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Organized Manufacturing Sector of Himachal Pradesh: A Case Study of Chemical and Chemical Products Industry

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Abstract

In this paper, the growth and productivity performance of the organized manufacturing sector and the chemical and chemical products industry of Himachal Pradesh is undertaken. The period covered in the analysis is from 1980-81 to 2012-13, which is broken into three sub-periods dividing the study period into the pre and post-reform period and the data is taken from the Annual Survey of Industries. The percentage share of the chemical products industry has increased during the post-reform period, particularly after the year 2005-06 and industry emerged as a dominant industry. The paper concludes that the growth rate of the output, value added, capital and the employment in the organized manufacturing sector has decelerated, due to decelerated growth rates of the labour and capital productivity along with the total factor productivity, during the first decade of the reform period as compared to the pre-reform period. Nevertheless, the growth rate of the above mentioned variables has accelerated during the second decade of the reform period. The industry has realized increased growth rates of the number of factory units, the total person employed and the number of employees, but there was declined growth rate of the fixed capital, which has brought deceleration of the growth rate of the output and value added during the second decade of reform period as compared to the first decade of the reform period. The growth rate of the labour productivity and capital intensity has increased during the first decade of the reform period, but has declined during the second decade of the reform period. Total factor productivity has improved during the post-reform period.

Introduction

Industrial development has become a matter of serious concern for the planners and policy makers, for the development of the nation. Industrialization plays an indispensable part in the development of developing as well as developed countries as it helps them not only to maintain their existing growth, but also to enjoy still higher standards of living. Therefore, rapid industrial growth has been a major objective of planning in India. Industrialization in Himachal Pradesh is comparatively a recent phenomenon. The severe climatic conditions, topographical and geographical severities throw challenges in the process of industrialization. In such a scenario, the benefits in the form of incentives and subsidies as well as the development of appropriate infrastructure become the main instruments to attract industrial investment in the State.

The organized manufacturing sector of Himachal Pradesh has stood in 19th rank among Indian states. Himachal Pradesh contributes less than two percent share of output and 1.5 percent share of the employment and contributed 4.5 percent share in the total fixed capital of the organized manufacturing sector of India up to the year 2012-13 and this percentage share increased during the post-reform period as compared to the pre-reform period. The experience of developed and developing countries show that organized manufacturing sector acts as an engine of growth for development of economy. This issue initiates us to analyze the performance of the organized manufacturing sector of the Himachal Pradesh.

Further the chemical and chemical products industry is another oldest industry in India and is among the most diversified. The chemical products industry of Himachal Pradesh has made significant advances despite the challenges during the pre-liberalization and liberalization period. The industry has occupied a dominant position not only in output and value addition, but also in providing employment throughout the study period. It encompasses more than 70,000 commercial products, ranging from basic chemicals to petrochemicals; fertilizer to pharmaceuticals; paints, soap, detergent; toiletry to perfumes, etc. In the modern diversified world, the industry not only plays an important role in meeting the household needs of the consumer, but also serves as a catalyst for the industrial and economic growth of a country. In this background the present study analysed the performance of the Organized manufacturing sector and the chemical and chemical products industry of Himachal Pradesh.

Data Sources, Time Period and Methodology

The major source of the data is the Annual Survey of Industries (ASI). The data has been deflated by the consumer price index and wholesale price index. The wholesale price index of 2011-12 as the base year, whereas for consumer price index the base year is 2010-11. The time frame of the present paper has been since the year 1980-81 to 2012-13, which has further divided to the pre-reform period (from 1980-81 to 1990-91), the first decade of the reform period (from 1990-91 to 2000-01) and second decade of reform period (from 2000-01 to 2012-13).

The objectives of the study are; to analysis the percentage shares of the chemical and chemical products industry out of the organized manufacturing sector of Himachal Pradesh; to analysis the trend growth rates of various selected variables. Further, to analysis the trend growth

rate of partial factor productivity, capital intensity and total factor productivity during the pre-reform period and post-reform period.

The paper has been divided into four sections. The first section will give an account of the percentage share of the chemical and chemical products industry. The growth behavior of the selected variables for the organized manufacturing sector and the chemical products industry was presented in section two. The growth rate of the partial factor productivity and factor intensity has been presented in section third. Section fourth presented the growth rate of the total factor productivity and it has been followed by the conclusion.

Section 1

Percentage Share of Important Variables: An Analysis of the Chemical and Chemical Products Industry

In the chemical and chemical products industry, the percentage share of the number of units and fixed capital has declined during the pre-reform period, but impressive recovery was exhibited during the post-reform period. Removal of quantitative and non-quantitative restriction, rationalization of subsidies, enforcing fiscal prudence, easing regularity controls are some of the reasons that helped the industry to register a higher percentage share during the post-reform period.

The percentage share of the total person employed and the number of workers has declined during the pre-reform period, but increased during the post-reform period. Similarly, the trend has also been found in the percentage share of the number of workers and employees, which declined up to the year 1995-96 and thereafter, increased consecutively during post-reform period. As demand for labor is derived demand, hence higher level of output must increase employment level. The chemical and chemical products industry has witnessed dominant position in the percentage share of output in the early year of the 1980s, but it has lost its position to the textile industry up to 2000-01. But after the year 2000-01, the chemical industry has again displayed its dominance in output and value addition. The chemical industry has cornered dominant share in the output of (35.3%) and value added (52.4%) in the year 1980-81, out of the organized manufacturing sector of Himachal Pradesh.

The percentage share of wages and the number of workers decreased during the pre-reform period, but increased during the post-reform period. The chemical and chemical product industry emerged as the gainer in percentage share of the worker and wages in the post-reform period. Percentage share of the emoluments in the chemical and chemical product industry has declined from 21.7 percent to 8 percent in the pre-reform period.

The percentage share of the output has increased from 4.61 percent to 20.97 percent and placed this industry at the second position in the first decade of the post-reform period. Besides this, the industry has secured the third position in terms of value added in the year 2000-01 and its percentage share has increased from 5.39 percent to 19.89 percent during the period of the 1990s. The table 1.1 reveals that the percentage share of output and gross value added of the chemical and chemical products industry has gained the largest share (20.9% and 38.5%, respectively) during the

period from 2000-01 to 2005-06 and it has retained its dominance in the year 2012-13 and stood at first position by cornering 35.16 percent in output and 52.50 percent in value added respectively.

Table 1.1 Percentage Share of selected Variables of Chemical and Chemical Products Industry out of the Organised Manufacturing Sector of Himachal Pradesh

(Percentage share)									
Variables	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2011-12	2012-13
Output	35.35	9.46	4.61	10.19	20.97	38.02	37.11	39.12	35.16
Gross Value Added	52.45	10.83	5.39	10.50	19.89	58.40	49.44	57.52	52.50
Total Persons Employed	21.75	12.98	7.52	7.79	8.52	17.63	32.33	31.52	33.39
Number of Units	16.09	9.18	8.89	8.20	14.08	17.93	24.31	23.46	25.04
Fixed Capital	14.25	4.73	4.99	9.84	15.62	46.73	31.31	36.67	40.22
Total Emoluments	21.72	12.32	8.04	9.38	11.71	22.93	39.74	40.48	38.43
Wages	20.54	11.93	7.39	8.08	7.72	14.48	32.29	26.08	32.30
Number of Workers	20.81	12.18	7.45	6.62	7.00	16.16	30.92	28.13	30.44
Number of Employees	21.77	13.04	7.51	7.80	13.25	22.06	37.02	40.13	41.27

Sources: calculated from various issues of ASI

Percentage Share of Important Variables: An Analysis of Intra-Chemical Products Industries.

The Structural Composition of Chemical and Chemical Product Industry.

- (1) NIC-241- Manufacture of basic chemicals
- (2) NIC-242-Manufacture of other chemical products
- (3) NIC-243-Manufacture of man-made fibers

Table 1.2 presents the percentage share of employment, emoluments, output and gross value added of sub-group of chemical and chemical products industries for the year 1980-81 to 2012-13. It is clear from the table values that the percentage shares of employment; emoluments, output and gross value added have increased in the pre-reform period, but exhibited a mixed trend in post-reform period for the manufacture of other chemical products industry (NIC-242). Further, the percentage share of gross value added is higher than that of output during the pre-reform period as well as post-reform period. The industry (NIC-242) retained largest percentage share of employment (82.57 %); the emoluments (91.3%), output (96.9 %) and gross value added (96.3%) in the post-reform year 2000-01.

The percentage share of employment, emoluments, output and value addition of manufacture of basic chemicals (NIC-241) industry was conspicuous by its absence during the pre-

reform period, but marked its considerable presence up to 1995 and started to decline sharply and showed its presence in terminal years of study.

Declined percentage share of output and employment led to higher percentage share emoluments and gross value added for the manufacture of man-made fibers (NIC-243) in the year 1980-81 to 1985-86. The (NIC-243) industry has lost its presence after the year 1985-86 and has not been able to re-emerge again significantly. The percentage share of output is greater than that of gross value added in the same time period. The manufacturing of other chemical products industry (NIC-242) maintained its dominance in providing employment, emoluments, output and value added (except 1985-86) throughout the study period. But up to 1985-86 higher percentage share of employment was unable to produce higher percentage share of output and value added and this share was grabbed by the manufacturing of man-made fiber industry (NIC-243).

Table No. 1.2 Percentage Share of Important Variables - An Analysis of Intra-Chemical and Chemical Products Industry

Variable	Employment			Emoluments			Value of Output			(Percentage share) Gross Value Added		
	NIC-241	NIC-242	NIC-243	NIC-241	NIC-242	NIC-243	NIC-241	NIC-242	NIC-243	NIC-241	NIC-242	NIC-243
1980-81	0.00	63.80	36.20	0.00	64.47	35.53	0.00	15.17	84.83	0.00	42.56	57.44
1985-86	0.00	66.72	33.28	0.00	63.93	36.07	0.00	30.02	69.98	0.00	41.86	58.14
1990-91	26.60	73.40	0.00	24.74	75.26	0.00	59.89	40.11	0.00	41.24	58.76	0.00
1995-96	33.51	66.49	0.00	33.18	66.82	0.00	32.81	67.19	0.00	13.81	86.19	0.00
2000-01	17.43	82.57	0.00	8.66	91.34	0.00	3.01	96.99	0.00	3.70	96.30	0.00
2005-06	3.60	96.40	0.00	1.78	98.22	0.00	1.58	98.42	0.00	1.18	98.82	0.00
2010-11	1.55	98.45	0.00	0.66	99.34	0.00	1.13	98.87	0.00	0.29	99.71	0.00
2011-12	1.59	98.19	0.22	1.04	98.91	0.05	0.55	99.33	0.12	0.39	99.59	0.02
2012-13	1.51	98.23	0.26	0.83	99.06	0.11	0.64	99.36	0.00	0.24	99.65	0.11

Sources: Author's own calculation from various issues of ASI

Section 2

An Analysis of the Growth Rate of Selected Variables: Organized Manufacturing Sector of Himachal Pradesh

The growth rate of selected variables of the organized manufacturing sector of Himachal Pradesh has been presented in table 1.3. The growth rate of selected variables in organized manufacturing sector has been subjected to greater inter-temporal variation during the study period. The growth rate of selected variables has decelerated during the first decade of the reform period (1990-91 to 2000-01) as compared to pre-reform period, but there was a significant acceleration during the second decade of reform period (2000-01 to 2012-13).

The growth rate of the number of factory units has been higher during the second decade of reform period 2000-01 to 2012-13 as compared to first decade. The most probable reason may be due to the onset of new economic policies, enterprises must have certain apprehensions in their minds, for establishing new units during the first decade of the reform period, but during the second

decade, the growth rate of the number of factories accelerated up to the highest level. In contrast, the growth rate of fixed capital has decelerated throughout the post-reform decades as compared to the pre-reform period; however, the pace of deceleration speeded up during the second decade of reform period. It is interesting to note the significant growth rate of the number of factory units' accelerated up to the highest peak, which has been accompanied by significant deceleration of fixed capital touching its lowest ebb during the second decade of the reform period. The probable reason may be either existing units were splitting or new units were entering with low capital investment during the second decade. The growth rate of fixed capital remained higher than the growth rate of the number of units during the pre-reform periods as well as the post-reform periods. Therefore, it can safely be concluded that capital formation has taken place in the existing industries of the organized manufacturing sector during the study period.

The organized manufacturing sector has witnessed an impressive significant growth rate in output (38.28%) during the pre-reform period. Such a high growth rate may be due to the lower value of the base year. But this growth rate significantly decelerated and settled at 16.54 percent per annum during the first decade of the reform period. This may be primarily on account of the slow growth of various factors, including major labour inputs during the first decade of the reform period. However, some recovery was witnessed with statistically significant growth rate of 23.27 percent during the second decade of reform period. Similarly, the growth rate in value added has witnessed an impressive significant growth rate of 36.9 percent per annum during the pre-reform period, but sharply tapered off more than double and settled at 17.55 percent per annum during the first decade of the reform period. However, the growth rate picked upward to 24.24 percent per annum during the second decade of deregulation period.

Table No. 1.3 Trend Growth Rates in Selected Variables of Organized Manufacturing Sector of Himachal Pradesh

(Percent per annum)				
Variables	1980-81 to 1990-91	1990-91 to 2000-01	2000-01 to 2012-13	1980-81 to 2012-13
Output	38.28*	16.48*	23.27*	20.96*
Gross Value Added	36.91*	17.55*	24.24*	21.83*
Total Persons Employed	15.50*	6.95*	17.07*	10.09*
Number of Units	11.45*	8.19*	16.99*	10.11*
Fixed Capital	25.47*	24.05*	18.41*	17.90*
Emoluments	25.6*	10.3*	29.8*	16.9*
Wages to workers	27.15*	7.06*	24.32*	14.19*
Number of Workers	15.43*	6.91*	16.82*	10.03*
Number of Employees	15.48*	-7.99*	19.13*	3.68**

Sources: Calculated from Various Issues of ASI by Author

*= significant at 1 % level , **=significant at 5 % level

The growth rates of output and value added have realized higher growth during the pre-reform period as compared to the post-reform as well as whole study period, which implies that the organized manufacturing sector failed to sustain the growth momentum in output and value addition during post-reform period. The higher growth rate of value added as compared to output

implies that the organized manufacturing sector is either fetching higher prices for their products or got successes in the reduction of cost. It might be possible to charge higher prices in the pre-reform period, but due to the onslaught of MNCs, chances of charging higher prices seem impossible during the post-reform period. A similar growth rate trend was observed at all India level as Pappola et al. (2011) and Goldar (2014) reported a decelerated growth rate of the gross value added of the organized manufacturing sector of India during the corresponding period.

The higher trend growth rate in output and fixed capital as compared to the growth rate in the number of factory units and employment was noticed during the whole study period. Thus, the higher capital formation has resulted in higher output growth in the organized manufacturing sector of Himachal Pradesh. The high growth rate of the capital stock has failed to achieve a high growth rate in employment during the first decade of the reform period.

According to our expectation, the decelerated growth rate in output and value added has been accompanied by decelerated growth rate of employment during the first decade of reform period and accelerated growth has been matched by the accelerated growth rate of employment during the second decade of reform period. But, employment generation, has fallen far short of output and value added during the study period.

An Analysis of the Growth Rate of Selected Variables: Chemical and Chemical Products Industry

The analysis the growth performance of selected variables for the chemical products industry has been discussed during the pre-reform and the post-reform period and the results are shown in table 1.4. In the chemical products industry, there was a negative growth rate of the number of units and fixed capital during the pre-reform period, but the growth rates significantly accelerated during the post-reform period (except fixed capital during second decade). The higher growth rate of fixed capital, viz-a-viz the number of units' after the introduction of the new economic policies, signified that there was increase in capital formation by existing units as well as new entrants in the chemical industry. It is surprising to see that although there was a significant acceleration of factory units, but the growth rate of the fixed capital has declined during the second decade of reform period.

The growth rate of output was 2.51 percent during the pre-reform period; further it accelerated up to the highest peak rate of 29.29 percent during the first decade of reforms, but the same has decelerated to 18.18 percent during the second decade of reform period. However, the growth of value added has significantly accelerated up to a range of 34-35 percent during the post-reform periods as compared to the pre-reform period. The industry has witnessed higher growth rate of gross value added than that of output during the post-reform period.

The total person employed and the number of employees witnessed negative growth rate during the pre-reform period, but witnessed a significant increase during the second decade of the reform period, but surprisingly the effect cannot be transformed into output and value added during the same period. A higher growth rate in capital stock and output, as well as value added, have miserably failed to achieve higher growth of employment during the first decade of the reform

period, but despite a deceleration in capital stock and output, the growth rate of employment has accelerated during the second decade of the reform period.

In the chemical products industry, the expansion in the number of units with sound capital base has played the major role in the acceleration of the output and employment during the post-reform period. The chemical industry has failed miserably for gross value added, the total person employed, fixed capital and emoluments as the industry witnessed negative growth rate during the pre-reform period, however, all the above-mentioned variables have performed better on growth prospects during the post-reform period. Higher growth rate of the number of units has accompanied by higher growth rate of employment and emoluments and value added, during the study period. The wage and emoluments have more or less followed the same path that of employment during the study period.

In the basic chemical products industry (NIC-241), the declined growth rate of factory units has been accompanied by decelerated growth rate of fixed capital and total person employed during the first decade of reform period and it has resulted in a negative growth rate of the output and value added during the corresponding period. The manufacture of basic chemical (NIC-241) industry has exhibited higher growth rates than the manufacture of other chemical products (NIC-242) industry for all selected variables during the pre-reform period, however, the trend reversed during the first decade of the reform period (except fixed capital).

Table No. 1.4 Trend Growth Rates of Important Variables of the Chemical and chemical Products Industry

(Percent per annum)					
Variable	Industry	1980-81 to 1990-91	1990-91 to 2000-01	2000-01 to 2012-13	1980-81 to 2012-13
Output	Chemical products industry	2.51	29.29	18.18	23.21
	Manufacture of basic chemicals	85.49	-10.98	15.40	8.05*
	Manufacture of other chemical products	20.73*	45.79*	32.14*	33.33*
Gross Value Added	Chemical products industry	-1.98	34.35*	35.33*	28.66*
	Manufacture of basic chemicals	68.02	-5.58	13.90	12.40*
	Manufacture of other chemical products	-1.58	43.06*	35.57*	32.79*
Total Person Employed	Chemical products industry	-10.15	2.72	34.74*	13.58*
	Manufacture of basic chemicals	89.94	-11.36	11.29	4.52
	Manufacture of other chemical products	-7.04	5.93	36.24*	15.44*
Emoluments	Chemical products industry	-0.1	7.8	41.8*	27.0*
	Manufacture of basic chemicals	300.29	-13.54	21.62	6.76
	Manufacture of other chemical products	1.23	11.54*	42.41*	24.75*
Fixed Capital	Chemical products industry	-9.01	45.79*	25.47*	29.57*
	Manufacture of basic chemicals	120.45	-4.69	34.96	9.90*
	Manufacture of other chemical products	25.16	60.56	25.37	36.80
Wages	Chemical products industry	-1.18	-2.86	48.25*	17.26*
	Manufacture of basic chemicals	317.84	-14.08	18.94	3.26
	Manufacture of other chemical products	-3.81	-1.31*	49.93*	19.80*
Number of Employees	Chemical products industry	-10.26	-4.16	31.99*	8.52*
	Manufacture of basic chemicals	91.24	-21.83	14.52*	-1.54
	Manufacture of other chemical products	-7.28*	-0.60*	32.76*	10.38*
Number of units	Chemical products industry	-3.1	12.3*	25.5*	13.5*
	Manufacture of basic chemicals	21.67	-0.11	12.16*	7.27*
	Manufacture of other chemical products	1.71	17.79*	27.51*	17.01*

Sources: Calculated from various issues of ASI

The manufacturing of other chemical industry (NIC-242) has achieved higher trend growth rate in output, gross value added, total person employed, total emoluments, fixed capital and number of units as compared to the manufacturing of basic chemical industry (NIC-241) during the first decade of the reform period (1990-91 to 2000-01). The manufacture of other chemical products industry has realized much higher growth rate of all selected variables as compared to the manufacture of the basic chemical industry during the whole study period. The growth rate of employment has fallen more than two times shorter as compared to the growth of output and value added for both of these sub-group industries.

Section 3

An Analysis of the Growth Rate of Partial Factor Productivities and Factor Intensity: Organized Manufacturing Sector and Chemical and Chemical Products Industry

In organized manufacturing sector, the decline in the growth rate of labor productivity was contributed by a decline in the growth rate of capital productivity (although the capital intensity accelerated) during the post-reform period as compared to the pre - reform period. The present analysis reflects that despite improvements in capital intensity, the capital productivity has declined substantially during the 1990s indicating the persistence of under-utilization of capital stock or failure to sustain an optimum level of capital-output ratio, during the first decade of deregulation period. In contrast, there was an improvement in capital productivity despite a decline in capital intensity during the second decade of reform period and showing better utilization of capital stocks; however, it was not able to arrest deceleration of the growth rate of in labour productivity during same time period.

Table No. 1.5 Trend Growth Rate of Partial Factor Productivity and Factor Intensity of the Chemical and Chemical Products Industry of Himachal Pradesh

Industry	Year	1980-81 to 1990-91	1990-91 to 2000-01	2000-01 to 2012-13	1980-81 to 2012-13
Organized Manufacturing sector	LP	18.53**	9.97*	6.12**	10.67*
	CP	9.12	-5.24	4.92	3.34*
	CI	8.63	16.05*	1.14	7.10*
Chemical and chemical products Industry	LP	9.09	30.80*	0.44	13.28*
	CP	7.72	-7.84**	7.85**	-0.71
	CI	1.28	41.93*	-6.87**	14.08*
Manufacture of basic chemical products (NIC-241)	LP	-11.54	6.52	2.34	7.53*
	CP	-23.78	-0.50	-15.60	2.27
	CI	16.06	7.05	21.27*	5.14
Manufacture of other chemical products (NIC-242)	LP	5.88	35.06*	-0.50	15.03*
	CP	-21.36	-10.90	8.13*	-2.93
	CI	34.64	51.57*	-7.98*	18.50*

Source: Calculated from various issues of ASI

In the manufacturing of chemical and chemical products industry, labour productivity has significantly accelerated (up to the highest peak rate of 30.80%) during the first decade of reform period viz-a-viz the pre-reform period (9.09%). But lower growth rate of capital intensity arrested the impact of higher growth rate of capital productivity, which led to the deceleration of the growth rate of labour productivity for the chemical and chemical products industry during the second decade of reform period.

The sub-groups of intra-chemical products industries have exhibited comparatively much greater variation in growth rate during the study period. In the manufacture of basic chemicals (NIC-241) industry, the negative growth rate of capital productivity along with a decelerated growth rates of the capital-labour ratio led to higher growth rate of labour productivity during the first decade of the reform period as compared to the pre-reform period. However, the accelerated growth of the capital-labour ratio (up to the highest peak rate 21.27%), along with a negative growth rate of capital productivity, has ultimately resulted in the decelerated growth rate of the labour productivity during the second decade of reform period.

In the manufacture of other chemical products industry (NIC-242) combination of higher growth rate of capital-labour ratio (34.64%) and the negative growth rate of capital productivity (-21.36%), has finally resulted in the lower growth rate of labour productivity (5.88%) during the pre-reform period. However, the accelerated growth rate of capital intensity has been able to push the growth rate of labour productivity upward, although there was a negative growth rate of the capital productivity during the first decade of the reform period. The growth rate of labour productivity became negative during the second decade of reform period.

Section 4

An Analysis of Growth Rate of Total Factor Productivity: Organized Manufacturing Sector and Chemical and Chemical Products Industry

It is clear from the table values that the total factor productivity growth recorded positive value (1.79%) for the organized manufacturing sector during the pre-reform period. However, this momentum has not been maintained during the first decade of the reform period, where same growth rates have turned to negative (-0.57%). But there was some recovery and growth rate of total factor productivity (1.76%) has increased during the second decade of reforms. Hence, the growth rate of the total factor productivity has remained less in the post-reform period, viz-a-viz the pre-reform period. Thus, our results support the productivity trend findings of other studies (Kumar, 2005) and national level studies (Srivastava (2000); Balakrishna et. al. (2000); Trivedi et. al. (2000); Golder (2000, 2002), Golder and Kumari (2003); Das (2003), Banga (2003) Sharma (2011) etc. There could be several possible inferences. First, the failure of total factor productivity growth to accelerate with deregulation policies is perhaps indicative of harmful lag effects of the previous interventionist regime. Second, since there was a spurt in investment activity in the 1990s in response to economic reforms, there could be an immediate adverse effect due to the gestation lags. Another possible reason is that the discretionary controls on domestic and foreign dimensions of the manufacturing sector are largely responsible for the lower growth rate of total factor productivity.

But the chemical and chemical product industry witnessed negative growth rate (-5.42 %) of total factor productivity during the pre-reform period, which accelerated (0.34%) during the first decade of the reform period, which further accelerated to 2.31 percent during the second decade of reform period.

Table No.1.6 Translog Index and Trend Growth Rate of Total Factor Productivity of the Organized Manufacturing Sector and the Chemical and Chemical Products Industry

Year	Chemical and Chemical Products	Manufacture of basic chemicals	Manufacture of other chemical products	Organized Manufacturing Sector
1980-81	1		1	1
1984-85	1.13		0.24	1.47
1990-91	0.49	0.63	0.02	1.65
1994-95	0.48	0.42	0.02	1.51
2000-01	0.57	0.54	0.02	1.62
2001-02	0.53	0.64	0.02	1.54
2002-03	0.58	0.73	0.02	1.76
2003-04	0.52	0.68	0.02	1.68
2004-05	0.55	1.15	0.02	1.82
2005-06	0.71	0.33	0.03	2.08
2006-07	0.83	0.34	0.03	2.38
2007-08	0.70	0.23	0.03	2.09
2008-09	0.67	0.20	0.03	2.13
2009-10	0.69	0.26	0.03	1.96
2010-11	0.68	0.18	0.03	1.86
2011-12	0.72	0.13	0.03	1.97
2012-13	0.64	0.07	0.02	1.90
Trend Growth Rates				
1980-81 to 1990-91	-5.42	-20.93	-39.30*	1.79
1990-91 to 2000-01	0.34	-3.49	-2.63	-0.57
2000-01 to 2012-13	2.31	-16.35*	2.35	1.76
1980-81 to 2012-13	-2.24**	-6.06*	-10.74*	1.65*

Sources: Calculated from various issues of ASI

Within the sub-groups of the chemical products industry, the manufacturing of basic chemicals (NIC-241) industry has realized negative growth rate during the pre-reform as well the first decade of the reform period and the growth rate became significant negative during the second decade of reform period.

Manufacture of other chemical products (NIC-242) industry witnessed negative growth rate of total factor productivity during the pre-reform period as well as the first decade of the reform period, but has accelerated (up to the highest peak rate of 2.35 percent) during the second

decade reform period. Deregulation of manufacturing sector since 1991 has resulted in significant gains in productivity caused by the market determined more efficient allocation of resources. These measures aim at the relaxation of restrictions on the entry of private firms have introduced competition both domestically and through import of manufactured goods, capital and technology.

Conclusion

It is concluded from the above observation that the growth rates of selected variables, for the organized manufacturing sector as well as the chemical products industry were subjected to greater inter-temporal variation during the study period. The growth rate of the output, gross value added and fixed capital was all time high for the organized manufacturing during the pre-reform period viz-a-viz all other sub periods. The chemical products industries have realized increased growth rates of the number of factory units, the total person employed and the number of employees, but there was declined growth of the fixed capital, which has brought deceleration of the growth rate of the output and value added during the second decade of reform period. The growth rate of the employment level has fallen far behind than the growth rate of the output; value added and fixed capital for the organized manufacturing sector and the chemical products industry during the study period. The organized manufacturing sector and the chemical product industry have exhibited a higher growth rate of the value added as compared to the output during the post-reform period. Above observation implies that the sector is either fetching higher prices for their manufactured products or got success in reduction of the cost of production during the post-reform period. It might be possible to charge higher prices in the pre-reform period, but due to the onslaught of multinational companies, the chances of the charging higher prices seem less possible during the post-reform period. Hence it might be possible that above industries might get successes in reduction of the cost of production.

The organized manufacturing sector witnessed deceleration of the growth rate of the labour productivity. It was due to the dominant role of the declined growth rate of the capital productivity, although the accelerated growth rate of the capital intensity tried to raise the growth rate of labour productivity during the first decade of the reform period as compared to the pre-reform period. The chemical products industries have witnessed accelerated growth rate of the labour productivity due to the dominant role of improved growth rate of the capital intensity, although the declined growth rate of capital productivity tried to pull down the growth rate of the labour productivity during the first decade of the reform period. In the chemical products industries, decelerated growth rate of the capital intensity has ultimately brought deceleration of the growth rate of labour productivity; however, the improved growth rate of the capital productivity was unsuccessful to push up the growth rate of labour productivity during the second decade of reform period.

The trend growth rates of total factor productivity have declined for the organized manufacturing during the post-reform period as compared to the pre-reform period. In contrast, the trend growth rates of total factor productivity for chemical and chemical products industries and manufacture of other chemical products (NIC-242), have accelerated during the post-reform period viz-a-viz the pre-reform period.

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