GROWTH PERFORMANCE AND PRODUCTIVITY OF RUBBER & PLASTIC PRODUCTS INDUSTRY IN PUNJAB

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ABSTRACT: *Present study is an endeavour to investigate growth pattern and productivity trends in small scale rubber and plastic products industry of Punjab. The growth of industry has been gauged in terms of variables - number of units, fixed investment, employment and production. Yearly growth rates have been computed to catch year- to- year fluctuations in growth and compound annual growth rates (CAGRs) have been worked out to ascertain the impact of the policies of liberalized regime on growth of this industry. Productivity trends have been sketched in terms of partial factor productivities of labour and capital. In order to understand the strengths and weaknesses of the industry, SWOT analysis has been conducted. The study revealed that the liberalisation has promoted the use of capital intensive and labour saving techniques of production leading to a dismal growth of employment and sluggish growth of number of units.*

KEY WORDS: *fixed investment; direct employment; production; labour productivity; capital intensity; capital output ratio; capital productivity*

JEL CLASSIFICATION: *F43, O14*

1. INTRODUCTION

Rubber and plastic are the two basic materials which are finding greater and greater application in modern industrialized environment. With the advancement of technology, a vast array of products made of rubber and plastic have come up which are not only efficient but also making new products affordable and costs effective.

In Punjab, the rubber and plastic industry in small scale sector has experienced several changes in line with the changing business environment under the policies of liberalized regime. The policies of liberalization have removed the protective umbrella for the large as well as small scale industries and have thrown them to weather the winds of free enterprise and competition. The basic philosophy behind economic reforms was to lift the Government controls and regulations on production, trade and

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investment in order to build a more competitive environment conducive to growth and efficiency. The removal of quantitative and non quantitative restrictions has a long term bearing on the survival and growth of small scale industries.

As per the Annual Survey of Industries (ASI) classification, rubber and plastic industry includes manufactures of rubber, tyres & tubes, retreating and rebuilding of rubber tyres; manufactures of plastic and plastic products.

During pre–liberalization and liberalization period, the rubber and plastic industry in the small scale sector of Punjab have made significant advances in absolute sense. The rubber and plastic products producing units (in the small scale sector)were only 1509 in the year 1980-81 which swelled to 3603 in 1991-92 but declined to the level of 3508 in the year 2004-05. As regards employment, the industry provided employment to 8437 persons in year 1980-81 which surged to 23962 persons in year 1991-92 and further climbed to the level of 20504 persons in the year 2004-05. In the sphere of fixed capital investment it was only Rs.15.16 crores in the year 1980-81 which jumped to Rs. 66.25 crores in 1991-92 and further advanced to the level of Rs.118.16 crores in 2004-05. Similarly, the level of production was only worth Rs. 34.36 crores 1980-81, increased to the level of Rs.151.42 crores in the year 1991-91 and further jumped to the level of Rs. 624.07 crores in the year 2004-05 (Directorate of Industries Punjab, 2005).

2. OBJECTIVES OF THE STUDY

A sound industrial development strategy is essential but obligatory to be framed on the basis of analysis of growth and productivity of concerned industry. In this study, an attempt has been made to dig the facts about rubber and plastic products industry in Punjab which can be treated as the conducive agents for policy formulation. The specific objectives of the study were:

1. To compute partial productivity of labour and capital, average capital output ratio and capital intensity.
2. To analyse the comparative picture of growth of number of units, fixed investment, direct employment and production during pre-liberalization and liberalization periods.
3. To carry out analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT) of rubber and plastic products industry.

3. DATA BASE AND METHODOLOGY

Present study is based on secondary data for the period of 25 years i.e. 1980-81 to 2004-05. The data relating to number of units, employment, fixed capital and production of rubber and plastic goods industry (in small scale industrial sector) at aggregate level for the said period were culled from Directorate of Industries, Punjab. Since the figures of fixed capital and production were given at current prices, these have been converted into constant prices by deflating them with index number of the wholesale prices of manufactured products' total, taking 1993-94 as the base year. Yearly growth rates for all the four variables were computed to capture year-to-year

fluctuations in growth. Partial productivities of labour and capital were obtained as O/L and O/K. For making an assessment of the extent of amount of units of capital that are needed to produce a certain level of output as well as capital intensity, K/O and K/L ratios were also computed. Compound Annual Growth Rates (CAGRs) for overall period (1980-81 to 2004-05) and two sub-periods: pre-liberalization (1980-81 to 1991-92) and liberalization periods (1991-92 to 2004-05) for all the variables were estimated by fitting an exponential function of the following form:

$$Y_t = \beta_0 \beta_1^t e^{U_t} \tag{1}$$

Where Y_t is dependent variable, β_0 and β_1 are the unknown parameters, and U_t is the disturbance term. The equation (1) could be written in the logarithmic form as follows:

$$\log Y_t = \log \beta_0 + t \log \beta_1 + U_t \tag{2}$$

Above equation was estimated by applying Ordinary Least Square Method and compound rate of growth (gr_c) was obtained by taking antilog of estimated regression coefficient, subtracting 1 from it and multiplying the difference by 100, as under:

$$gr_c = (A.L.\hat{\beta}_1 - 1) \times 100 \tag{3}$$

Where $\hat{\beta}_1$ is an estimate for β_1. The significance of growth rates was tested by applying t – test, given as follows:

$$t = \frac{\hat{\beta}_1}{s(\hat{\beta}_1)} \sim t(n-2) \text{ d.f.} \tag{4}$$

where $\hat{\beta}_1$ is the regression estimate and $s(\hat{\beta}_1)$ is the respective standard error.

4. RESULTS AND DISCUSSION

This section presents the results and discussion of the study. The first subsection is devoted to analysis of growth of number of units, employment, fixed capital and production. Moreover, yearly growth rates were also calculated to capture the year to year fluctuations. The second subsection is devoted to the profile of capital intensity, capital-output ratio and partial productivities of labour and capital in rubber and plastic products industry. The third subsection deals with SWOT analysis of rubber and plastic products industry.

5. GROWTH PERFORMANCE

Measurement of growth has been one of the most extensively researched areas. The growth rate analysis provides the whole vision of growth performance. The year to year growth rates and compound annual growth rates (CAGRs) of number of units,

fixed investment, employment and production of rubber and plastic industry are shown in table 1. The results have been discussed in brief under the following four sub heads:-

Table 1. Compound Annual Year to year and Growth Rates (in percent)

Year	Number of units	Fixed investment (in Rs.Crore)	Direct Employment (in No.)	Production (in Rs.Crore)
1981-82	13.32	5.54	10.60	3.43
1982-83	8.42	6.29	8.13	7.37
1983-84	10.68	9.38	8.97	8.65
1984-85	8.82	3.10	9.16	2.61
1985-86	9.81	4.25	7.27	21.69
1986-87	7.63	13.87	8.75	9.63
1987-88	6.03	3.48	5.55	0.00
1988-89	9.04	12.59	7.61	5.80
1989-90	7.11	7.83	10.16	4.86
1990-91	5.20	5.06	5.46	9.57
1991-92	4.80	2.10	6.05	2.60
1992-93	2.78	-2.63	2.82	52.14
1993-94	3.75	8.28	4.99	16.79
1994-95	2.68	6.40	5.04	14.32
1995-96	4.97	8.61	6.51	2.60
1996-97	2.56	11.66	3.98	15.14
1997-98	2.54	14.00	4.08	13.58
1998-99	2.43	9.08	4.07	4.83
1999-00	1.95	6.21	2.50	27.36
2000-01	1.61	3.83	2.35	5.52
2001-02	1.41	4.86	2.57	5.96
2002-03	-22.98	-10.45	-26.68	-10.83
2003-04	-3.71	-10.74	-3.66	-5.43
2004-05	0.95	-3.89	1.20	0.23
CAGRs:				
PreLiberalization Period	8.21*	7.08*	7.93*	7.33*
Liberalization Period	0.08**	4.96*	0.63**	9.34*
Overall Period	3.91*	5.92*	4.47*	10.49*

Source: Calculated from the data supplied by Directorate of Industries, Punjab.
**Significant at 5 percent level of significance. **Insignificant at 5 percent level of significance.*
Note: Fixed investment and Production figures are taken on 1993-94 constant prices to compute various growth rates.

NUMBER OF UNITS: Perusal of year to year growth rates of number of units as contained in column II of Table I exhibits swings in the initial years of the study period until 1988-89. Starting from a peak of 13.32 percent in 1981-1982 it went down to 6.03 percent in the year 1987-88 and jumped to 9.04 percent in 1988-89. Thereafter, the annual growth rates observed almost free fall with minor resistance

witnessed in the year 1993-94 and 1995-96. The year 2002-03 showed the disastrous fall of -22.98 percent followed by a growth rate of -3.71percent in the year 2003-04. However, the year 2004-05 clocked the growth of 0.95 percent. Further perusal of the same column reveals that the pre-liberalization period noticed a significant compound annual growth of 8.21 percent but the liberalization period registered a virtual no growth by observing an insignificant compound annual growth rate of 0.08 percent. However, a CAGR of 3.91 percent was observed for overall period of the study.

FIXED INVESTMENT: Investigation of annual growth rates of fixed investment as compiled in Column III of Table 1 portrays phases of negative, low, moderate and spikes of high growth rates. The period 1981-91 observed relatively low growth rates i.e. 3.10 percent and 3.48 percent for the years 1984-85 and 1987-88 respectively and registered relatively high growth rates of the order of 13.87 percent and 12.59 percent during the years 1986-87 and 1988-89 respectively. The period 1991-2002 spots low growth rates of 2.10 percent and 3.83 percent during 1991-92 and 2000-01 respectively and high growth rates 11.66 percent and 14.0 percent during 1996-97 and 1997-98 respectively. The period is also marked by a negative growth of 2.63 per cent during 1992-93. The period 2002-05 can be termed as the worst phase as the growth rates remained negative through out during the said period. Further investigation of the column delineates a CAGR of 7.08 percent in pre-liberalization period as compared to a CAGR of 4.96 percent for the liberalisation period. However, a CAGR of 5.92 percent was observed during overall period of the study.

DIRECT EMPLOYMENT: The annual growth rates of direct employment as shown in column IV of Table I exhibits a pattern almost similar in the one observed in number of units. Starting from a peak of 10.60 percent in the year 1981-1982 and then showing fluctuations, the growth rate reached the level of 5.55 percent in the year 1987-88 and regained double digit annual growth figure of 10.16 percent in 1989-90. Thereafter the annual growth rates remained depressed and touched the level of 2.57 percent in 2001-02 after experiencing fluctuations of mild to moderate magnitude. The worst phase of growth rates commenced in 2002-03 when it plunged to register a growth rate of -26.68 percent followed by a growth figure of -3.66 percent in 2003-2004 and a final growth figure of 1.20 percent in 2004-05. Further perusal of the column suggests a much better CAGR of the pre liberalization period (7.93 percent) when compared with the CAGR of 0.63 percent belonging to the liberalization period. However, a CAGR of 4.47 percent observed for overall period of the study.

PRODUCTION: A glance at the column of production in the table 1 reveals that the annual growth rates of production do not mirror any consistent behaviour rather it portrays extreme volatility with wild swings moving in either direction. Starting from a low growth rate of 3.43 percent in the year 1981-82 jumped to a level of 8.65 percent in 1983-84, stooped again to a low level of 2.61 percent in 1984-85 and bounced aggressively to touch a peak of 21.69 percent in the 1985-86. Soon thereafter the annual growth rate fell to zero percent in 1987-88 and after fluctuations of moderate intensity, touched the highest peak of 52.14 percent in 1992-93. The annual growth rate started downhill journey again to touch a low level of 2.60 percent in 1995-96, rebounded to register a growth rate of 15.14 percent in 1996-97. It again slipped to a level of 4.83 percent in 1998-99 and mounted a peak of 27.36 percent in the

following year. The period 2000-05 paints a discouraging picture when the annual growth rate not only fell but entered the negative territory in the years 2002-03 (-10.87 percent) and 2003-04 (-5.43 percent) before finishing at a level of 0.23 percent in 2004-05. A further look of the same column demonstrates a CAGR of 7.33 percent in the pre-liberalization period and a CAGR of 9.34 percent in liberalization period. However, a CAGR of 10.49 percent was noticed in the overall period of the study.

The above analysis concludes that except the value of production, all other variables namely number of units, employment and fixed capital investment showed a decline in CAGR in the liberalization period over the pre-liberalization period. While CAGR of fixed capital investment declined marginally, whereas that of employment and number of units fell disastrously. Thus the policies of the liberalized regime have effected relocation, closure or consolidation of existing manufacturing units. It has also promoted capital investment and technological up-gradation in the rubber and plastic industry of Punjab but at the cost of employment.

6. PRODUCTIVITY ANALYSIS AND PROFILE OF RELATED VARIABLES

Productivity depends on the relationship between total output and related inputs such as labour and capital which have been used in production of that output. It is evident that the capacity of the economy to produce goods and services mainly depends on productivity of these factors. Productivity can be enhanced through proper utilization of such resources. It is widely agreed that increasing productivity is a barometer of good health of a system which allows producing at lower cost and makes it competitive both in short as well as in long run. Table 2 depicts the profile of capital intensity, capital output ratio and partial productivities of labour and capital of the rubber & plastic products industry of Punjab. This table also highlights the compound growth rates of capital intensity, capital-output ratio and partial productivities of labour and capital for the pre-liberalization and liberalization period. The detailed column wise explanation of table 2 is discussed as under:

LABOUR PRODUCTIVITY (AOLR): Labour productivity as complied in column II of table II shows a decline in the initial years of study when it fell from Rs.0.0104 crores in 1980-81 to Rs. 0.0091 crores in 1984-85. It regained it previous peak of Rs. 0.0104 crores in 1986-87 and starting skidding in the subsequent years to reach a level of Rs. 0.0093 crores in 1991-92. It commenced the uphill march from 1992-1993 and continued till 2002-03 with the exceptions for the years 1995-96 and 1998-99. However, AOLR fell marginally from the peak of Rs.0.0313 crores in 2002-03 to Rs.0.0304 crores in 2004-05. The column further highlight that the CAGR for the liberalization period (8.47 percent) registered a remarkable improvement over the CAGR of -0.54 percent belonging to the pre-liberalization period. However, a CAGR of 5.76 percent was observed for over all period of the study.

CAPITAL INTENSITY (DOM): Trends of capital intensity as shown in column III of Table 2 demonstrates that the capital intensity which was Rs. 0.0046 crores in 1980-81 fell to the lowest level of Rs.0.0038 crores in 1992-93 with great deal of fluctuations. DOM started its upward march from 1993-94 and continued till 2002-03. However, it fell marginally thereafter to reach at the level of Rs.0.0058 crores

in 2004-05. The column further reveals a significant improvement in the CAGR of liberalization period (4.19 percent) from the CAGR of -0.72 percent belonging to the pre-liberalization period. However, a CAGR of 1.38 percent was noticed during overall period of the study.

Table 2. Profile of Capital Intensity, Capital-Output Ratio and Partial Productivity of Capital and Labour

Year	AOLR (In Rs.Cr.)	DOM (In Rs.Cr.)	COR	AOCR
1980-81	0.0104	0.0046	0.44	2.27
1981-82	0.0098	0.0044	0.45	2.22
1982-83	0.0097	0.0043	0.45	2.24
1983-84	0.0097	0.0043	0.45	2.23
1984-85	0.0091	0.0041	0.45	2.22
1985-86	0.0103	0.0040	0.39	2.59
1986-87	0.0104	0.0042	0.40	2.49
1987-88	0.0098	0.0041	0.41	2.41
1988-89	0.0097	0.0043	0.44	2.27
1989-90	0.0092	0.0042	0.45	2.20
1990-91	0.0096	0.0042	0.44	2.30
1991-92	0.0093	0.0040	0.43	2.31
1992-93	0.0137	0.0038	0.28	3.61
1993-94	0.0152	0.0039	0.26	3.89
1994-95	0.0166	0.0040	0.24	4.18
1995-96	0.0160	0.0040	0.25	3.95
1996-97	0.0177	0.0043	0.25	4.07
1997-98	0.0193	0.0048	0.25	4.06
1998-99	0.0159	0.0050	0.26	3.90
1999-00	0.0242	0.0052	0.21	4.67
2000-01	0.0249	0.0052	0.21	4.75
2001-02	0.0257	0.0054	0.21	4.80
2002-03	0.0313	0.0065	0.21	4.78
2003-04	0.0307	0.0061	0.20	5.06
2004-05	0.0304	0.0058	0.19	5.28
CAGRs:				
Preliberalization period	-0.54**	-0.72*	-0.29**	0.24**
Liberalization period	8.47*	4.19*	-3.99*	4.17*
Overall Period	5.76*	1.38*	-4.12*	4.32*

Source: calculated from the data supplied by directorate of industries, Punjab.
*Note: *significant at 5 percent level of significance. ** Insignificant at 5 percent level of significance*
Terms used: a). DOM: Degree of Mechanization (capital intensity):- It is fixed capital at constant prices per employee; b). COR: Capital output Ratio:-It is ratio of total fixed capital to total production (both deflated); c). AOCR:- Average output capital ratio (Capital Productivity):- It is ratio of total production to total fixed capital (both deflated); d). AOLR: - Average Output Labour Ratio (Labour Productivity):- It is total production of constant prices per employee.

CAPITAL OUTPUT RATIO (COR): The profile of annual growth rates of capital output ratio as charted in column IV of table 2 demonstrates healthy pattern. The capital output ratio which was 0.44 in 1980-81 reached the same level in 1990-91 after experiencing same fluctuations. Thereafter it declined continuously, barring a period of 1995-99 during which it was stable at the level of 0.25 and then it marginally rose to the level of 0.26 in 1998-99. The distinctive feature of the profile of capital output ratio is that it observed complete stagnation at two occasions, firstly at the level of 0.25 during the period 1995-98 and secondly at the level of 0.21 during the period 1999-2003. The column also explains that the CAGR observed during pre-liberalization period was -0.29 percent and detected at the level of -3.99 percent in the liberalization period. However, the CAGR of -4.12 percent was observed during the overall period of the study.

CAPITAL PRODUCTIVITY (AOCR): The column V of table 2 sketches the profile of labour productivity which shows visible improvement. The labour productivity which was 2.27 in the year 1980-81, went down to the level of 2.20 in the year 1989-90 after experiencing fluctuations. Thereafter it moved up continuously till 1994-95 to touch the level of 4.18. The period 1995-99 recorded fluctuations and the upward journey restarted in 1999-00 which lasted till 2004-05. The labour productivity which was 4.67 in 1999-00 embarked on a peak of 5.28 in the year 2004-05. The column further reveals that the CAGR which was 0.24 for the pre-liberalization period cheered up during the liberalization period to reach the level of 4.17. However, a CAGR of 4.32 was observed for overall period of the study.

7. SWOT ANALYSIS OF RUBBER & PLASTIC PRODUCTS INDUSTRY

SWOT analysis is a basic, straight forward model that provides direction and serves as a basis for development of marketing plans. It accomplishes this by assessing an organization's strengths, weaknesses, opportunities and threats. It is an important step in planning. The role of SWOT analysis is to take information from environment and separates it into internal issues (strengths& weaknesses) and external issues (opportunities and threats).Once this is completed, SWOT analysis determines if the information indicates something, that will assist the firm in accomplishing its objectives or if it indicates an obstacle that must be overcome or minimized to achieve desired results (Ferrel, Lucas and Luck, 1998).

STRENGTHS: A firm's strengths are its resources and capabilities that can be used as basis of developing a competitive advantage. In the strength analysis, we are going to examine what advantages the rubber and plastic products industry has over its counterparts. The following points highlight the strengths of the rubber and plastic industry of Punjab:

- Easy availability of cheap migrant labour.
- Increasing domestic market having demands from both low and high end sectors
- Small scale sector derive the benefits of simpler management structures.
- Greater locational flexibility.
- Raw material component resources available within the country.

- Declining capital output ratio especially during liberalisation period provides a promising outlook for the future.
- Marked improvement in labour and capital productivities provides a strong impetus to growth.

WEAKNESSES: Weaknesses are those areas in which the existing rubber and plastic product industry do not perform well. The absence of certain strengths may be viewed as weaknesses. Following points highlight the weaknesses of the rubber and plastic industry of Punjab:

- No raw material base in the state leading to dependence on outside sources
- Insufficient process technology.
- Uneconomic size of plants.
- Unfair international competition owing to the practice of dumping.
- Legacy of past policies of industrialization.
- Irregular and erratic power supply
- Instability in the prices of raw material
- Lack of standardization and quality control
- Absence of R & D culture.
- Lack of Sophisticated marketing sense.
- Lack of synergies between Government Institutions and practical market.

OPPORTUNITIES: The external environment analysis may reveal chances for profits and growth, known as opportunities. Opportunities are those factors that have the potential to make the business stronger, more enduring and profitable. The following points highlight the opportunities available to the rubber and plastic products industry:

- Punjab being a part of national freight corridor scheme can boost the industry to expand their business.
- R &D and reverse engineering.
- Sunrise areas of Information Technology and ITES can be tapped to enhance efficiency.
- Markets of developed countries are also opening up.

THREATS: Changes in the external environment may present threats to an industry. Threats can be treated as those factors that have the potential to adversely affect the rubber and plastic industry of Punjab. The following points highlight the threats to the rubber and plastic product industry in Punjab:

- Increased competition owing to dismantling of quantities restrictions under WTO
- High tariff levels on most of the raw material items, when compared with other competing nations.
- Vulnerability to fast changes in technology from large business house.
- Changing consumer needs.

8. CONCLUSION AND FINDINGS OF THE STUDY

The conclusion that emanates from the entire discussion is that despite the problem of militancy in the pre-liberalization period, significant growth rate was

observed in all the four variables namely numbers of units, employment, fixed investment and value of production. But the policies of the liberalized regime have not remained benign to the growth of the small scale rubber and plastic industry of Punjab. While, significant growth was envisaged in fixed investment and production but a dismal and insignificant growth was witnessed in number of units and direct employment during liberalization period. However, in the overall period of the study, significant growth rate was registered in all the four variables. Thus it could be safely inferred from the analysis that the liberalization has promoted the use of capital intensive and labour saving techniques of production leading to very poor growth of employment. It has also facilitated the elimination of unviable production units.

The profile of labour and capital productivity indicates that in absolute terms partial productivities of labour and capital has gone up significantly whereas the capital output ratio has fallen miserably and capital intensity depicted very little improvement during the overall period of the study. The comparative profile of pre liberalisation and liberalisation period revealed that during liberalisation period productivities of labour and capital and capital intensity have improved significantly whereas capital output ratio has decelerated significantly.

Even the SWOT analysis of the rubber and plastic products industry of Punjab highlights numerous challenges as well as opportunities for the industry. The industry is facing a tremendous amount of competition from big domestic and foreign producers. Fiscal incentives provided by some neighbouring states coupled with unfavourable and irresponsive approach of the state administration are forcing the industry to relocate their businesses. The need of the hour is that the state administration puts in place a health, congenial and investment friendly policy and regulatory framework, so that the small scale sector in general and the rubber and plastic industry in particular can flourish in the fast changing competitive and globalised business environment.

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