

Chapter 6

INDUSTRIAL DEVELOPMENT

THE INDUSTRIAL SECTOR OVER THE YEARS

At the time of independence, Punjab had only a few hundred industrial units mainly processing foodgrains, cotton ginning and brick kilns. Most of the manufactured items of even common use came from outside. During the post-independence period, industrial development in Punjab took place in phases. Thus, in the fifties the cycle-parts and hosiery industries took their roots, while in the sixties, with the advent of the green revolution, agriculture-related industries like farm machinery manufacturing came up. The main focus in the seventies was on such industries as auto-parts and electronic items and during the eighties on such resource-based industries as food processing, vanaspati, edible and non-edible oils and sugar in a big way. Diversification of industry started, with the process of liberalization and economic reforms, while many of the established processing units, both in the small and medium and large sectors, came under pressure. The industrial sector in the state is in the throes of a very significant phase of transition with severe challenges and many new opportunities.

Share of manufacturing sector in SGDP

Table 1
Percentage Share of Manufacturing Sector in Gross Domestic Product

Year	At Current Prices		At Constant Prices	
	Punjab	India	Punjab	India
1980-1981	11.61	17.70	11.61#	17.70#
1985-1986	13.51	17.90	14.40#	19.40#
1990-1991	15.05	18.60	16.58#	21.10#
1995-1996	15.76	18.10	15.80*	17.90*
1996-1997	15.23	17.70	15.58*	18.20*
1997-1998	15.04	16.70	15.88*	17.70*
1998-1999	14.04	15.60	15.99*	17.00*
1999-2000	14.44	15.40	15.84*	17.10*

Source: *National Accounts Statistics*, CSO, Government of India

Statistical Abstract of Punjab ESO, Government of Punjab

Note: (#) At 1980-81 (Constant) Prices, (*) At 1993-94 (Constant) Prices

The share of the manufacturing sector in the State Gross Domestic Product which was (at current prices) 11.61 per cent during 1980-81 gradually increased to 15.76 per cent in 1995-96, but showed a declining trend later and, during 1998-99, it came down to 14.04 per cent. Subsequently, during 1999-2000 it went up slightly to 14.44 per cent as shown in Table 1. At constant prices the share of the manufacturing sector has shown a similar trend and it has been almost at the same level since 1995-96. The share of the manufacturing sector at constant prices has always been higher than at current prices, indicating that prices of manufactured goods are not rising at par with the prices of other goods. The share of the manufacturing sector in the Gross National Domestic Product at current as well as constant prices has always been higher than in the State Gross

Domestic Product, which indicates that Punjab is still comparatively less industrialized. For obvious reasons, for transforming a traditional economy into a modern, dynamic economy, the share of the secondary sector, including manufacturing, as well as the tertiary sector in the State Gross Domestic Product should steadily increase over time, while the share of the primary sector should decline.

Growth of industrial sector

Tables 2 and 3 clearly show that the industrial sector has grown at an impressive rate during the Sixth FYP (1980-85) in terms of number of units, employment, investment and production. During the Seventh FYP (1985-90) the large and medium sector has shown better growth both in terms of investment and production, but the overall growth rate of the SSI sector has declined. Production showed an impressive growth during the Eighth Plan. This high rate of growth in production may be attributed to the investment made during the Seventh and Eighth FYPs. Many new large and medium units came into operation during this period. However, the growth rate of employment has been continuously declining during the Seventh, Eighth and Ninth Plan periods. The implications of this trend and its impact on the economy deserve to be critically examined in depth. During the first three years of the Ninth FYP there has been an all round decline in the growth rate of the industrial sector in terms of the number of units, employment, investment and production.

Table 2
Growth of Industry in Punjab

Year	Units (No.)			Employment (No.)			Investment (lakh) current prices			Production (lakh) current prices		
	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total
1980-81	43338	228	43566	264869	109767	374636	33202	72742	105944	111844	114107	225951
1985-86	97517	292	97809	464809	132174	596983	73894	148972	222866	215100	253453	468553
1992-93	181563	414	181977	728580	188034	916614	162097	519461	681558	535515	933525	1469040
1996-97	193332	586	193918	821170	219383	1040553	249133	984465	1233598	1109622	2138765	3248387
1997-98	195383	620	196003	840568	221154	1061722	285999	1172084	1458083	1305774	2540577	3846351
1998-99	197344	602	197946	864592	227929	1092521	336067	1403854	1739921	1444447	2537561	3982008
1999-2000	199071	611	199682	883005	235993	1118998	379368	1476581	1855949	1661085	2372014	4033099

Source: Director of Industries, Punjab

Note: (SSI) Small Scale Industry, (L&M) Large & Medium Scale Industry

Table 3
Annual Average (Linear) Growth Rate of Industry during Five Year Plans in Punjab (%)

Plan	Years	Units			Employment			Investment			Production		
		SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total
6 th Plan	1980-85	21.32	6.16	21.25	13.67	6.19	11.60	19.24	14.75	16.18	16.30	19.57	17.87
7 th Plan	1985-90	10.77	5.40	10.75	8.36	5.31	7.66	13.16	19.80	17.67	12.37	20.18	16.61
8 th Plan	1992-97	1.85	8.24	1.87	2.91	2.56	2.83	10.71	16.84	15.42	20.40	22.82	21.81
9 th Plan	1997-00	0.98	1.46	0.98	2.45	2.47	2.45	15.06	14.67	14.73	14.43	4.05	7.74

Source: Based on data from Director of Industries, Punjab

Table 4 shows major industrial sector-wise break up of industry in Punjab as on 31 March 2000. The important sectors in terms of production, investment, employment and export potential are bicycle and bicycle parts and automobile and components (transport

equipment and parts), agro/food processing (food products and beverages), textiles and hosiery, basic metal, metal products, machinery other than electrical and electronics industry. These sectors have contributed about 70 per cent of the total industrial output. Bearing in mind their significance for the economy of the state in general and industry in particular, they will be discussed in the following sections with a view to highlighting their technological status, human resource development, and other factors that impinge on their potential for growth.

Table 4
Major Sector-wise Statistics of Industry as on 31 March 2000

NIC Code	Name of the industry	Units		Employment		Fixed Investment		Production	
		(No.)	%*	(No.)	%*	Rs. lakh	%*	Rs. lakh	%*
20-22	Food Products & Beverages	9765	4.89	97704	8.73	273139	14.72	752769	18.66
23-26	Textiles, Hosiery & Garments etc.	14556	7.29	190337	17.01	528706	28.49	668973	16.59
27	Wood products	11623	5.82	39472	3.53	11509	0.62	30353	0.75
28	Paper products	3527	1.77	23055	2.06	70258	3.79	87758	2.18
29	Leather & Leather products	14488	7.26	38242	3.42	10241	0.55	33356	0.83
30	Rubber & Plastic products	4567	2.29	43537	3.89	53317	2.87	183483	4.55
31	Chemical and products	4022	2.01	36792	3.29	252516	13.61	444896	11.03
32	Non-metallic mineral products	2556	1.28	31684	2.83	24387	1.31	52243	1.30
33	Basic metal products (Forging, Re-Rolling & Casting)	5645	2.83	69837	6.24	119858	6.46	477530	11.84
34	Metal products (Hand tools)	20579	10.31	103505	9.25	39465	2.13	150958	3.74
35	Machinery & parts except electrical (Machine Tools)	10644	5.33	67691	6.05	53143	2.86	226415	5.61
36	Electrical machinery & parts (Incl. Electronics)	4438	2.22	32657	2.92	123238	6.64	147942	3.67
37	Transport equipment and parts (Automobiles & Parts, Bicycle & Parts)	6955	3.48	105574	9.43	167151	9.01	506915	12.57
38	Miscellaneous Industry (Sports Goods)	3030	1.52	16615	1.48	51958	2.80	51965	1.29
74-99	Repairing and servicing	36984	18.52	82996	7.42	26883	1.45	41358	1.03
	Non-SIDO Industries	46303	23.19	139300	12.45	50179	2.70	176185	4.37
		199682	100	1118998	100	1855948	100	4033099	100

Source: Director of Industries, Punjab

Note: (*) % Indicates the share of the sector to total Industry.

Concentration of industry

Tables 5 and 6 on distribution of industry indicate that the main industrial centres in Punjab are Ludhiana, Jalandhar, Amritsar, Mandi Gobindgarh, Batala and Mohali. Ludhiana is known for the production of hosiery and readymade garments, bicycles and components, sewing machines and parts, machine tools, auto-parts, industrial fasteners,

electrical and electronic goods. About 21 per cent of the total industrial units in Punjab are located in Ludhiana district. Famous for hand tools, pipe fittings, valves and leather products, Jalandhar is well-known for its sports-goods too. Mandi Gobindgarh, popularly known as the 'Steel-Town' of Punjab, hosts more than 300 steel re-rolling mills despite being situated far from the sources of raw materials. Batala is famous in the country for its castings and machine tools, while Amritsar is known for food products, paper machinery and textiles. Mohali near Chandigarh, which attracted a number of 'sunrise industries', thanks to its locational advantages and infrastructure, seems to have lost its momentum for growth in recent years.

District Ludhiana leads Punjab in industrialization. More than 28 per cent of the industrial output of Punjab comes from Ludhiana, which has the highest number (166) of large and medium units. While Amritsar and Jalandhar were traditionally more advanced, Sangrur, which was one of the centrally declared Backward Districts and Patiala, have become fast growth areas.

Districts Bathinda, Ferozpur, Gurdaspur, Hoshiarpur, Kapurthala and Moga, each contributes two to five per cent share to the state's industrial production; while Faridkot, Mansa and Muktsar each contributes less than one per cent share. These districts are industrially backward and 'A' category incentives are provided to industry coming up in them under the Industrial Policy, 1996.

Table 5
District-wise Distribution of Industry in Punjab as on 31 March 2000

District	Units (No.)			Employment (No.)			Investment (lakh)			Production (lakh)		
	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total
Amritsar	27221	58	27279	113748	19007	132755	49999	84631	134630	208335	95865	304200
Bathinda	6318	17	6335	19327	4601	23928	12716	61877	74593	59098	86787	145885
Faridkot	2528	5	2533	11721	804	12525	6482	5487	11969	19254	5603	24857
Fatehgarh Sahib	3866	17	3883	19215	3015	22230	16095	18811	34906	125948	61596	187544
Ferozpur	6391	20	6411	25635	6996	32631	20796	15702	36498	47216	47329	94545
Gurdaspur	11543	19	11562	54029	4768	58797	14540	15563	30103	65822	33494	99316
Hoshiarpur	9109	33	9142	29085	14912	43997	10045	106903	116948	18901	137164	156065
Jalandhar	27790	26	27816	143549	9696	153245	40077	27122	67199	190406	47760	238166
Kapurthala	7792	7	7799	25119	17603	42722	8237	91349	99586	31865	126181	158046
Ludhiana	42232	166	42398	265871	72252	338123	95664	302577	398241	556094	597737	1153831
Mansa	2753		2753	8781		8781	4074		4074	29533		29533
Moga	5245	5	5250	19285	1701	20986	8698	22316	31014	28044	82907	110951
Mukatsar	4061	7	4068	17182	2095	19277	7728	10892	18620	18796	18821	37617
Nawan Shehar	3934	14	3948	10360	6771	17131	2757	53703	56460	5900	101866	107766
Patiala	12579	109	12688	45041	32272	77313	39300	266377	305677	126840	363461	490301
Ropar	8754	59	8813	28967	20398	49365	18389	245173	263562	41489	407266	448755
Sangrur	16955	49	17004	46090	19102	65192	23770	148098	171868	87543	158177	245720
TOTAL	199071	611	199682	883005	235993	1118998	379367	1476581	1855948	1661085	2372014	4033099

Source: Director of Industries, Punjab

Table 6
District-wise Distribution and Types of Industries in Punjab

District	Concentration of types of industries
Amritsar	Power Loom Weaving, Wood & Machine Screws, Radio & Transistors, Agricultural implements, Paints & Varnishes and Dyes, Electric fans, Pharmaceuticals, Printing machinery, Textiles, Chemicals, Soap, Acids.
Bathinda	Cotton ginning and processing, Pharmaceutical, Flour mills
Faridkot	Agricultural implements, Cottonseed oil, Rice bran oil
Fatehgarh Sahib	Steel re-rolling, Pump parts, Sewing machine parts, Truck body building
Ferozepur	Cotton ginning & processing, Grey board, Flour mills, Agricultural implements, Millboard
Gurdaspur	Agricultural implements, Conduit pipes, Machine tools, Soap & chemical products, C.I. castings, Brassware
Hoshiarpur	Rosin & Turpentine oil, Paints & Varnish, Sugar, Agricultural implements, Pressure cookers, Paper and Paper board
Jalandhar	Surgical instruments, sports goods, Hand tools, Automobile parts, Cocks & valves, Pipe fittings, Bus body building, Leather tanneries, Ball bearings, Publication, Switch & switch-gears and Rubber goods
Kapurthala	Agricultural implements, Pressure cookers, Fans, Wood & Machine screws, Electrical goods, Rice Mills, Rubber goods, Bolts & Nuts and Diesel engines.
Ludhiana	Bicycles & bicycle parts, Automobile parts, Hosiery goods, Sewing machine & parts, Home appliances, Machine tools, Readymade garments, Hosiery needles, Rubber goods, Labels (Metal & Cotton), Chemical goods, Oil engines, Agricultural implements, Electronic goods, Tractor parts, Cycle tyres/tubes, Plastic goods
Mansa	Agricultural implements, Cotton spinning
Moga	Agricultural implements, Milk products.
Muktsar	Cotton yarn, Rice Bran Oil, Paper
Nawanshahar	Light Commercial Vehicles, Pharmaceutical, Yarn, and Sugar
Patiala	Automobile parts, Sewing machine parts, Enamelled copper wire, Electrical goods, Bakery machinery, Cutting tools, Biscuits, shoes
Rup Nagar	Agricultural implements, Pharmaceuticals, Tractors & Parts, Electronic components, Electrical components
Sangrur	Agricultural implements, Tractor parts, Cycle parts, Sewing machine parts, Milk products, Chilled Rolls

Source: Director of Industries, Punjab

Exports

During 1999-2000 the total value of exports from Punjab was Rs. 4,062 crores. The major sectors which have made significant contribution towards exports from the state are woollen textiles, bicycles and parts, hosiery goods, hand tools, leather products, and

sports goods. Export of principal items during 1997-98 to 2000-01 is shown in Table 7. The trend of exports has not been uniform and has been nearly stagnant of late.

Table 7
Statement Showing Value of Exports (Rupees lakh)

Principal items	1997-98	1998-99	1999-2000	2000-01
Woolen Textile	84623	86236	91838	93424
Carpets	6139	9082	13131	7224
Hosiery/Readymade garments	50757	44502	51816	52472
Tanned/chrome leather products	10366	8259	11375	11814
Sewing machine & Parts	4360	7556	6539	5215
Electric switch gears/Electronic goods	6240	2362	7218	1415
Engg. Goods	12585	14946	14274	15228
Auto parts	8434	13862	14282	14415
Bicycle parts/Moped	88956	46243	51620	52016
Sports goods	24644	16144	19318	20416
Machine tools	6779	7123	8131	8029
Hand tools	28417	22917	26872	24059
Rice	48554	49886	52872	49916
Food products	6698	4914	8014	6415
Diesel engines	3844	3126	4475	@
Drugs & Pharmaceuticals	2316	1409	3431	@
Handicrafts	@	@	@	742
Other items	26766	24346	21056	38696
Total	420478	362913	406262	401496

Source: Director of Industries Punjab

Note: (@) Included in other items

BICYCLE AND BICYCLE PARTS INDUSTRY

The second largest manufacturer of bicycles and bicycle parts in the world, India produced 13.1 million bicycles in 2000, while China produced 52.2 million. The Ludhiana cluster produces about 60 per cent of the total bicycles manufactured in the country in the large and small-scale sector and more than 80 per cent of the parts and components in the small and tiny sector. The first indigenously owned bicycle-

manufacturing unit, Atlas Cycles, was established at Sonapat in 1951 in the SSI sector in undivided Punjab. Hero Cycle Ltd. commenced production of complete bicycles in 1956 as an SSI unit in Ludhiana and became the world's largest producer of bicycles in 1989, with a record production of 29,36,076 units and entered the Guinness Book of World Records.

Status of bicycle industry

Though the bicycle industry originated in Kolkata, Punjab became the most fertile ground for its evolution and growth. It mainly manufactures the roadster model (70 % of total production) with standard single speed with cosmetic variations. The remaining 30 per cent of the production is of new models, such as Sporty Light Roadster (SLR), All Terrain Bike (ATB), British Motor Cross (BMX), Mountain Terrain Bike (MTB), Racer, children, juvenile, etc. These bicycles are quite heavy in weight, varying between 10 to 18 kg. The unique feature of this industry of Punjab is that the components and parts (numbering 300) are manufactured in about 4,000 small and tiny units for both domestic as well as export markets. More than 80 per cent of the total components and parts of complete bicycles are produced in the small and tiny sector. Table 8 presents the status of the industry for the last five years (SSI including tiny sector and the large and medium), showing time-series data on the number of units, number of employees, production and investment. Production has increased at an average annual growth rate of 12.8 per cent during 1995-96 to 1999-2000.

Table 8
Status of Bicycle and Bicycle Parts Industry in Punjab

Year	Units (No.)			Employment (No.)			Investment (lakh)			Production (lakh)		
	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M*	Total*
1995-1996	3538	7	3545	43433	10476	53909	8770	18755	27524.93	91531	100013	131536
1996-1997	3615	8	3623	43898	9773	53671	952219	22295	31824.27	109053	112170	153921
1997-1998	3703	8	3711	44564	10843	55407	10178	31168	41345.91	133040	98532	172453
1998-1999	3753	6	3759	45335	10475	55810	11314	35158	46472.47	152485	110448	196664
1999-2000	3773	8	3781	45730	11011	56741	12296	41752	54048.27	170034	120520	218242

Source: Director of Industries, Punjab

Note: * - Only 40% (value added) of the production of L&M sector is added

Capital-output ratio and investment per employee

The capital output ratio of the SSI and tiny sector is consistently declining as shown in Table 8. The industry is largely primitive, neither replacing the existing obsolete machinery, nor adopting the latest and improved technology. On the other hand, in the large and medium sector the capital-output ratio has been continuously improving during the same period. The investment in the SSI sector per employee has increased from Rs. 20,000 in 1995-96 to Rs. 27,000 in 1999-2000; in the large and medium sector it has increased to Rs. 3,80,000 from Rs. 1,87,000.

Exports

As shown in Table 9 the export value of bicycles and parts in Punjab in 1995-96 was Rs. 43,611 lakh, which increased to Rs. 70,643 lakh in 1996-97 and to Rs. 88,956 lakh in 1997-98. Exports declined sharply during 1998-99 to Rs. 46,243 lakh. During 1999-2000 it increased to Rs. 51,620 lakh and remained at the same level in 2000-01.

Table 9
Exports of Bicycle Industry

Year	Exports (Rs. lakh)	Change (%)
1995-1996	43611	
1996-1997	70643	62
1997-1998	88956	25
1998-1999	46243	48
1999-2000	51620	12
2000-2001	52016	--

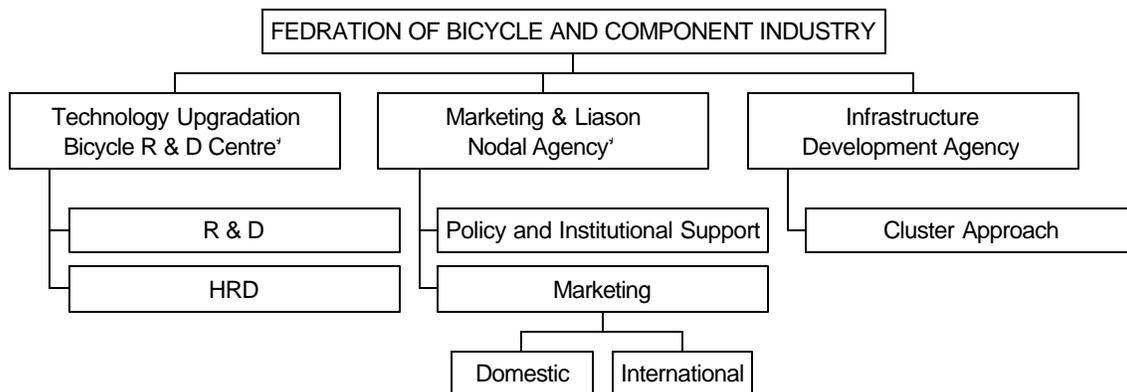
Source: Director of Industries, Punjab

Technological status: some observations

- Most of the components of our cycles are made from mild steel, with the latest introduction of plastics and aluminum for the export market only. Even the steel of desired specifications and quality is not available at reasonable rates.
- Quality control system is generally poor. The component manufacturers, being mostly in the tiny sector, have very inadequate quality control systems. Even at the assembly stage and in retailers and shops, the mechanics are not adequately trained and aware of the importance of various alignments, etc.
- The ordinary bicycle comprises of as many as 300 individual components and over 1,500 operations are performed to manufacture it. Various manufacturing techniques prevalent in our country are not only time consuming, but also causing extensive raw material wastage.

Strategy for future development

A well-defined strategy has to be formulated to sustain and accelerate the present growth rate and increase the market size, both domestic and export, against the backdrop of stiff competition from China. The industry has to produce quality products and introduce new designs in the market for survival. Technological upgradation through innovative R&D, human resource development through skills-upgradation and training, adoption of the cluster approach for systematic infrastructure development and market oriented policy and institutional framework are absolutely essential for growth.



Based on a wide-ranging interaction with various segments of the industry, which sometimes have divergent points of view, it is suggested that a single federation of bicycle and bicycle parts industries with different association as its constituents should be formed to promote overall growth. The federation should evolve appropriate mechanisms for providing R&D, marketing, policy and infrastructural support to facilitate growth. The proposed federation could have the following structure:

Technology upgradation

Wide technology gaps have been observed between the technologies in use in the developed countries and in India and it is necessary to bridge them by new developments in the designs of bicycles, parts and components. As it is beyond the capabilities of the existing small-scale sector it is absolutely necessary to suitably restructure and strengthen the Research & Development Centre for Bicycles & Sewing Machines at Ludhiana.

Research & Development Centre for bicycles and sewing machines

The centre was set up in 1981 with the assistance of UNDP/UNIDO with the following main objectives:

- Design and develop new models of bicycles and pass on the know-how to the industry for commercial exploitation.
- Evolve testing and quality control procedures, which could be adopted by the industry and, thus enable it to produce contemporary and high quality models for domestic and export markets.

With UNDP assistance the centre was equipped well, but it has not been able to contribute much to technology upgradation of the industry and development of new models of cycles and parts. Whatever little R&D work was going on in the centre came to a standstill with the discontinuation of financial assistance from the Punjab Government. At present, the centre is only working as a production and testing unit and earning just enough to pay wages and salaries and other establishment expenses.

The quality of bicycles has to be improved and new models, comparable to international designs, introduced, to sustain the growth and further development of the bicycle

industry in the state and to increase its share of export. To achieve this objective the R&D centre should be restructured and strengthened possibly on the following lines:

- The bicycle industry should form a Federation of Bicycle Industry with the active participation of industry associations representing different segments.
- The state government should transfer the management, control, and assets of the R&D Centre to the Federation on the basis of a binding protocol.
- Future expenditure, recurring/non-recurring, to run the centre should be borne by the Federation. For this purpose a Bicycle Development fund may be created by levying a Development Cess of say two rupees per bicycle. Appropriate mechanism for collecting the cess may be evolved by the Central/State Government in consultation with the proposed Federation.
- A one-time grant may be provided by the Central/State Government or obtained from some international agency like UNDP through the good offices of the Government of India, to meet the financial requirements for upgradation of the R&D Centre.

The R&D Centre should work with the objectives of:

- Designing and developing new models comparable with the latest available in the international market and pass on the knowhow to the industry for commercial exploitation.
- Strengthening the testing and quality control labs to make available testing facilities for all types of bicycles and components.
- Upgrading of standardization and calibration facilities.
- Reinforcing the Documentation centre by making available latest literature and periodicals on domestic and international marketing information, new designs, manufacturing techniques and testing methods and international standards and specifications.

Human resource development and training

Training the workforce of the industry is necessary for upgrading their skills to adopt the latest manufacturing technologies, management techniques and quality management systems enabling them to compete in the international markets. Study visits to the developed countries should be conducted to give exposure to new developments taking place in the global arena.

Consortium/nodal agency

The trade associations related to bicycle and component industry should join hands and form a consortium/nodal agency to obtain the maximum advantage of partnership. This agency should work to for safeguard and promote the interests of the industry in domestic and international markets, for procuring raw materials at reasonable prices, dissemination of trade information and liaison with government, financial, and other developmental institutions.

A consortium approach may be adopted to reap the following benefits:

- Improve the bargaining strength in price negotiation, thus avoiding price cutting and undercutting by individual exporting units.

- Secure favourable terms of trade with regard to price, payment terms, etc.
- Popularize the common brand through effective marketing in the export market.
- Build strategic tie-ups, including joint ventures, with well-known international companies in the industry to tap growing and vibrant segments of markets in USA, Europe and other developed countries.
- Avail the advantage of marketing development assistance and other promotional policy measures of the government.

The mindset of the consumer has to undergo a sea change. Bicycle is considered a poor man's transport. Populations with higher income avoid riding a bicycle because it is a typical roadster model and does not suit their tastes and status. Under these conditions, there is not much demand from the higher income strata. The bicycle is made keeping in view the lower income group of the population that cannot afford higher prices. In trying to keep the price low, not much headway has been made in the design and look of the bicycle. The following steps could be taken to break the vicious circle:

- New fancy models should be developed and offered to the public for free test ride.
- Trade fairs and bicycle racing should be popularized.
- Enable the industry to have access to raw materials from international as well as domestic sources.
- Possibilities of providing locally produced raw materials at international prices can be pursued.
- Imports of raw materials can be made in economically viable bulk quantities.

Policy and institutional support

- More specialized SSI bank branches may be opened to provide financial assistance to the SSI sector.
- Finance should be made available at a reasonable cost, e.g., at a interest below or equal to prime lending rate (PLR).
- Financial evaluation procedures for lending should be made more objective and transparent and made public.

Reservation policy

The reservation policy for bicycle components and parts has played a major role in fostering the small and tiny sectors. Though serious doubts about its relevance have been raised, in the context of current national and international trends, after a series of meetings with industry associations and representatives, it is felt that the present policy of reservation should be continued for the time being. However, the investment limit of Rs. 1 crore could be enhanced to Rs. 5 crore in some selected and identified components to begin with, in order to:

- achieve higher quality standards;
- introduce new models in domestic and export markets;
- avail of economies of scale to face the new challenges under the emerging WTO regime; and
- introduce state of art technologies to attain higher levels of productivity and share of export market.

Cluster approach

After independence, Ludhiana and areas around it have emerged as a natural cluster for the bicycle industry, with medium, small and tiny industrial units, using traditional and modern techniques of production, but not well organized and systematic. These units are located in a haphazard manner causing considerable environmental degradation and other problems. Unless a systematic and planned cluster approach is followed, further development of the industry and even the present trend of growth will not be sustainable. Based on detailed discussions with government officials and industry associations concerned, it is suggested that the existing cluster should be strengthened with modifications. A common effluent treatment plant is absolutely necessary in the existing cluster, to provide a pollution-free environment. Better infrastructure facilities are essential for efficient material movement. The concept of 'flatted factory system' should be introduced in selected, planned areas, provide more industrial accommodation and factory space. For facilitating future growth the following specific suggestions deserve urgent follow-up:

- There should be an area exclusively allocated for the bicycle industry; to begin with 100 acres with provision for further extension.
- The units in residential areas should be relocated within this new cluster to check pollution in these areas and facilitate future growth.
- Concerted efforts are necessary by both Central and State Governments, industry associations and other agencies involved, with industry taking the lead, for developing the cluster.
- Central/State Governments may give one time grant for the development of the cluster.

The planned cluster will not only help remove the existing bottlenecks but also facilitate availing of the full benefits of government policy and available resources and facilities. The major benefits of the cluster could be:

- Taxes can be levied only at entry and exit points, thus enabling the free movement of goods within the cluster.
- Units located within the cluster can be linked through a computer network for better sharing and dissemination of information.
- Labour laws can be liberalized within the cluster.
- Time-and-work study can be conducted within the cluster for achieving higher levels of productivity and efficiency.
- The single-window clearance scheme can be better implemented.
- Access to finance to industry through banks and other financial institutions can be improved
- Promote partnership for HRD, technology upgradation, procurement of raw materials, common facility services in production and testing, and marketing of products in domestic and international markets.

AUTOMOBILE AND COMPONENTS INDUSTRY

With the increase in the motor vehicle population in the country during the 1980s, a large number of SSI units were established in Punjab to produce automobile components. These units have been catering to the needs of original equipment manufacturers (OEMs) and replacement markets. Of late, some units have also come up to serve the export market with improved technology and product quality and they have been able to export even to developed countries. The industry, which started as motor vehicle repair workshops, has come of age and is now a major foreign exchange earner.

The automobile industry in Punjab is mainly an auto-component industry. The total number of units has grown to 2,598 (with 2,569 in SSI and 29 in L&M) employing about 45,745 persons in 1999-2000. The total production in this sector has been valued at Rs.2,154.90 crore with an investment of Rs.1,128.03 crore growing at an annual average rate of 14.7 per cent and 8.4 per cent for production and investment respectively, during 1995-96 to 1999-00. Thus, the performance of this sector has been quite good. The status of the automobile and components industry is shown in Table 10.

Table 10
Status of Automobile and Components Industry in Punjab

Year	Units (No.)			Employment (No.)			Investment (Rs. lakh)			Production (Rs. lakh)		
	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total
1995-1996	2269	27	2296	15432	25105	40537	5044	82359	87403	19569	108647	128216
1996-1997	2334	29	2363	15492	25929	41421	5764	89347	95111	22189	139802	161991
1997-1998	2451	31	2482	16727	25570	42297	6815	126957	133772	28064	122685	150749
1998-1999	2505	29	2534	17658	27285	44943	8310	115767	124077	29824	141565	171389
1999-2000	2569	29	2598	18281	27464	45745	9844	102959	112803	32647	182843	215490

Source: Director of Industries, Punjab

The capital-output ratio in the SSI sector has marginally increased from 0.26 in 1995-96 to 0.30 in 1999-2000, while in the L&M sector it has declined from 0.76 to 0.56.

Investment and production in the SSI sector per employee during 1995-96 to 1999-2000 increased from Rs. 0.33 lakh to 0.54 lakh and from Rs. 1.27 lakh to Rs. 1.79 lakh respectively. During the same period, investment and production per employee in the L&M sector increased from Rs. 3.28 lakh to Rs. 3.75 lakh and from Rs. 4.33 lakh to 6.66 lakh respectively.

Major destinations of auto components exports are Europe (36%), America (27%), Asia (16%), Africa (13%) and others (8%). The auto components industry has contributed significantly to exports as shown in Table 11.

Table 11
Export of Auto Components (Rs. in lakh)

Year	Value (FOB)	Change (%)
1994-1995	4419	
1996-1997	5436	23.01
1997-1998	8434	55.15
1998-1999	13862	64.36
1999-2000	14282	3.03
2000-2001	14415	0.93

Source: Director of Industries, Punjab

Auto-parts manufacturing units are spread over the whole state and most of them manufacture components required in the replacement market. The products presently manufactured in the industrial belts of Ludhiana, Jalandhar, Kapurthala and Ropar are metal-based. They range from such simple items as nuts and bolts to such complex items as axle, shafts and radiators. Managerial standards, engineering capability, machinery and quality control vary from poor to excellent, with most of the small-scale units showing engineering ingenuity and getting the best out of what they have and what they know.

Present technological status and observations

Among the auto-component manufacturers, there exists a three-tier structure. At tier-I are the original equipment manufacturers (OEM) and components manufactured by them go either directly into assembly lines or are exported. There are a few units in tier-I category and they are in the large and medium sector. Tier-II manufacturers supply sub-components to tier-I manufacturers as well as to the export market. Tier-III manufacturers produce low-cost, low value-added, low quality auto-component and mainly cater to the needs of the replacement market. Most of the component manufacturers in the large and medium sector and in the SSI sector fall in the tier-II category and tier-III category respectively.

Auto-components manufacturers in the SSI sector use conventional techniques of production and machinery, such as open die, old types of power presses, inefficient furnaces, old generation welding equipment, and locally made special purpose machines called 'Addas', etc. The processes are not carried out in sequence and based on scientific lines. Dies and other press tools are generally got manufactured from die makers lacking knowledge of designing and development techniques. Consumables, such as lubricants, welding electrodes and tools, etc., are selected on a random basis and no proper attention is given to the required grade. Without the latest designing facility, like CAD or OEM drawings of the components, most of the small-scale units merely produce components by copying samples. Small-scale units cannot achieve interchangeability as well as the required tolerances required by the replacement market. The majority of the units do not follow documented procedures of quality control. Components are not inspected at various stages of processing. Locally made inspection gauges are used, and there is no provision to calibrate them periodically. Small-scale entrepreneurs are not aware of various new methods and techniques, to either combat pollution or adopt alternative pollution-free processes. The low level of technologies in

use results in high cost, poor quality and low productivity and consequent competitive disadvantages.

Strategy for Development of Auto-component Industry

There is no doubt that the auto-component industry needs quality improvement and more market exposure. To achieve these objectives, technology upgradation, human resource development and training, effective innovative management techniques for producing zero-defect products, quality control and adopting the cluster approach for systematic and planned infrastructure development are necessary.

Technology upgradation

Wide gaps exist between technologies used by auto-component manufacturers in India and abroad. With MNCs setting up their shops in India, auto-component manufacturers should give serious thought to technology upgradation and quality control. It is well nigh impossible for SSI in Punjab to bridge this technological gap on their own, because they neither have the resources nor the capabilities. The Automobile R&D Centre at Ludhiana needs to be strengthened and its technological capabilities upgraded to provide guidance and support to the industry.

Suggestions to bridge the identified gaps

Product development: Hot forging requires to be replaced by cold forging techniques wherever possible and economical. An intermediate technology in the form of warm forging could also be introduced. The OEM drawings of components should be made available to small-scale units so that quality components within required tolerances and interchangeability are ensured.

Quality control: Units should adopt documented procedures for quality control, and inspection of components at various stages of processing should be introduced. Separate inspection cells/sections should be established in the units and their working should be made effective. The ultimate aim of Total Quality should be achieved through various quality control measures. The units should go for ISO-14000 Certification.

Pollution control: Entrepreneurs should be provided with information on various new techniques and technologies, which are eco-friendly and can combat pollution hazards. Small versions of economical and efficient systems of pollution-control devices and equipment should be made readily available in the market. The State Pollution Control Board should not only act as a regulatory body but also assist small-scale entrepreneurs to overcome problems faced by them in trying to control pollution.

Energy conservation: Economical versions of fuel-efficient designs of furnaces and other heating equipment could be made available to the entrepreneurs at reasonable prices, to achieve energy conservation. Power-efficient electric motors, lighting system, welding equipment, etc., should be introduced to small-scale industrialists.

Human resource development: Various institutions engaged in imparting training to industrial workers and supervisors and other managerial staff should be equipped on modern lines to cater to the special needs of the industry.

AGRO/FOOD PROCESSING INDUSTRY

Punjab is endowed with fertile land and a favourable climate to grow a large number of cereals, fruits and vegetables, oilseeds, pulses and maize and provides about 25 per cent of India's wheat production and approximately 10 per cent of rice production. The state has basic raw materials, manpower and a vast consumer market, which are the necessary prerequisites for industrial production. Value addition in agriculture is the answer to the wheat-paddy rotation, which has become one of the weak spots in the state's economy.

There is a huge domestic and export market for food products, but the consumer demands high quality food, both raw and processed, at affordable prices. Development of the agro/food processing sector can bring more employment opportunities, especially in the small towns and rural areas, and cheaper and better products to the consumers. Therefore, Punjab will have to look for alternative crops, which can increase revenues/returns to the farmers and have better scope for marketing/processing. This would be possible with research and development in specific crops to achieve desired quality/yield and supporting infrastructure.

Status and potential

The food-processing sector covers a wide spectrum of products and is one of the largest in terms of production, consumption, export and growth prospects. The vast potential of agricultural resources available in Punjab can be better exploited and utilized by preserving and processing, using available technologies. Though the Government of India has sanctioned a number of schemes, so far not much progress has been made towards setting up agro-based food processing industries, proportionate to the agriculture potentials and commodities available in the state. At present, the agro-processing industry is mainly limited to traditional processing of agricultural raw materials, such as atta chakkies, oil mills, cotton ginning and rice shelling, etc., using a basic, low-grade technology. There is little high-tech agro/food industry adding value to primary products. Only less than two per cent of the fruits and vegetables produced is processed, compared with 80 per cent in Malaysia. Therefore, there is scope for setting up a processing industry in the state, on a priority basis, using indigenous technologies as well as the latest technologies from abroad. The present status of the food and beverages industry in Punjab is shown in Table 12. Production has grown at an average rate of 15 per cent during 1995-96 to 1999-2000. The share of the food and beverages Industry on 31 March 2000 was 18.66 per cent, the highest of the total production of the industrial sector in Punjab.

The capital-output ratio of the SSI sector has slightly improved from 0.22 in 1995-96 to 0.24 in 1999-2000; in the large and medium sector it initially improved from 0.46 to 0.51, but later declined in 1998-99 and, 1999-2000 to 0.41. The investment in the SSI sector per employee has increased from Rs. 0.58 lakh in 1995-96 to Rs. 0.9 lakh in 1999-2000, and production per increased from Rs. 2.61 lakh in 1995-96 to Rs. 3.67 lakh in 1999-2000. On the other hand, in the large and medium sector the investment per employee increased from Rs. 4.18 lakh in 1995-96 to Rs. 5.81 lakh in 1999-2000 and the production per employee from Rs. 9.01 lakh in 1995-96 to Rs. 14.12 lakh in 1999-2000.

Table 12
Status of Food & Beverages Industry in Punjab

Year	Units (No.)			Employment (No.)			Investment (Rs. lakh)			Production (Rs. lakh)		
	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total
1995-1996	8972	103	9075	50872	33952	84824	29260	141899	171159	132527	305835	438362
1996-1997	9159	108	9267	52825	34855	87680	32829	164714	197543	154515	320804	475319
1997-1998	9301	114	9415	54318	35482	89800	37260	195533	232793	173856	405214	579070
1998-1999	9443	123	9566	56952	38165	95117	43941	220707	264648	192145	543721	735866
1999-2000	9644	121	9765	59950	37754	97704	53694	219445	273139	219750	533019	752769

Source: Director of Industries, Punjab

By using better techniques of farming, high yielding and hybrid seeds, agro-processing units could enhance farm income very substantially. Reports indicate that in the case of Pepsi Foods Limited, Hoshiarpur, the tomato yield increased by 200-266 per cent and income of farming increased by 230 per cent.

According to the assessment of Mckinsey (1997), packaged atta, packaged milk, fresh poultry, bakery, Indian dairy products and confectionery will grow faster with high volumes as these are mass-consumption items. The projected volume of business turnover in different categories of food processing industries, according to this study is given in Table 13.

Table 13
Projected Volume of Business Turnover of Agro-processing Industry in India (2005)

Sr. No.	Food category and sub category	Likely volume of business in 2005 (Rs. in crore)
1.	High volume & growth	
	(i) Packaged atta	15000
	(ii) Packaged milk	36000
	(iii) Fresh poultry	27000
	(iv) Bakery	10000
	(v) Tea & Coffee	7400
	(vi) Confectionery	6500
	(vii) Soft drinks	10500
	(viii) Processing meat & poultry	9000
(ix) Indian dairy products	7300	
2.	High growth & low volume	
	(i) Frozen vegetables	350
	(ii) Puree, jam, sauces	1000
	(iii) Fruit drinks	2000
	(iv) Fresh vegetables	1200
(v) Value-added dairy products	4700	
3.	Low growth & high volume	
	(i) Sugar	24000
	(ii) Oil	50000
Total		211950

Source: Mckinsey and Company (1997)

Technological gaps and suggestions for future development

Large gaps exist in the industry at different stages of operation, such as raw materials, technology and machinery, processing techniques, quality control and packaging. As already stated, most of the food processing units are in the small and tiny sector, using old inefficient, uneconomical machinery and technology and lacking infrastructure, because of financial and other constraints. At present, workers do not have basic ideas of food processing, and unskilled workers and supervisors work in the industry. Personal hygiene is also very poor in most cases. Training of floor level workers and their personal hygiene are essential to produce quality finished products. Quality control of raw materials and finished products is as important as processing. To compete in national and international markets, strict quality control of finished products is a must. Packaging is also one of the important aspects of the development of the food processing industry. The agro/food processing industry can be considered a sunrise industry and it has the potential of attracting local and foreign investments in Punjab.

To emerge as a leader in the agro-processing industry, a well thought-out, co-ordinated, growth-oriented, multipronged, strategy covering the following aspects could be considered:

- The role and responsibility of public sector undertakings in the agricultural sector should be thoroughly reviewed and appropriate structural changes made to render them effective instruments for promoting the agro/food-processing industry in the present situation.
- Agri-Export Zones (AEZs) and Parks should be set up productwise, after examining their viability. This will facilitate building centralized, modern infrastructure. These facilities should be available to medium SSI/Tiny industries and farmers on a shared basis against reasonable cost. The private sector should be motivated to participate effectively in setting up the AEZs, with initial financial assistance from the Government of India and promotional support from the Punjab Government.
- Multinational companies (MNCs), should be attracted to invest in agro/ food processing industry in Punjab. This will facilitate upgradation of the entire infrastructure for achieving the benefits of large-scale vertical integration of different activities across the agro-business chain. This step is very vital for the growth of the agro/food processing industry in Punjab, in the emerging competitive markets for agro/food products.
- The state government should carefully examine the schemes of the Government of India for the promotion of agro/food processing and adopt and implement expeditiously only those which further and facilitate the achievements of its objectives.
- Keeping in view the growth potential of the agro/food processing industry, an Apex Review Committee, presided over by the chief minister, should review and monitor periodically the strategies and plans and projects in this sector.

TEXTILE AND HOSIERY INDUSTRY

Ludhiana is famous worldwide for its hosiery and knitting industry. The history of hosiery in Ludhiana can be traced back to 1902-1903, when the first unit manufacturing woollen socks was set up. During the years that followed this industry in Ludhiana progressed steadily. Till recent years our main trading partner for the export of hosiery knitwear, was the erstwhile USSR. However, after its disintegration, exports have diversified to other markets, viz., Europe, USA and other advanced countries. Production in the textile and hosiery industry in the Eighth FYP achieved an impressive average annual growth rate of 26 per cent. It, however, declined sharply during 1995-96 to 1999-2000 to 14 per cent in textile and 11.22 per cent in hosiery, as shown in Table 14:

Table 14
Status of Textile and Hosiery Industry in Punjab

Year	Textile/ Dying/ Weaving			Hosiery & Garments			Grand Total
	SSI	L&M	Total	L&M	SSI	Total	
Units							
1995-1996	635	56	691	54	12760	12814	13505
1996-1997	653	69	722	73	13068	13141	13863
1997-1998	673	79	752	79	13311	13390	14142
1998-1999	696	87	783	67	13486	13553	14336
1999-2000	715	108	823	68	13665	13733	14556
Employment							
1995-1996	4119	48455	52574	24744	89884	114628	167202
1996-1997	4397	55347	59744	23652	91945	115597	175341
1997-1998	4909	55761	60670	21679	93600	115279	175949
1998-1999	5327	57180	62507	18684	96537	115221	177728
1999-2000	5719	67535	73254	18618	98465	117083	190337
Investment		(Rs. lakh)					
1995-1996	2194	182524	184718	74565	15970	90535	275253
1996-1997	2620	237904	240524	79029	17678	96707	337231
1997-1998	3827	266879	270706	95923	19657	115580	386286
1998-1999	6089	319088	325177	151957	26157	178114	503291
1999-2000	7578	328617	336195	162272	30239	192511	528706
Production		(Rs. lakh)					
1995-1996	11234	212495	223729	103264	96758	200022	423751
1996-1997	12953	298970	311923	125861	107401	233262	545185
1997-1998	19846	322782	342628	152897	121243	274140	616768
1998-1999	21927	355536	377463	145299	135818	281117	658580
1999-2000	24840	340008	364848	148063	156062	304125	668973

Source: Director of Industries Punjab.

During 1995-96 to 1999-2000 the capital-output ratio of the SSI and the L&M sectors in the textile industry increased from 0.20 to 0.31 and from 0.86 to 0.97 respectively. In the hosiery industry during the same period it increased from 0.17 to 0.19 and from 0.72 to 1.10 respectively, as shown in Table 14. Investment per employee in the SSI and the L&M sectors in the textile industry increased from Rs. 0.53 lakh to Rs. 1.33 lakh and

from Rs. 3.77 lakh to Rs. 4.87 lakh respectively and in the hosiery industry from 0.18 lakh to 0.31 lakh and from Rs. 3.01 lakh to Rs. 8.72 lakh respectively.

Table 15
Consolidated Data for the Textile and Hosiery Industry

Year	Units (No.)			Employment (No.)			Investment (lakh)			Production (lakh)		
	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total
1995-1996	13395	110	13505	94003	73199	167202	18164	257089	275253	107992	315759	423751
1996-1997	13721	142	13863	96342	78999	175341	20298	316933	337231	120354	424831	545185
1997-1998	13984	158	14142	98509	77440	175949	23484	362802	386286	141089	475679	616768
1998-1999	14182	154	14336	101864	75864	177728	32246	471045	503291	157745	500835	658580
1999-2000	14380	176	14556	104184	86153	190337	37817	490889	528706	180902	488071	668973

Source: Director of Industries Punjab.

The capital output ratio of the SSI and the L&M sectors increased from 0.17 to 0.21 and from 0.81 to 1.01 respectively as shown in Table 15 during 1995-96 to 1999-2000. Investment per employee in the SSI sector nearly doubled from Rs. 0.19 lakh to Rs. 0.36 lakh while in the L&M sector it increased from Rs. 3.51 lakh to Rs. 5.70 lakh during 1995-96 to 1999-2000. Production per employee in the SSI sector increased from Rs.1.15 lakh to Rs.1.74 lakh and in the L&M sector from Rs.4.31 lakh to Rs.5.67 lakh.

Table 16
Annual Average (Linear) Growth Rate of Textile and Hosiery Industry during Eighth FYP and 1996-00 (%)

Year	Units		Employment		Investment		Production	
	SSI	L&M	SSI	L&M	SSI	L&M	SSI	L&M
Eighth Plan	4.41	17.96	3.08	5.34	12.00	26.48	28.84	26.04
1996-2000	1.79	13.03	2.61	4.37	17.95	20.51	13.79	12.31

Source: Based on data from Director of Industries Punjab.

As shown in Table 16, there has been a decline in the number of industrial units, employment and production in 1995-96 to 1999-2000 compared with the Eighth FYP.

Exports

Table 17
Exports of Textile and Hosiery Industry

Year	Exports (Rs. lakh)	Change (%)
1997-1998	141519	
1998-1999	139820	-1.20
1999-2000	156785	12.13
2000-2001	153120	-2.34

Source: Director of Industries, Punjab

Status of the industry: some observations

The textile and hosiery Industry in Punjab can be classified into two groups, viz., hosiery & readymade garments and textiles. The hosiery and readymade garments industry is highly labour- intensive. There exists a 'technological dualism' in this industry as, on the one hand, it uses state-of-the-art technology, manufacturing high value-added fashion

garments and on the other, it relies on conventional, locally manufactured and fabricated machinery and equipment, well suited to the capabilities of the untrained and illiterate labour force. Yarn is the basic raw material for textile, hosiery and readymade garments. Proper blended yarn of requisite quality is not available at a reasonable price. The dyeing processes at present are highly energy consuming, inefficient and polluting and in-house testing facilities for colour-matching and colour-fastness are not available in most of the units. Designs normally are copies from magazines, journals, or samples provided by the buyers. The majority of the units have not adopted Computer Aided Designing/ Manufacturing.

Machinery being used in the industry are flat-bed machines, circular knitting machines and imported reconditioned knitting machines. To cater to the requirements of western countries, it is essential to improve the technology not only to manufacture hosiery products, but also the basic machinery. Emphasis should be more and more on the use of computerized machinery and equipment. The industry is still not using laser and other modern techniques for cutting the fabric. Knitwear is stitched on multi-thread lock-stitch, chain-lock, flat-lock and over-lock machines, either manufactured indigenously or imported. Embroidery, patchwork, printing and beadwork are done with indigenous machinery and the quality of embroidery is not acceptable in the international market. However, some of the progressive units have imported computerized multi-head embroidery machines, which can create intricate logos on T-Shirts and other garments. Latest models of modern machinery and equipment in use in developed and other developing countries for producing yarns of new blends, ready to use yarn, knitting fabric, cutting and stitching knitwear, dyeing and finishing the and products, and CAD/CAM facilities must be introduced in our country.

As the Hosiery and Knitwear Facility has closed down there is no institute or agency, which is involved in research and development in hosiery and knitwear in the state, to develop low-cost hybrid technologies. The industry is in need of such a facility, which would develop and transfer technologies to the units.

Strategy for the development of hosiery and textile industry

Human resource development: With the addition of the latest models of machinery and equipment, the industry needs a trained workforce to handle these efficiently and effectively. There is no training centre to impart training on electronic gadgets and systems, computer-aided designing and manufacturing, handling of testing equipments, etc. Apart from these technical training facilities, the industry also needs specialized trained professionals in different managerial, marketing, and financial areas, to make the units sustainable and internationally competitive.

Textile park: Textile parks with ultra-modern facilities are required to be developed near Ludhiana for hosiery and knitted garment units. The layout of the complex should be such that dyeing and processing units are clubbed together, so that a Common Effluent Treatment Plant is feasible. Provisions should also be made for setting up on R & D Centre, Testing and Training Centres, Exhibition hall, Auditorium, Telecommunication, etc.

Air cargo facilities at Ludhiana: Facilities for Air Cargo Services in or around Ludhiana would facilitate exports.

Research and development centre: An exclusive Centre for Research & Development for hosiery and knitted garments, to develop appropriate modern technologies and processes is required at Ludhiana. It should have modern facilities backed by well-known specialists and experts in the field, with a separate wing for imparting training to workers and intermediate-level management personnel. Regular courses at the degree and post-graduate level should also be undertaken. The Centre should act as a show-window of modern technology, by installing various machinery and equipment. The land, building and equipment of the defunct common facility set up by the state government could be transferred to the Association of Hosiery and Knitwear Industry, which should take on the responsibility of establishing and running the new facility. An appropriate institutional mechanism should be evolved for this purpose through consultation between the Central and State Governments and the Associations concerned.

National institute for fashion technology: A full fledged Institute of Fashion Technology, on the pattern of such Institutes at New Delhi, Hyderabad, Tirupur, Kolkata and Mumbai, should be established at Ludhiana to train professionals in designing, marketing, quality control and manufacturing of knitwear. The institute could help in creating awareness among the local entrepreneurs by organizing exhibitions, fashion shows, seminars, etc. The management of this institute too should be with the Association of Industry defined by a protocol with the State/Central Governments.

Visits of foreign experts: The Government of India should invite experts on spinning, dyeing, processing, knitting, finishing and manufacturing of garments from developed and other developing countries, to enlighten small-scale entrepreneurs about appropriate technologies and processes, on the basis of study of the existing set-up of the units during their stay. This will help in creating confidence among the entrepreneurs in making their units sustainable and competitive in the international market. The proposed Institute could co-ordinate this activity.

Development of economical models of modern machines: Machine building facilities and capabilities within the country should be upgraded and updated, either through foreign collaborations or by assigning special projects to various institutes engaged in R & D, such as MERADO, (Ludhiana) and CMTI (Bangalore). Creation of such facilities would not only help in developing the hosiery and readymade garments manufacturing units, but would also save foreign exchange, as well as earn it through export.

Financial assistance: For modernization and technology upgradation of the cluster, it is essential in this era of stiff competition to provide finance at rates of interest comparable with internationally prevailing interest rates. This will help the small-scale units to purchase modern machinery and components required to produce products of acceptable quality. This will encourage more and more small-scale units to enter the international market, thus boosting India's share in world trade. The state government should take up the matter with the Central Government and the Reserve Bank of India.

Development and transfer of dyeing and processing technology: The IITs/universities in the country, having textile technology as a branch of study, should be entrusted with special projects for developing and transferring eco-friendly, lesser energy- and water-consuming technology for wet dyeing of yarn/fabric.

Common brand: The hosiery and knitwear manufacturing industry at Ludhiana can not compete with the multinational companies in the quantum of production, types, styles,

designs and quality of products. Some tie-ups with some of the larger established brands for manufacturing as well as marketing in the international market are essential for increasing India's share of foreign trade in this area.

BASIC METAL INDUSTRY

The basic metal industry is acclaimed as the mother of all industries. Before independence there were some restrictions on setting up the iron and steel industry and, therefore, very few units were engaged in the manufacture of basic metals. These units were mainly concentrated in the erstwhile princely states of Nabha, Patiala, and Faridkot. These states offered many incentives, such as tax holiday and free land, to promote industry within their respective territories. After independence, overall industrial growth in Punjab to the development of the steel industry as backward-linkage efforts. The industry, which started with the manufacture of bars and rods and small smith shops, graduated to the manufacture of forging items, castings for machine tools, girders, heavy channels and joints of different compositions. This impressive growth despite Punjab's distance from coal mines, steel producing areas and ports was due to such factors as availability of cheap and good quality power, entrepreneurship and incentives given by government such as freight equalization.

Major constituents of the basic metal industry are casting, forging, melting and re-rolling. The present status of the industry is shown in Table 18.

Table 18
Status of Basic Metal Industry in Punjab

Year	Units (No.)			Employment (No.)			Investment (lakh)			Production (lakh)		
	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total
1980-1981	2232	26	2258	19588	8837	28425	4452	4886	9338	12887	11692	24579
1985-1986	3101	33	3134	25902	10131	36033	8247	11881	20128	21832	30574	52406
1990-1991	4086	51	4137	33442	14729	48171	12603	22457	35060	48904	91874	140778
1995-1996	5093	95	5188	45093	18387	63480	217.64	675.33	892.97	1373.09	2718.07	4091.16
1996-1997	5227	105	5332	47280	18683	65963	25070	76974	102044	163353	281346	444699
1997-1998	5349	105	5454	49410	18207	67617	29964	70837	100801	197929	442597	640526
1998-1999	5462	93	5555	51902	16942	68844	35723	78205	113928	213184	228951	442135
1999-2000	5568	77	5645	54468	15369	69837	41262	78596	119858	270937	206593	477530

Source: Directorate of Industry Punjab

The capital-output ratio in the basic metal industry is 0.25 with 0.15 in the SSI sector and 0.38 in the L&M sector. The investment required to generate one unit of employment is Rs. 75,000 and rupees five lakh in the SSI and L&M sectors respectively. The L&M sector, with an average share of 70 per cent and 58 per cent in investment and production, has been leading over the SSI sector in the basic metal industry in Punjab, for the last four years (1996-97 to 1999-2000). However the SSI units employ 75 per cent of total workforce in the basic metal industry.

Melting and re-rolling industry

Re-rolling is one of the most important segments of the iron and steel industry, constituting an essential link in its supply chain. The rolling and re-rolling mills cluster in Punjab is located at Mandi Gobindgarh and adjoining areas. Mandi Gobindgarh is rightly called the Steel Town of Punjab. About 275 rolling and re-rolling mills, five arc furnaces and 100 induction furnaces are in operation in Punjab. The steel melting and re-rolling sector consists of small and medium scale units producing several thousand tonnes annually of different types of structurals, rods, plates, flats, etc.

Technological status and gaps

Various sizes and types of re-rolling mills and induction furnaces are in operation. Machines and furnaces are indigenously designed and manufactured. Sizes of induction furnaces vary from two tonnes to 12 tonnes per charge. These furnaces produce mild steel of structural quality at a competitive cost and as per BIS standards. Generally, rolling mills operate at slow speeds, though a few units have established medium-speed rolling mills. Some units have adopted automation to perform certain difficult and hazardous operations and these semi-automatic rolling mills are more efficient and produce better quality products. Almost all types of sections of various sizes in different compositions are being manufactured in Punjab, contributing about 25 per cent of the total production of rolled steel products in India.

Consumption of oil and coal per metric tonne of steel is much higher than international standard, as the industry uses 45-60 litres of oil compared to 25-30 litres internationally. Cost of fuel alone accounts for about 30 per cent of the total cost of production. Therefore, the main emphasis should be on energy conservation as a cost saving measure. Scrap is the basic raw material for the melting and re-rolling industry. It comes from different sources, such as ship-breaking, steel plants, imports and local scrap dealers. Scrap coming from steel plants and ship-breaking is of good quality. Local as well as imported scrap are not so. Though induction furnaces undertake limited refining, the end products are not of good quality.

The roll passes are designed purely on the basis of the practical experience of the foreman of the mill, who is generally not well qualified and well conversant with requirements of grades of rolling materials, pressures, speeds and reductions, etc. Faulty roll-pass design results in frequent breakdown of machinery, poor quality of finished goods and wastage of energy. Average capacity utilization of Punjab's re-rolling industry is about 37 per cent of the total installed capacity, with many mills not even breaking even. This is mainly due to the obsolete technology and consumption of expensive energy.

The major problems of the industry are lack of technical knowledge and awareness of energy-efficient and environmentally sound technologies, as well as practices that have been introduced successfully across the globe. The means of transforming this knowledge and awareness into an operational framework is also lacking because of:

- Low and asymmetric information base which has limited the size of the technology market.
- Low engineering, technology, innovation and R&D base.
- Low level of human resources development.
- Dominance of technical and financial risks in the minds of decision makers.

Re-rolling mills do not often adopt quality control measures and normally they keep control only over dimensional accuracy. Very few re-rolling mills have BIS certification. Units of induction furnaces possess good laboratories and some of them even have the latest instruments like spectrometers.

Apart from general trade practices and finance schemes of banks, the industry has evolved a unique finance system of its own to meet its working capital needs. A third party finances the deal between the induction furnace owner and the re-roller. He pays instantly to the furnace owners and charges a premium of a certain fixed amount per tonne for a specified period from the re-roller. The re-roller repays the amount to the third party on a specified date. If he is unable to pay back the financier within the stipulated period, the financier charges higher premium for subsequent next period. This system is reportedly working well as, the seller receives the payments immediately and the re-roller is able to procure raw materials to run his industry.

Suggestions for technological upgradation

- The industry should use liquefied natural gas as fuel, as it has many advantages over coal and oil, which are now in use. LNG is environment friendly, has more calorific value and is cheaper than oil.
- Pilot projects, using continuous processes, having both induction furnace and re-rolling mill should be set up, where preheated scrap could be charged to induction furnace. The plant will not only conserve energy, but also help in providing better quality products.
- Regular workshops/seminars, with the participation of technology suppliers, equipment manufacturers and consultants, will help the industry by providing exposure to new technologies.
- Training operators in operation and maintenance of new systems should be organized.
- Support to provide back-up services and update the technology from time-to-time with R&D inputs, should be ensured.
- Adoption of new technology by a large number of units/markets will depend on information-base and technology dissemination.
- Technical and financial risks involved in the introduction of new technologies have to be assessed by the industry in consultation with experts.
- Software to be developed for roll-pass design and computerized fluid dynamics (CFD) for each unit with institutional back-up for development, installation, training, etc., at the shop floor.
- Market has to be provided intelligence on input material and finished products to help the units to plan their inventory and improve the flow of material.

Status of forging industry

Expansion of road transport, the green revolution and the development of steel making and light engineering industry in the state gave a boost to the forging industry. More than 90 per cent of the forging units are located in Ludhiana and Jalandhar and the remaining in Mandi Gobindgarh, Phagwara, Mohali, Amritsar, etc. The forging industry in the state may be categorised in order of merit into various segments and dispersal thereof at different locations, as indicated below:

Segments	Location
Nuts, Bolts and Screw	Ludhiana, Jalandhar, Mohali, Amritsar
Hand tools and garden tools	Jalandhar, Ludhiana
Bicycle & sewing machine parts	Ludhiana
Auto-parts	Ludhiana, Jalandhar, Phagwara
Tractor parts, Diesel engine parts	Ludhiana, Phagwara
General forgings	Ludhiana, Mandi Gobindgarh.

Status of technology and upgradation

The forging industry mainly employs hot-forging techniques. Nuts, bolts, screws and similar items upto certain specified sizes are manufactured by the cold-forging process. Some of the progressive units employ warm-forging technology for producing B.B. Axles and allied cycle products.

Hot-forging techniques in general are of a primitive nature, where machinery and equipment in use date back to the fifties or sixties. The technology in practice is both labour- as well as energy- intensive and is dependent on the skill of the persons involved. However, a trend has emerged during the past couple of years to import and install second-hand multi-station horizontal forging machines.

Oil-fired furnaces used for heating and heat treatment are of non-standard specifications and design and are not fuel-efficient. The tools and die-making facilities in the units are very poor. Products forged through poorly designed and manufactured dies are of sub-standard quality.

More than 90 per cent of the units do not have adequate in-house material-testing facilities. The majority of the machinery and equipment in use in the forging industry are manufactured by the small-scale machinery manufacturers located at Ludhiana and other places in the state. Modern accessories and gadgets are nor available for these machines. Recent additions of imported Knuckle-joint type power presses, Multi-station Horizontal Forging Machines, etc., though second-hand, have brought in new vistas of awareness in the industry.

Provisions for designing of press tools and forging dyes are totally missing. These are traditionally developed under the guidance of foremen by the tool-room people without precision measuring instruments. Recently, some progressive manufacturers have started applying CAD/CAM to forging. The conventional process of designing the formed products by the 'build-and-test' method is no longer cost-effective in today's global competitive market. The only way to reduce the 'design-to-build' time and optimize the process is to resort to computer-based product and process design.

Human resource development

The basic metal industry is critically dependent on a skilled work-force, but there is a dearth of technically trained manpower. Though some of the units have engaged better qualified personnel, trained from various institutes, the majority of the labourforce on the shop floor is employed on a contract basis. They are often not concerned about wastage

and quality of products and conserving various inputs. There are many institutions imparting technical training at various levels in the state. However, these training courses need to be revised and upgraded according to latest developments in the industry.

METAL PRODUCTS INDUSTRY

The metal products industry transforms basic metals into more useful products, such as conversion of metal sheets into trunks and almirahs, and pipes into steel furniture. Similarly, it also produces such industrial products as nuts and bolts and hand tools, etc. The metal products industry is concentrated in Amritsar, Jalandhar, Ludhiana and Kapurthala, though fabrication units are spread all over the state. Tables 19 and 20 depict the status and growth of the industry in Punjab. Production in the Eighth FYP achieved quite a good annual average growth rate of 21.27 per cent, but declined in the first three years of the Ninth FYP to 12.21 per cent. The employment growth rate also declined from 2.43 per cent to 1.79 per cent during the same period as shown in Tables 19 and 20.

Table 19
Status of Metal Products Industry in Punjab

Year	Units (No.)			Employment (No.)			Investment (Rs. lakh)			Production (Rs. lakh)		
	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total
1980-1981	7854	14	7868	43917	3574	47491	4168	827	4995	10505	1577	12082
1985-1986	12656	14	12670	66081	3119	69200	9035	816	9851	18292	2454	20746
1992-1993	18165	15	18180	85859	3335	89194	17276	1700	18976	45014	5293	50307
1995-1996	19651	12	19663	93077	3180	96257	22248	1869	24117	86396	8518	94914
1996-1997	19870	15	19885	95194	2938	98132	24736	3261	27997	97244	9954	107198
1997-1998	20094	16	20110	96789	2981	99770	27118	4544	31662	116727	11080	127807
1998-1999	20339	12	20351	98825	2945	101770	29462	6169	35631	125292	11252	136544
1999-2000	20569	10	20579	100973	2532	103505	33434	6031	39465	139985	10973	150958

Source: Director of Industries Punjab.

Table 20
Annual Average (Linear) Growth Rate of Metal Products Industry during 1997-00 (%)

Units (No.)			Employment (No.)			Investment (Rs. lakh)			Production (Rs. lakh)		
SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total
1.16	-11.67	1.15	1.98	-4.59	1.79	10.59	24.29	12.13	13.03	3.46	12.21

Source: Based on data, Director of Industries Punjab.

The capital-output ratio in the SSI sector declined marginally during 1996-97 to 1999-2000, while in the large and medium sector it increased from 0.33 to 0.55 as shown in Table 19. Investment per employee in SSI and the large and medium sectors increased from Rs. 0.26 lakh to Rs. 0.33 lakh and from Rs. 1.11 lakh to Rs. 2.38 lakh respectively

during 1996-97 to 1999-00. During the same period production per employee in SSI and large and medium sectors increased from Rs. 1.02 lakh to Rs. 1.39 lakh and from Rs. 3.39 lakh to Rs. 4.33 lakh respectively.

Hand tools

The term 'hand tool' is generally applied to tools used by hand. These are quite small-sized tools, but are essential for erection and maintenance of plants, machinery and equipment. The use of hand tools covers almost all types of industries, viz., engineering, electrical and electronics, construction, plumbing, etc.; different types of servicing industries; and also certain types of production processes irrespective of their sizes and scales of operations (i.e., small, medium or large). Absence of these tools would in fact paralyse every type of industrial activity. Hand tools most commonly used in industries are wrenches, hand drills, pullers, vices, hammers, screwdrivers, pliers, spanners, clamps, cramps, etc. Such hand tools, as flaring tools, pullers, ring expanders and compressors, screw and stud extractors, tyre valve pull-out tools, flanging tools, valve lifters and reseating tools, etc., are extensively used in automobile repair workshops and garages. They also have important applications in the household sector in day to day life.

Growth and present status

The hand tools industry is concentrated in Jalandhar and Ludhiana. With the partition of the country in 1947, there was a large-scale influx of people, including industrialists and artisans, from West Pakistan. Some of them started small manufacturing units for their survival. Certain incentives given by government helped these people to rehabilitate themselves and set up their industries. Owing to acute shortage of foreign exchange and consequent restrictions on the import of various items, including hand tools, the domestic hand tools industry got a comparative advantage in the home market. This, together with increased effective demand in this sector, led to induced investment. In such conducive economic conditions, the hand tools industry of Punjab grew rapidly. The freight equalization scheme of the Central Government, took care of the locational disadvantage of the state of being far away from sources of raw materials, such as iron, steel and coal, and gave a big push to the hand tools industry. The natural dynamism of Punjabi entrepreneurs helped it capture markets not only in the county but also abroad. The product mix and product range availability in Jalandhar is quite extensive and exhaustive compared to other areas of concentration. The industry in the small-scale sector, by adopting a lower-level and labour-intensive technology provides employment to thousands of people in the state. Details of industrial growth, employment, production and investment from the year 1980-81 onwards are given in Table 21.

Table 21
Growth of Hand Tools Industry in Punjab

Year	No. of Units	Employment (Nos.)	Investment (Rs. lakh.)	Production (Rs. lakh.)
1980-1981	569	6042	1022.44	2469.24
1995-1996	1058	9906	2912.51	29187.12
1998-1999	1158	10733	4049.12	43761.12
1999-2000	1178	11169	4259.16	44911.82

Source: Director of Industries Punjab.

The SSI hand tools manufacturing units of Punjab contribute about 30 per cent of the total exports of the country. There is good scope to increase exports further provided the design, quality and packaging of hand tools are improved. Export figures for the years 1997-98 to 2000-01 are as shown in Table 22.

Table 22
Exports of Hand Tools from Punjab

Year	Export (Rs. lakh)	Percentage change
1997-1998	28417	
1998-1999	22917	-19.35
1999-2000	26872	17.26
2000-2001	24059	-10.47

Source: Director of Industries, Punjab

Technological gaps and strategy to overcome them

Production of forged hand tools by drop forging hammers, presently adopted by the local units, has the inherent disadvantage of high flash generation. To overcome this serious process, draw-back combination of forging techniques can be used, such as special purpose machines based on the principles of chipless forging and zero machining, cold/warm/ hot forging automatic formers, multi-station transfer presses.

The present process of heating raw materials in oil-fired furnaces is not only slow, but also polluting. This can be performed by the induction heating process, which is environment friendly, reduces scale and results in faster production; shot blasting and barrel rolling machines may be used to clean the forgings/castings. Use of a modern packaging system is necessary to survive in global competition.

Facilities for manufacturing forging tools and dies in the units are very poor. The quality of the forged products depends on the die impression. Products forged through poorly designed and manufactured dies will be of sub-standard quality. Tool rooms equipped with latest die-making precision machines have to be set up by the units, to improve the surface finish and obtain required contours of the forgings. Large investments in R&D activities and CAD/CAM techniques are needed for improved designing and manufacturing of hand tools.

Different grades of steel, i.e., EN-8, EN-9, carbon steel, alloy steels, etc., are used as raw materials, but Indian raw materials are often not comparable with imported ones in quality standards. Development efforts are required for making steels needed for hand tools, having cold- and warm-forging characteristics with adjustment in composition.

Human resource development and training

The hand tools industry in Punjab is skill-intensive and facing scarcity of technically qualified and trained manpower. The root cause of this sad state of affairs lies in the system of the contractual labour-management relationship. The labour and the majority of the supervisory staff are employed on a contract basis making weaning away of labour easier by offering small increments in wages by unscrupulous competitors. This perpetuates a high labour turnover and makes labour unconcerned about wastage of materials, product quality deterioration and conserving various other inputs. Contractual labour is more concerned about high tonnage of production. The high labour turnover discourages individual initiatives to impart skill-development training to hand tools workers.

During the recent past, some units have employed trained persons from the Central Tool Room (CTR), Ludhiana, and the Central Institute of Hand Tools (CIHT), Jalandhar. There is still a supply-lag of technically qualified and trained manpower. Specialized and need-based short-term courses for training of the workforce at different levels are required to bridge the gap. The CTR, Ludhiana and CIHT, Jalandhar could play a major role in this area. The industry also needs qualified professionals in designing, overseas marketing and financial management to make the units competitive in national/international markets.

Labour laws

The labour laws are generally in favour of labour and cause many practical problems for the employers. They need to be reviewed and amended in the interests of both labour and management. This is urgently necessary to gear up the industry for global competition, and government has to take the initiative.

Research and Development Centre

The Ministry of Industry under UNDP set up the Central Institute of Hand Tools in the early eighties at Jalandhar. During the last one and half decade, this institute has been working for the development of the hand tools industry in Punjab by developing new designs for hand tools as well as modern manufacturing processes. Now the industry badly needs technology upgradation to work manufacture modern hand tools to enable it compete in the global market. Therefore, this centre has to be adequately equipped and its facilities upgraded to provide specialized training for designing, quality control and manufacturing.

Cost of bank finance is a significant factor in export pricing. This becomes more crucial for such highly competitive products as hand tools. Since we have to integrate with the global market in the WTO regime, rates of interest, particularly for export, should be brought in line with international rates, which are reported to be five to six per cent. Timely and adequate availability of finance, particularly to the small-scale sector, is a must for growth. Study visits of entrepreneurs in the SSI sector to various technically advanced units both in India and developed countries, along with technical experts in the trade, to make them aware of prevailing technologies and manufacturing techniques, will be very productive.

MACHINERY OTHER THAN ELECTRICAL INDUSTRY

The machinery manufacturing industry plays a significant role in the industrial development of every country, since the quality, accuracy and durability of components, parts and industrial and consumer products, depend to a large extent on the quality of the machinery used for their production.

The machinery making industry of Punjab has played a very significant role in the industrial development of the country. This is particularly true of the small-scale sector of the state engaged in the production of machines for the manufacture of a variety of industrial products. This industry includes diesel engines, tractors, oil expellers, textile machinery, centrifugal pumps, machine tools, sewing machines and their parts. As shown in Tables 23 and 24, production in the Eighth FYP achieved an impressive annual average growth rate of 28.27 per cent, while it declined in the first three years of the Ninth FYP to 17.35 per cent. During the same period the employment growth rate slightly declined from 2.32 per cent to 2.29 per cent. However, the employment growth rate was quite high in the Sixth and Seventh FYPs.

Table 23
Status of Machinery Other than Electrical Industry in Punjab

Year	Units (No.)			Employment (No.)			Investment (Rs. lakh)			Production (Rs. lakh)		
	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total
1980-1981	4336	11	4347	25286	4421	29707	4520	3097	7617	10587	6164	16751
1985-1986	6874	11	6885	37248	3587	40835	7558	1730	9288	15721	8774	24495
1992-1993	9379	7	9386	54111	3675	57786	12468	8135	20603	30016	28761	58777
1996-1997	10084	12	10096	58334	4972	63306	16889	20005	36894	59127	91069	150196
1997-1998	10263	9	10272	59851	5620	65471	18983	44698	63681	68451	137065	205516
1998-1999	10490	10	10500	62024	6495	68519	22951	60066	83017	77784	192133	269917
1999-2000	10636	8	10644	62937	4754	67691	24500	28643	53143	84424	141991	226415

Source: Director of Industries Punjab.

The capital-output ratio of the SSI sector has remained the same during the 1996-97 to 1999-2000 as shown in Table 23, while in the large and medium sector it initially increased from 0.22 to 0.3, but came to the same level in 1999-2000 as in 1996-97. Investment per employee in SSI and large and medium sectors increased from Rs. 0.29 lakh to 0.39 lakh and from Rs. 4.02 lakh to 6.03 lakh respectively during 1996-97 to 1999-2000, while production per employee in SSI and large and medium sectors increased from Rs. 1.01 lakh to 1.34 lakh and Rs. 18.32 lakh to Rs. 29.87 lakh respectively.

Table 24
Annual Average (Linear) Growth Rate of Machinery Other than Electrical Industry during 1997-00 (%)

Units (No.)			Employment (No.)			Investment			Production		
SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total
1.79	-11.30	1.78	2.57	0.60	2.29	13.35	35.17	22.33	12.65	21.53	17.35

Source: Director of Industries Punjab.

The machine tools industry in Punjab, with an annual output of more than Rs. 250 crore is mainly concentrated in Batala and Ludhiana, and produces a variety of machine tools of different sizes and types, such as lathes, shapers, milling machines and drilling machines, special purpose machines for different industries. Machine tools worth Rs. 80 crore are being exported annually from Punjab.

Technological gaps and suggestions for upgradation

Technology gaps exist in the following areas:

- Conventional general-purpose flat-bed lathe machines being manufactured are like those manufactured by developed countries 50 years ago. There has not been much progress in improving the designs of the machines. On the other hand, machine tool designs are continuously updated with the use of Computer Aided Design and Finite Element Analysis in developed nations.
- Spindle speeds are in the range of 5,000 rpm and not much automation has been adopted.
- Whereas in modern machines, spindle speeds up to 30,000 rpm and in some cases up to 1,60,000 RPM have been achieved, use of automatic tool changers and pallet changers, make the machines more productive. Feed rate of 0-5,000 mm/minutes and rapid traverse rates can be 9,000 to 12,000 mm/minute achieved. Accuracy is seldom claimed by manufacturers or demanded by customers locally. Accuracy is very high in developed nations and will have to be achieved in the coming WTO regime.
- The machine operator makes himself and the work-place dirty. Chip conveyor systems are not used to clean the machines. Leakage from the hydraulic system and absence of dust extraction systems in wood-working machines lead to more noise and dust. At the same time safety features are mostly absent or crude. Safety is not built into designs. Much needed electronic safety guards are not used in mechanical presses/metal forming machines.
- Conventional material, such as graded C.I., are mostly without any quality control. Advanced materials, such as C.I. by potential mehanite process and polymer concrete, granite and other patented materials to make them thermally stable, vibration free, more accurate and ensure longer tool life, are not in use.
- Conventional measuring instruments, such as vernier calipers, micrometers, dial indicators, etc., are used. The laser calibration system for inspection of machine tools, roundness checking, and surface roughness checking machines to evaluate accuracy of machine tools parts, are not used.
- Flame hardening of guide-ways, grinding of slide-ways of lathe, use of patented turret material to reduce friction in slide-ways and AC servo motor, CNC control, are not used by our machine tools industry. Advanced designs, such as machine vision system of work-holding to ensure accuracy and reliability, have yet to be developed.
- Conventional machining, such as drilling, turning, grinding, polishing and pressing is in use. Modern machining methods, such as laser machining, aqua jet machining, plasma cutting, etc., developed for greater accuracy and productivity are not available.
- Much time is wasted in setting up and operating machines, as most of the operations are manual. Set-up time can be reduced by putting up operation

panels within easy reach of the operator, by clearly designating interference-free work area, and by direct mounting of tools into the turret face.

- Modern machine tools with specialized attachments, such as automatic tool changer, automatic pallet changer, pneumatic feeders, electronic safety guards to improve speed and productivity of machines tools, are not manufactured.
- Advanced design concepts, such as moving column design, moving head stock swing beam principle, hydraulic tool clamping, hydraulic hold down system in shears, flying optics principle in laser cutting machines, etc., to improve accuracy, safety and speed of the machine tools, are not employed in our machine tools industry.
- Upgradation of technologies in use and human resource development and training on a continuing basis are essential for the growth of this segment of industry.

ELECTRONICS INDUSTRY

The evolution of technology has led to increasing use of electronics in a variety of applications. Today, the electronics hardware industry spans a whole gamut of products and the entire spectrum of the value chain. Newer applications and better ways of doing things are fuelling growth. Electronics gadgets and tools are being used in India too in a large range of applications and fast catching up with the world in terms of penetration. This can lead to an enormous domestic demand for these products, giving the necessary critical mass for global competitiveness. Such a base will also be a stabilizing factor for manufacturers to target the international market.

The major segments of the electronics hardware industry are information technology (comprising computers and computer peripherals), telecommunications (comprising switching equipment, transmission equipment and customer premises equipment) and consumer electronics (the major products being television, audio/video equipment, clocks and watches), control instrumentation, industrial electronics, strategic electronics and the electronic components industry which supplies components to these segments. They have similar basic building blocks, value chain and issues. Convergence is increasingly blurring distinctions between these segments. Technology evolution is resulting in increasing convergence. Hence, in view of future trends, it will be appropriate to integrate these segments into one industry – Electronics Hardware Industry (EHI).

The growth rate of the electronics hardware industry has been slower than that of the software and service industry during the Ninth FYP. This trend needs to be reversed into a growth path by introducing a set of policies conducive to the growth of the electronics hardware industry. An investment climate comparable to Taiwan, the Philippines, Singapore, Korea and Malaysia has to be created, to derive the maximum competitive advantage from the twin factors of low-cost high-quality knowledge-workforce and a fast growing domestic market. The electronics hardware industry is characterized by growing competition and shrinking margins and has to bear high risk arising out of technological

obsolescence. Hence, strong policy support from the government, coupled with fierce entrepreneurial spirit, is required. The sector-wise production of the electronics hardware industry during the Ninth Plan in India is given in Table 25:

Table 25
Production in Electronic Hardware Manufacturing Sector during Ninth Plan in India (Rs. in crore)

Sector	1997-98	1998-99	1999-2000	2000-01	2001-02 (E)
Consumer	7600	9200	11200	11550	13000
Industrial	3150	3300	3750	4000	4500
Computers	2800	2300	2500	3400	4000
Comm. & Broad Eqpt.	3250	4400	4000	4500	5000
Strategic	900	1300	1450	1750	1900
Components	4400	4750	5200	5500	6000
Total	22100	25250	28100	30700	34400

Source: Ministry of Information Technology (MIT) Report, Tenth Five Year Plan

On the assumption that an electronic hardware growth-oriented policy, similar to the software policy, would be introduced, the Ministry of Information Technology, Government of India, has projected the production of the electronics hardware industry sector-wise, as shown in Table 26.

Table 26
Sector-wise Projected Production by 2007

Sector	Production by 2006-07 (Rs. in crore)	Compound annual growth rate
Consumer electronics	38100	24
Industrial electronics	6600	8
Computers H/W	14900	30
Communication & Broadcasting	12500	20
Strategic electronics	3800	15
Components	15000	20
Total	90900	22

Source: MIT Report, Tenth Five Year Plan

Status and potential of electronics hardware industry in Punjab

During 1985-90, SAS Nagar, (Mohali), Punjab, was the hub of electronics hardware industry and the second largest centre after Bangalore with top-grade units in communications, computers and peripherals, electronic components including picture tubes, semi-conductor devices, active components, etc. However, during recent years there has been an overall decline of the electronics hardware industry and it seems to have lost its momentum. Table 27 shows the growth rate of the electrical and electronics industry in the state.

Table 27
Status of Electrical and Electronics Industry in Punjab

Year	Units (No.)			Employment (No.)			Investment (Rs. lakh)			Production (Rs. lakh)		
	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total	SSI	L&M	Total
1980-1981	977	10	987	5437	4495	9932	655	1635	2290	2073	5804	7877
1985-1986	2167	23	2190	10841	5742	16583	1827	11446	13273	4510	6694	11204
1992-1993	3633	27	3660	17495	8852	26347	4521	35522	40043	12809	53859	66668
1996-1997	4113	28	4141	20696	9448	30144	6609	65453	72062	26427	187719	214146
1997-1998	4223	33	4256	21947	10221	32168	8322	83765	92087	31388	252362	283750
1998-1999	4301	34	4335	22436	10487	32923	8731	92193	100924	33056	170823	203879
1999-2000	4403	35	4438	23203	9454	32657	9379	113859	123238	36193	111749	147942

Source: Director of Industries, Punjab

During 1999-2000, however, the total output of the electronics hardware industry has been Rs. 679.83 crore according to the *Statistical Abstract, Punjab 2001*. The major units are M/S Punjab Communication Ltd., Mohali (PCL); M/S Semiconductor Complex Ltd., Mohali; M/S Bharat Telecommunication Ltd. Ludhiana (Beetel), and M/S Telephone Cables Ltd. There are a large number of industries in the SSI sector, manufacturing PCs, power supplies, industrial electronic equipment, TVs, Radios, UPS, electronic instruments, electronic test zigs, tools and components, etc. Penetration of telephones, computers and colour TVs is quite high in Punjab. This, coupled with increased use of IT in the rural sector, E-governance, Internet, and software industry, the domestic market is expected to expand. The electronics hardware industry has a very good employment potential, as mostly ancillary units, particularly in the SSI sector, are run by self-employed graduate engineers, diploma holders, ITI's in engineering and graduates/post-graduates from the science stream. To achieve accelerated growth of the electronics hardware industry in the state the following measures are suggested:

- State government to give priority-sector status to the electronics hardware industry on par with software and service industries.
- An Electronic Hardware Technology Park (EHTP) in Mohali with world-class infrastructure will greatly boost the small-scale sector and attract new entrepreneurs and foreign investors. More Electronic Hardware Parks in the state on private initiative and with government support are necessary.
- Provide appropriate facilities and incentives to MNCs, to set up manufacturing plants in each sector of the electronics hardware industry in the state.
- Train and develop quality manpower suitable for evolving innovative designs and the development of manufacturing, assembly and quality control techniques.
- Set up Research and Development, Designs and Quality Control Centres in participation with industry, with financial and technical assistance from international agencies.

RURAL INDUSTRIES INCLUDING KHADI AND VILLAGE INDUSTRIES

The Punjab Government has been making special efforts to promote small-scale/tiny and cottage industrial, services and business units at the Rural Focal Points, to create employment opportunities in rural area. So far 594 Rural Focal Points have been identified, of which land has been made available for 263. These Focal Points are under the control of the Department of Rural Development and Panchayats. The status and growth of rural industries is given in Table 28.

Table 28
Growth of Industries in Rural Areas

	1980-81			1990-91			2000-01		
			Percentage		Percentage	Percent increase (compare with 1980-81)		Percentage	Percent increase (compare with 1980-81)
Units (in nos.)	Urban	32884	75.88	93267	58.16	183.62	117866	58.76	258.43
	Rural	10454	24.12	67101	41.84	541.87	82737	41.24	691.44
Employment (in nos.)	Urban	223018	84.20	482454	72.13	116.33	624806	69.61	180.16
	Rural	41851	15.80	186391	27.87	345.37	272836	30.39	551.92
Investment (in Rs. crores)	Urban	288.73	86.93	1000.91	74.21	246.66	2448.00	59.57	747.85
	Rural	43.4	13.07	347.87	25.79	701.54	1661.14	40.43	3727.51

Source: Director of Industries, Punjab

Table 28 indicates that there has been impressive growth in the last 20 years from 1980-81 to 2000-01 in the number of industrial units, employment and investment in the SSI/Tiny Sector. During 1980-81 to 2000-01 the number of industrial units in SSI/Tiny sector in rural areas increased eight times, employment 6.5 times and investment 38 times. Investment per employee in SSI/Tiny sector in rural areas increased during 1980-81 to 2000-01 from Rs. 10,400 to Rs. 60,000, compared to the increase of total SSI/Tiny sector per employee from Rs. 12,500 to Rs. 46,000 during the same period.

Traditional Rural and Tiny units in Khadi and Village Industries

Since its inception in 1956, the Punjab Khadi and Village Industry Board (KVIC) has been implementing various schemes for generating sustainable employment for the traditional rural artisans and entrepreneurs, by providing financial assistance and technical help for setting up village and tiny industries. The KVIC has been promoting very small and tiny industries by traditional artisans, such as weavers, spinners, cobblers, blacksmiths, carpenters, potters, etc. With the advance of technology, entrepreneurs have started making use of modern machinery and equipment and are manufacturing quality products. By 1999-2000 the number of units established under the schemes of the KVIC went up to 34,678, with production valued at Rs. 220.46 crore and employment of about 45,100 persons.

Improved infrastructure, upgradation of technologies and skills, easy credit, and better marketing are essential to improve productivity in the rural sector. Training on non-farm

income-generating activities is one of the necessary prerequisites for the creation of productive employment opportunities in rural areas.

THE INDUSTRIAL SUPPORT SYSTEM

Over the years several specialized institutions, some directly under government departments and others under corporate structure, have been set up in the state to provide financial, technological and other promotional support to industry. A brief overview of this industrial support system follows.

Small Industries Service Institute, Ludhiana

The Small Industries Service Institute of the Government of India was set up at Ludhiana in 1956 to serve small industries in Punjab. The main services provided by this institute are:

- Technical counselling
- Managerial counselling
- Economic counselling
- Management development training
- Product/Process oriented entrepreneurship development training
- Skill development training
- Modernization
- Ancillary development
- Export marketing
- Marketing assistance including sub-contract exchange
- Technology upgradation
- Energy conservation
- Pollution control
- Quality management
- Testing facilities by chemical laboratory
- Vendor development
- Workshop facilities (engineering)

Common facility workshops have been upgraded with the installation of CNC Horizontal and Vertical machines and CNC lathes in the Hi-Tech cell

Central Tool Room, Ludhiana

The Government of India established the Central Tool Room at Ludhiana in 1980-81 with financial and technical collaboration from the Federal Republic of Germany and the active support of the Government of Punjab. The Centre has been providing services to industry in general and small-scale units in particular, in such areas as technical consultancy, designing and manufacturing of tooling, heat treatment and training.

Central Institute of Hand Tools, Jalandhar

The Government of India set up the Central Institute of Hand Tools, Jalandhar, with UNDP assistance and the active participation of Punjab Government. Registered as a Society in 1983, it provides comprehensive support in the field of design and development of the latest hand tools, and consultancy and common facility services to small-scale entrepreneurs.

Mechanical Engineering Research and Development Organisation

The Central Mechanical Engineering Research Institute (CMERI), Durgapur, under the aegis of the Council of Scientific & Industrial Research (CSIR), established a centre in Ludhiana in 1965, known as MERADO, to boost mechanical engineering research and development in Punjab. The centre helps the industry in the following fields:

Design, development and standardization of industrial machinery and equipment, farm machinery and equipment and jigs, fixtures, tools and gauges. Testing of materials, components and products for hardness, tensile, compression, bending and impact strength, internal flaws by ultra sonic, radiographic, magnetic and penetrate methods, measurement of coat thickness and crack depth, precision measurements of linear and angular dimensions, profiles and surface finish, calibration of instruments and gauges, performance testing of I.C. engines, pumps, sprayers, etc., chemical analysis of materials, microstructure analysis and foundry sand testing. Preparation of feasibility reports for light and medium industries, industrial consultancy, expert guidance to the foundry industry and precision jig boring, etc.

Bureau of Indian Standards (BIS)

The Bureau of Indian Standards has an office at Chandigarh to provide quality testing of industrial products of the state.

Electronic Test & Development Centre, Mohali

This centre has been set up to provide testing facilities to electronic industries, besides developing new techniques for the growth of electronics industries in the state.

National Institute of Secondary Steel Technology, Mandi Gobindgarh

This institute provides technical services to the secondary steel sector by arranging seminars and workshops in the state and undertaking consultative projects and pollution studies relevant to the industry.

National Metallurgical Laboratory, CSIR, Batala

This laboratory provides facilities for research and development work, besides chemical, mechanical and metallurgical tests for ferrous and non-ferrous metals.

Central Food Technology Research Institute, Ludhiana

The CFTRI Mysore has set up an Extension Centre at Ludhiana for the development of the food processing industry in the state.

National Productivity Council, Chandigarh

The Council is engaged in the improvement of productivity of SSI units in Punjab.

Central Scientific Instruments Organisation, Chandigarh

This organization is equipped to carry out research, design and development in electrical, electronic, electro-mechanical, optical and medical instruments of different natures and specifications.

Central Leather Research Institute, Jalandhar

This organisation provides testing facilities, training in leather manufacturing and leather garments, research and development and extension services including common facilities.

Wood Grading & Marketing Centre, Ludhiana

This centre, set up in 1968 with the assistance of UNDP, mainly purchases quality wood to save producers and consumers from exploitation by middlemen.

Institute for Auto Parts Technology, A-9, Phase-V, Focal Point, Ludhiana

Institute for Machine Tools Technology, Batala

The Punjab Government with the assistance of UNDP/UNIDO has established these institutes, to cater to the overall development and growth of the auto-parts and machine tools industries. These institutes provide the following facilities:

- Design development
- Testing and job work
- Specialized short-term training
- Consultation

Bicycle & Sewing Machine Research & Development Centre

This centre was set up with UNDP assistance for carrying out research, design and development work on bicycles and components and sewing machines and components. It provides metrology, chemical testing and tool room facilities to the industry.

Northern India Technical Consultancy Organisation, Chandigarh

This organization provides a package of total consultancy services to the industry, covering all stages of project implementation. Besides, it also provides consultancy services to departments of the state government and financial institutions.

Punjab State Electronic Development Corporation

This corporation is engaged in the promotion of the electronics industry in the public, joint and private sectors. Besides, its also creates infrastructure facilities necessary for the growth of electronics industries.

Science & Technology Entrepreneurs Park (STEP)

Science & Technology Entrepreneurs Park provides space and environment for creative thinking/innovation, self-development, product development and venture development for science and technology entrepreneurs.

Punjab Energy Development Agency, Chandigarh

This agency assists in the installation of wind/water pumps and small aero-generators for battery charging and stand-alone power generator, on subsidy.

Punjab Pollution Control Board, Patiala

This institution has been entrusted with the task of implementation of the Pollution Control Act in the state. Some of the obligations of industrial entrepreneurs for control of pollution are clearance of site from the environmental angle and consent to establish an industry (N.O.C).

Industrial Development-cum-Quality Marking Centres

The Punjab Government has set up the following 10 Industrial Development-cum-Quality Marking Centres, which provide such services as quality marking, testing, research, design and development and common workshop services:

- Government Industrial Development-cum-Quality Marking Centre, (Engg), Amritsar.
- Government Industrial Development-cum-Quality Marking Centre, (Paints/Varnishes), Amritsar.
- Government Quality Marking Centre (Textiles), P.O. Rayon & Silk Mills, Amritsar.
- Government Industrial Development-cum-Quality Marking Centre (Engg.), Batala.
- Government Industrial Development-cum-Quality Marking Centre, Bathinda.
- Government Quality Marking Centre (Sports & Leather Goods), Industrial Area, Jalandhar.
- Government Industrial Development-cum-Service Centre (Engg. Goods), Ludhiana.
- Government Industrial Development-cum-Quality Marking Centre for Plastic Moulds, Ludhiana.
- Government Industrial Development Centre (Engg), Mandi Gobindgarh.
- Government Industrial Development-cum-Quality Marking Centre (Engg), Patiala.

Government Tanning Institute, Jalandhar

This institute provides diploma in tanning and footwear technology and training for artisans.

Banks

Punjab is well served by banks with 51 branches per 000' sq. km against the national average of 21 bank branches per 000' sq. km. By the end of December 2000, the following banking facilities were available in the state:

Indian commercial banks	2574
Co-operative banks	829
Post-office saving banks	3931
Foreign banks	1
	<hr/>
	7335
	<hr/>

Small Industries Development Bank of India

The SIDBI is an apex financial institution, established for the promotion, financing and development of small-scale industries. Through its branch office in Chandigarh, SIDBI administers the following schemes for the promotion of small-scale industry:

- Scheme for direct assistance to specialized marketing agencies.
- Scheme for assistance to marketing organizations.
- Scheme for purchase of mobile sales vans.
- Scheme for direct discounting of bills.
- Bill re-discounting schemes.
- Short-term bills re-discounting schemes.

National Small Industries Corporation (NSIC)

The NSIC supplies machinery and equipment on hire-purchase and lease-basis to small entrepreneurs, besides providing finance for purchase of raw materials under the Government Purchase Programme. The Single Point Registration Scheme of NSIC provides such marketing assistance, as supply of tenders free of cost; exemption from payment of earnest money; waiver of security deposit and issue of competency certificate. The corporation has opened a Prototype Development and Training Centre at Rajpura. Besides development of prototypes it also provides training facilities in the trade of electronics, plastics and computers.

Punjab Financial Corporation

Punjab Financial Corporation, set up in the year 1953 under the State Financial Corporation's Act 1951 to boost industrial growth in the state, provides medium and long-term loans to entrepreneurs for setting up new industrial units under various schemes and for expansion/diversification, renovation, modernization and rehabilitation of existing units. Assistance provided by Punjab Financial Corporation includes the following:

- Special scheme for unemployed persons.
- Composite Loan Scheme (AVIC).
- Single Window Scheme.
- Scheme for Scheduled Castes/Scheduled Tribes.
- Scheme for physically handicapped entrepreneurs.
- Scheme for ex-servicemen (Semfex).
- Scheme for women entrepreneurs (Mahila Udhyam Nidhi Scheme).

- Scheme for quality control facilities.
- Equipment Finance Scheme.
- Special Capital Scheme.
- Modernization Scheme.
- Scheme for purchase of generating sets.
- Scheme for hotel industry.
- Scheme for rehabilitation of sick units.
- General Scheme.
- Scheme for transport industry.

Punjab State Industrial Development Corporation, Chandigarh

Set up in 1966, the PSIDC promotes and develops medium and large-scale industries in the state and acts as an institutional entrepreneur. It provides financial assistance to projects promoted by private entrepreneurs in the state through term loans and direct participation in and underwriting of equity and preference share capital.

Technical education in Punjab

Punjab has a large network of institutions for imparting technical education. Such technical disciplines as computer engineering, electronics, architecture, irrigation, environmental engineering, agriculture structural engineering, textiles, chemical, mechanical, civil electrical, instrumentation and control, etc., are taught in these institutions. There are 19 institutions offering degree level engineering courses and 41 others providing diploma level technical courses. Besides these institutions, 130 Industrial Training Institutes and one Advanced Training Institute are also functioning in the state to impart technical training in different trades.

Institutional support to exporting units

The following institutions are connected with the promotion and development of exports from state:

- Export Marketing Wing, Directorate of Industries, Chandigarh.
- Joint Director-General of Foreign Trade, Ludhiana.
- Assistant Director-General of Foreign Trade, Amritsar.
- Export Credit & Guarantee Corporation, (ECGC), Ludhiana.
- Export Inspection Agency, Ludhiana.
- Export Inspection Agency, Jalandhar.
- Wool & Woollen Export Promotion Council, Ludhiana.
- Sports Goods Export Promotion Council, Jalandhar.
- Engineering Export Promotion Council, Jalandhar.
- Textile Committee, Amritsar.
- Textile Committee, Ludhiana.
- Punjab Small Industries & Export Corporation, Chandigarh.
- Apparel Export Promotion Council, Ludhiana.
- Regional Committee for Core Group on Exports in SSI Sector under the chairmanship of the Joint Director-General of Foreign Trade.
- Small Industries Service Institute, Ludhiana.

No consolidated report is available reviewing the functioning of the promotional and supportive institutions, set up at different points of time in response to the demands and felt needs of industry in specific situations. But, many of them have become largely inadequate and nearly irrelevant in the current globalized context in which the industry finds itself. Some of them are avoidable burdens on the state exchequer as their days are over!

OVERVIEW OF INDUSTRIAL POLICIES AND STRATEGIES FOR STRUCTURAL CHANGES IN THE EMERGING SITUATION

Like most other States, Punjab too has been making efforts to promote the development of industry, as evident from the successive Five Year Plans (FYPs), statements of industrial policy and growth strategies evolved and implemented by the government from time to time. As these policy pronouncements, coupled with the package of incentives and other promotional schemes, reflecting the priorities of the state, were expected to accelerate the growth of different sectors of industry, an overview of them is given in the following paragraphs.

Realizing that the small and tiny industry, which has been the backbone of industry in the state, flourishes best when there is commensurate development of modern large-scale industry, from the Sixth Five Year Plan (1980-85) onwards emphasis was laid on the co-ordinated development of large and medium and small and tiny industries. Accordingly, the Sixth Five Year Plan visualized the attainment of the following objectives:

- Accelerated growth and realization of economic benefits of the already created infrastructure of industries.
- Diversified rapid industrialization of the state.
- Promotion of rural industries for which separate incentives are envisaged, to ameliorate the economic condition of the weaker section of the society.
- Special emphasis on small-scale industrial units, to create maximum employment.
- Special incentives for setting up industries.
- Export of the state's industrial products and exploring new markets for exports.

The Sixth Plan provided an outlay of Rs. 81 crore for various promotional schemes and incentives for achieving these objectives, and actually utilized Rs. 74 crore. During this period industry grew at an annual rate of 5.41 per cent against 10.02 per cent in the Fifth FYP. Despite the progressive industrialization policy there was a slow-down in growth. The Seventh Plan (1985-90) continued the policy thrust of the Sixth plan with greater vigour. Actual expenditure under plan schemes went up to Rs. 149 crore against the approved outlay of Rs.124 crore and industry grew at an annual rate 10.05 per cent. During this period public sector undertakings and other industrial promotional institutions were strengthened, and the policy of providing incentives in the form of various subsidies was also continued.

The Industrial Policies of 1987 and 1989, which were introduced during this period, offered a package of graded incentives favouring 'no-industry districts' and 'backward areas', on the lines of the policy of the Government of India. The Industrial Policy of 1987 divided the state into four clearly identifiable categories of 'A', 'B', 'C' grade growth-areas and 'no-incentive areas', to bring about balanced industrial development. Capital subsidy, priority for power connection, sales tax incentives, land subsidy, exemption from electricity duty, special incentives to export-oriented units and entrepreneurs belonging to the SC community and generating-set subsidy were given under this policy. The Industrial Policy of 1989 continued to provide the package of incentives which included:

- (1) Capital subsidy
- (2) Sales tax incentives
- (3) Purchase tax
- (4) Sales tax exemption/deferment for expansion/modernization/diversification
- (5) Special incentives for pioneer units
- (6) Land subsidy
- (7) Priority for power connection
- (8) Exemption of electricity from electricity duty
- (9) Special incentives for specific categories of industries/entrepreneurs
- (10) Generating-set subsidy

At the same time certain types of industry were categorized as 'no-incentive industry'.

There was a gap of two years between the terminal year of the Seventh Plan and the beginning of the Eighth Plan. During this period (1992-97) the emphasis in the strategy of industrial policy and planning was shifted from accelerated growth to generation of gainful employment and balanced regional growth, as would be evident from the following policy objectives:

- Generation of gainful employment, particularly in rural areas, for optimum utilization of skilled/unskilled manpower and fuller utilization of raw materials, particularly agro-products available in rural areas.
- Balanced regional growth for removal of rural-urban disparity.
- Technological upgradation and modernization to achieve higher productivity and improve quality standards and designs to increase exports.
- Development of rural/cottage industries to exploit local resources.
- Provision of counselling services for better and scientific marketing and management techniques.
- Emphasis on upgradation of rural industry through improved technological inputs.

At about the same time was announced the Industrial Policy of 1992 with the following special features:

- Multiplicity of incentives avoided and only two incentives, viz., Investment Incentive and Sales Tax Concessions continued.
- Stress on investment in border districts for creating employment for youth in the area.
- Special incentives for electronic units.

The draft of the Eighth FYP proposed an outlay of Rs. 576 crore, out of which the lion's share of Rs. 317 crore was for state-level promotional institutions, such as the PSIDC,

the PFC and the PSIEC, while a sum of Rs. 26.5 crore was set apart for R&D Centres, including the new Machine Tool Centre at Batala and the Automotive Centre, Ludhiana, and technology upgradation. However, the Plan that was approved reduced the total outlay to Rs. 162.9 crore, but the actual expenditure was, Rs. 195.88 crore. Out of the total expenditure, approximately 60 per cent (Rs. 117.5 crore) was on account of payment of incentives to industry.

The Ninth FYP (1997-2002) gave high priority to infrastructure and technology upgradation and the thrust areas were:

- Proper infrastructure facilities.
- Upgradation of technology and modernization of industry.
- Reducing direct investment of government in production activities.
- Provision of adequate facilities/concessions to attract new entrepreneurs.

Though the outlay of the Ninth FYP was Rs.349.79 crore (out of which interest subsidy alone accounted for Rs. 301 crore), actual utilization during the first four years was Rs. 71.67 crore, about 20 per cent. The outlay of Rs. 288.9 crore for the Tenth Plan is less than the provision of Rs. 349.79 crore for the Ninth Plan (as shown in Table 29) and the major part of it (Rs. 250 crores) is again for grant of incentives, which have already accrued. The Plan lays stress on modernization and technological upgradation and provides approximately Rs. 30 crore, mainly for setting up the UNIDO-assisted R&D projects for Machine Tools, Batala; Automotive Centre, Ludhiana; Central Institute of Hand Tools, Jalandhar; and the North India Institute of Fashion Technology. However, the actual budgetary provision for industry for the first year of the Plan, i.e., 2002-03, is just Rs. 25 lakh for the North India Institute of Fashion Technology!

Quite interestingly, the Industrial Policy and package of incentives announced by the state government in 1996, which are still in vogue, sought to achieve the following targets:

- Increase the annual industrial growth rate from the present eight per cent to 12 per cent in the next two years.
- Increase the present share of industry in Gross Domestic Product (GDP) from 17 per cent to 25 per cent in the next five years.
- Divert 15 per cent of the present rural population to manufacturing and related occupations, through rapid industrialization, and thereby reduce dependence on agriculture and allied activities in the next fifteen years

Table 29
Plan- wise Approved Outlay, Actual Expenditure and Annual Growth Rate of Industry

	Approved Outlay (in Rs. lakh)	Actual Expenditure (in Rs. lakh)	Average annual growth rate of industry
6 th Plan(1980-1985)	8183.00	7417.00	17.87
7 th Plan(1985-1990)	12331.00	14900.00	16.61
8 th Plan(1992-1997)	162.92	19588.00	21.81
9 th Plan(1997-2002)	34979	7167.00 (first 4 years)	13.39
10 th Plan(2002-2007)	28893.00		
For 2002-2003	100.12*		

Note: * Actual budgetary provision for the year of 2002-03 is just of Rs. 25 lakh.

It is evident from the Industrial Policy Statement, that the packages of incentives and the allocation and actual utilization of funds during successive FYPs do not form part of an integrated, long-term strategy for planned development. The Ninth Plan presents a very dismal picture of the industrial sector and indeed, of the whole process of planning and implementation of plan schemes.

Trends in employment generation

As evident from Table 30 employment per unit has declined from six in 1980-81 to four in 1999-2000 in the SSI sector and from 481 to 386 in the large and medium sector during the same period. Investment per employee and production per employee have shown an increasing trend during the same period for both the SSI and the large and medium sectors. This trend, perhaps inevitable in the current competitive context, has a serious impact on employment generation and related socio-economic aspects of development, which deserves attention at policy-making levels.

Table 30
Average Employment per Unit, Investment and Production per Employee (Rs.)

Year	Employment Per Unit		Investment Per Employee (Rs.)		Production Per Employee (Rs.)	
	SSI	L&M	SSI	L&M	SSI	L&M
1980-1981	6	481	12535	66269	42226	103954
1985-1986	5	453	15898	112709	46277	191757
1990-1991	4	504	20166	213121	60549	376593
1995-1996	4	400	27622	415501	116063	791462
1999-2000	4	386	42963	625688	188117	1005121

Source: Based on data from Director of Industries, Punjab

The average investment in plant and machinery per small-scale unit in Punjab was only Rs. 1.46 lakh in 1997-98, which was much lower than Rs. 5 lakh in Maharashtra. During the same period the average employment per unit in Punjab was significantly low at 4.3 compared to eight in Maharashtra. During the first three years of the Ninth FYP the average production per small-scale unit in Punjab has been only Rs. 7.45 lakh, which is less than half the all India average of Rs. 16.82 lakh. These and other indicators show that though there has been progress in the industrial sector, Punjab is still lagging behind other states like Maharashtra.

Table 31
Number of Job Seekers on Live Registers of Employment Exchanges as on 31 December

Year	Unskilled	Skilled	Total
1980	NA	NA	452596
1985	NA	NA	636408
1990	101811	557439	659250
1992	239612	508174	747786
1995	138760	367476	506236
1997	138683	442335	581018
1998	118294	449918	568212
1999	123456	421561	545017
2000	110294	425865	536159

Source: Statistical Abstracts of Punjab

Table 31 reveals certain other aspects of the employment situation. From the live registers of employment exchanges it is observed that during the Sixth FYP (1980-85) the number of job seekers increased by 40 per cent, whereas during the Seventh FYP it remained static. During 1992 it peaked at 7,47,786, apparently due to a sudden increase in the registration of unskilled workers. By 1995 the situation improved and the number of job seekers decreased to five lakh. By the end of the Eighth FYP skilled workers swelled the number of job seekers to 5,81,018. During the first three years of the Ninth FYP this number has decreased slowly.

General observations and some suggestions for structural changes

Small scale industries in the state, the backbone of its industrial economy, are currently producing by and large low-value items, including sports and leather goods, hosiery and woollen textiles, hand tools, machine tools, bicycles and parts and sewing machines and parts. The level of technology in use in these industries is quite low, which results in low industrial productivity and quality of products, leading to a competitive disadvantage both in domestic and global markets. Upgradation of technology is the crying need of the hour for the very survival of most of the SSI units in the state. The Research and development facilities available are on the one hand woefully inadequate and out-dated and on the other seldom put to optimum use.

With the process of the integration of the Indian economy with the global economy and the consequent far-reaching structural changes taking place, small-scale industries have to adapt and adjust themselves to the demands of the time, requiring them to become internationally competitive. They have to transit from a protected to a competitive environment. At the same time the WTO regime opens up a window of opportunities for small-scale industries to grow and flourish with access to wider global markets. Upgradation of manufacturing processes and management practices, through the induction of technology, modern machines and adoption of international quality standards, are essential prerequisites for taking advantage of the emerging opportunities. This transformation has many implications, both in terms of governmental policies to promote small-scale and village industries and of providing a new focus and orientation to the institutions that have been set up in different contexts for this purpose. The thrust of government policies and programmes in the near future has to be specially geared primarily to bring about this transformation at the least cost to the economy. This is all the more important in the context of the existing weaknesses in the small-scale sector. According to estimates of the RBI, about 30 per cent SSI units were sick as at the end of March 1999 and if incipient sickness was also included, the number of sick units and closed units taken together would account for about 40 per cent of the total number of small-scale units.

Against this background, comprehensive reforms and structural changes are required to create WTO-compliant delivery mechanisms of developmental initiatives with the direct participation of industry.

- In the special context of the current financial crisis facing the state government, its role in the emerging industrial scene, will necessarily have to be limited to that of an active facilitator and co-ordinator of the processes of growth, providing a transparent conducive policy frame-work and efficient delivery mechanisms through good governance. Viewed in this light the following recommendations/observations of a systematic nature suggest

themselves for consideration over and above those made recently by the Chief Minister's Advisory Committee on Industrial Growth:

- Keeping in view the experience gathered over the years in setting up and managing research and development centres, including the Departmental Industrial Development-cum-Quality Marketing Centres, the emerging requirements of industry and the severe constraints on the Central and State Governments, the management of these institutions should be entrusted to relevant Associations of Industry, on the basis of binding partnership protocols evolved through a consultative process. The Department of Industries of the state government could take urgent initiative in this regard, so that arrangements for providing one of the most vital inputs required for the survival and growth of industry, especially in the SSI sector, are not delayed. Needless to stress, considerable idle infrastructure and large human resources available with government could be put to optimum use through this process. This could start with the Bicycle and Sewing Machine Research and Development Centre on the lines discussed earlier.
- The functioning of the Directorate of Industries should be reviewed and reoriented in order to make it more relevant to meet the requirements of industry in the emerging scene. Some of its officers, who are professionally qualified and competent, could be seconded to Associations of Industry where they could make better contribution by involving themselves actively in the developmental processes of various segments of industry. The Department of Industries could take necessary initiatives in this regard, as several issues of policy, including deployment of government officers outside departments and agencies of government and their service conditions are involved.
- The role of Udyog Sahayak should be redefined and strengthened and put on a statutory basis in order to facilitate effective operation of the 'One Window' concept for industrial promotion. The Kerala legislation, with appropriate modifications to suit state-specific requirements, could be the model for this purpose.
- Taking into account the sweeping changes taking place in the economy and their immediate as well as long term impact on industry, especially the SSI sector, an appropriate institutional mechanism, such as a state Industrial Promotion Board with wide statutory powers and functions should be put in place after due consultations with the relevant stake-holders to deal with sickness and symptoms of sickness in segments of industry/industrial enterprises.
- The proposed industry-driven State Industrial Promotion Board could be statutorily empowered to constitute an Industry Development Fund, with the levy of a development cess of say one per cent on the annual turnover of industrial enterprises with a turnover of over rupees one crore a year. The State Industrial Promotion Board could be statutorily obliged to utilize the Fund for the promotion of industry in accordance with the priorities it lays down from time to time.

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