA
Spinning, Weaving and Finishing	1185413	2308487	0.321	0.167	5.16	13.88
Manufacture of Other Textiles	1958885	1940475	0.435	0.279	5.29	7.08
Manufacture of Wearing Apparels	1200150	1797300	1.086	0.708	1.42	2.51
Manufacture of Knitted & Crocheted Fabrics	1371041	1405121	0.7	0.285	2.66	4.96

Source: Computation based on ASI data

Table V shows the change in the partial productivity indices of the different product groups of Indian textiles during the study period. It is evident from Table 5 that the capital intensity has increased for all the product groups in the post MFA period compared to pre MFA. If we consider the capital productivity, it can be seen that the post MFA period recorded decreasing capital productivity for all the product groups compared to pre MFA period. At the same time, labour productivity has increased for all the product groups, except for the manufacture of other textiles, during the post MFA period. This implies that increased capital intensity could have led to increased labour productivity in these sectors. This result conforms to the findings of Ahluwalia (1991) in which she had shown a sharp increase in capital

intensity accompanied by falling capital productivity and moderately rising labour productivity. In the case of the manufacture of other textiles (NIC 139), increased capital intensity has not resulted in improved labour productivity. There is a marginal decrease in the labour productivity of this product group in the post MFA period. This sector being capital intensive, the decreased capital productivity would have contributed to the declining labour productivity consists of two components. Y/L = Y/K x K/L where Y/L is the labour productivity, Y/K is the capital productivity and K/L is the capital intensity. Even though there is increased capital intensity in this sector the less efficient use of capital would have led to a decrease in labour productivity. In all other sectors, even though capital productivity is declining, the increased capital intensity has contributed to increased labour productivity. This result contradicts the findings of Singh (1987), Bhatnagar (1988) and Ahulwalia (1991) where they found a positive relationship between capital intensity and labour productivity.

Results from Table V also indicates that in spite of the increased capital intensity in capital intensive product groups, viz, spinning, weaving and finishing of textiles (NIC 131) and manufacture of other textiles (NIC 139), these product groups experienced a decline in capital productivity in the post MFA period. This result conforms to the findings of Bhatnagar (1988) where he found a negative relationship between capital intensity and productivity of capital. This reflects the scarcity of skilled workforce to work on the new installed capacity. This is a matter of concern for the Indian textile industry.

V. SUMMARY AND CONCLUSION

Estimation of labour productivity shows an improvement in labour productivity during the post MFA period. The highest average labour productivity was recorded in the manufacture of other textiles (NIC 139) and the lowest productivity in the manufacture of knitted and crocheted fabrics (NIC 143) during the post MFA period. A comparison of CAGR of labour productivity shows that only one product group, viz, the manufacture of spinning, weaving and finishing (NIC 131), has recorded a positive CAGR during the four phases of MFA. In the post MFA period only two product groups, viz, spinning, weaving and finishing of textiles (NIC 131) and manufacture of knitted and crocheted fabrics (NIC 143), achieved a positive growth rate.

Analysis of capital productivity reveals that average capital productivity was higher during the pre MFA period compared to post MFA period. Manufacture of wearing apparels (NIC 141) achieved the highest average capital productivity growth both during the pre and post MFA period. The lowest average capital productivity was recorded in spinning, weaving and finishing of textiles (NIC 131). A comparison of CAGR of capital productivity shows that all the product groups recorded a negative CAGR during the post MFA period. Two product groups, viz, manufacture of knitted and crocheted fabrics (NIC 143) as well as the manufacture of wearing apparels (NIC 141) recorded negative CAGR during the four phases of MFA.

A probe into the capital intensity reveals that there has been an increase in the capital intensity for all product groups in the post MFA period compared to pre MFA. Among the different product groups spinning, weaving and finishing of textiles recorded 169 percentage increases in capital intensity in the post MFA period compared to pre MFA. It can be inferred that increased capital intensity has led to increased labour productivity for all the product groups, except for the manufacture of other textiles (NIC 139). The highest capital intensity was recorded in the spinning, weaving and finishing of textiles. In spite of the increased capital intensity in capital intensive product groups, viz, spinning, weaving and finishing of textiles (NIC 131) and manufacture of other textiles (NIC 139), these product groups experienced a decline in capital productivity in the post MFA period. This reflects the scarcity of skilled workforce to work on the new installed capacity.

The above analysis throws light upon the fact even though the Indian textile industry's partial productivity performance shows an improvement in the post MFA period, the result is not very promising as expected. There are so many impediments which halt the productivity growth of the Indian textiles. Timely policy interventions are required to achieve remarkable progress in this sector.

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