

Chapter 7

INFRASTRUCTURE DEVELOPMENT

Infrastructure is the mother base for all activities. It is from the band of services within this domain that all other developmental activities draw their sustenance. Inadequately envisioned, or poorly delivered, it can stunt growth for decades.

As the world over this sector has been traditionally managed by the government, there is a presumption nowadays that the reason for this is to be found in its ownership *per se*. A number of studies the world over have found that the ownership pattern, whether public or private, is not conclusively linked to the actual performance of an enterprise. Examples of success and failure are equally distributed, irrespective of public or private ownership.

It is also not correct to be taken over by a 'the state has no funds' mentality. The reason for the unsatisfactory delivery of the infrastructure sector is also not within the 'resource crunch' hypothesis, but embedded in the inefficient working of the sector. This sub-optimality flows from an inherent presumption that the services within the sector can be run non-commercially, and/or can only survive based upon inputs of subsidies from other sectors.

Irrespective of ownership, the government would do well to devise sustainable long-term financial and business models, which are in a position to deliver infrastructure services, in line with the overall developmental vision of the state. From envisioning to implementation, the process should be communicative, and have peoples' participation all through. It remains clear that people do not expect services for free. While they may expect these freebies in the short run, they remain aware that this free service model will ultimately lead to the collapse of the service itself. People want working and guaranteed services, and they are willing to pay a reasonable price.

AGENDA FOR INFRASTRUCTURE

There cannot be any planning for infrastructure without a developmental vision. Infrastructure is the ultimate supplier, and everybody is its customer. Being the supplier of last resort, it must, therefore, subordinate itself to requirements of all other sectors.

Based on a blueprint of Punjab for 2020, the infrastructure sector can set itself an agenda in line with what is outlined in the following section.

Primary Sector

Dependence on bulk foodgrains is starting to taper off. The farm sector will switch over progressively to commercial cropping. The area under oilseeds, sugarcane, fruits and vegetables will gradually increase. While there will still be a demand for transport of bulk foodgrains, we will witness increased activity in the processing of agro-products, bringing

in the demand for speedy transport. There will be need for refrigerated movement to Indian and foreign destinations. The farmer will need support from information technology by setting up 'virtual mandis' for regional, national, and international trading. For this, the telecom and IT backbone will have to be strengthened and taken to the villages.

The farm and rural sector will require assured supply of good quality electricity for production of cash crops, agro-processing, storage, and to ensure the working of computers and telecom devices. The farm sector will need assured supply of fertilizers. As evident from current trends, consumption of urea will go down, and phosphatic fertilizer will increase.

Secondary Sector

Other than farming, Punjab has little primary resources. There are no coal, mineral or fossil fuel deposits that can be tapped. At present we are seeing a declining trend in the overall daily number of workers employed in the registered factories in the state.

There is no large industry in Punjab at the moment, which employs more than 5,000 people. All future hopes appear to be based on setting up an oil refinery by Hindustan Petroleum Corporation Ltd. near Bathinda. The reasons for these expectations are not very clear. Refinery building being a very specialized job, machinery, plant equipment, and other requirements are not likely to be sourced from within Punjab. The setting up of the refinery is not going to cause any significant changes in the sale and distribution patterns of petroleum products. At best, there would be some potential in transport, and direct employment for about 500 persons.

The major industries are textiles and readymade garments, motor parts, cycle and cycle parts and manufacturing of various food products. Their growth rates are not very encouraging.

Considering the more than five lakh youth borne on the live register of Employment Exchanges in Punjab, and the hidden unemployment in the farm sector, the industry sector in the state does not offer significant hope. With the most optimistic scenario, and in keeping with trends data of the *Economic Survey of Punjab*, industry may generate 10,000 fresh jobs per year, which is too little.

As is clear from the *Economic Survey of Punjab 2001-2002*, the real growth potential in future is anticipated to be in agro-processing. Considering that the strength of the state is in the primary sector, this appears to be reasonable, and the government is likely to put in place a strategy for this. Therefore, the infrastructure sector should also target this, and remain available to answer challenges. These are in the provision of speedy transport, assured power, broad-band telecom connectivity, and in the availability of latest farm and food-processing technologies.

Tertiary Sector

The tertiary sector provides trade, transport, banking, insurance, IT services, etc., and has grown at a rate of over seven per cent per annum. Considering the potential of growth in this area, infrastructure should also concentrate on it for speeding up the development of Punjab. This will need laying down broad-band telecom networks,

assured power supply, reliable transport infrastructure, including a well managed international airport.

The tertiary sector depends upon knowledge enhancement. The state has medical, engineering, and architecture colleges, along with management institutions. Punjab Technical University is also going ahead with its programme of taking technical education to the people, including IT skills. It may be noted that the tertiary sector is most dependent on good infrastructure support. Unlike the primary and secondary sectors, it is knowledge-person-oriented, and can be re-situated quickly. It is amenable to IT, and if the persons involved in it find any infrastructural lacunae, they take flight quickly. Thus, with the right infrastructure and policy to match, tertiary sector development can achieve a much steeper growth curve.

Health services are one of the most important tertiary sector activities. Trends are showing an increase in respiratory and circulatory system diseases, including cardiac ailments. Another area responsible for large casualties is accidents, especially road accidents. Heart, lung, and trauma management are areas, which need quick movement to the health centres. Therefore, infrastructure will have to factor in these important issues. It should assist in the prevention, diagnosis, and emergency management of these health issues all over the state.

With this vision, and a resultant agenda for infrastructure, the state can proceed to put in place the various sectors involved.

In this chapter, we comment on the following infrastructure sectors:

- Energy
- IT and Telecom
- Transport

ENERGY

Resources and Current Availability

One of the most vital inputs, it literally fuels the engine of progress and development. It can be tapped from both renewable and non-renewable resources. Let us examine the availability of the primary sources of energy (Table 1).

Table 1
Primary Sources of Energy

Renewable	
Hydro-power	Yes
Biogas	Yes, limited
Solar	Yes
Wind	Negligible potential
Geo-thermal	No
Tidal	No
Non-renewable	
Coal	No
Oil	No
Gas	No

Nuclear energy as an energy source is not considered on account of it being ruled out for strategic reasons, as Punjab is a border state. Considering the resource base, Punjab should concentrate on mini-and micro-hydel schemes, solar and biogas areas in renewable energy.

In the case of non-renewable sources, coal is already a major source of energy. Punjab is heavily dependent upon Guru Gobind Singh TPP at Ropar and Guru Nanak Dev TPP at Bathinda, and is also in an expansion mode for further units at Guru Har Gobind Singh TPP at Lehra Mohabbat. Thermal power continues to be the major supplier of energy in the state. Since 1997, thermal power has become the mainstay of electrical energy availability in the state (Table 2).

Table 2
Electrical Energy Availability (in million kwh)

Year	Thermal Generation	Hydro Generation	Purchased	Total
1991	5426	7540	2515	15481
1996	7534	7557	4972	20063
1997	8978	7616	5084	21678
1998	9424	6806	6647	22877
1999	9989	8808	6296	25093
2000	12641	7739	6008	26388
2001	13217	7063	6892	27172
2002	13198	6967	6830	26995

Source: Punjab State Electricity Board

Punjab also purchases power from outside, notably from Baira Siul, Singrauli thermal, Salal hydel and others. In 2001-2002, such purchases are likely to be about 6830 million kwh. Thus, the state's self-generated thermal power accounts for 50 per cent of total power availability, 25 per cent coming in from self-generated hydel sources, and the remaining 25 per cent being purchased from outside. The complete picture of electrical power availability in India is clear from the following Table 3:

Table 3
Electrical Power Availability in India

	1997-98 (billion kwh)	1998-99 (billion kwh)	1997-98 (Annual growth in per cent)	1998-99 (Annual growth in per cent)
Power generation	420.6	448.4	6.5	7.5
Hydro-electric	74.5	82.7	8.8	1.9
Thermal	336.1	353.7	4.6	9.9
Nuclear	10.0	12.0	14.1	12.8
Plant load factor of thermal plants (Percent)	64.7	64.6	-	-

Source: www.ficci.com/ficci/econo-upda/power.htm

While electrical generation is growing at an overall rate of 7.5 per cent, the major growth is in the thermal and nuclear sectors. With nuclear power ruled out, and mega hydro-

project power availability in the near future uncertain, Punjab has moved on the right track of building up a thermal generation capacity.

GVK Goindwal Sahib Power Project (500 MW)

This 500 MW coal-fired power plant is coming up in the Amritsar district of Punjab, with a 2X250 MW configuration. Coal for the project has been linked and the EPC contractor has been selected. The project also envisages using imported coal. The first unit will be commissioned in 34 months from the date of financial closure and the second unit in four months from then. This will be the state's first independent power project. It is likely to pump in 2,715 million kwh per year at 68.5 per cent plant load factor. The fuel supply agreement has been negotiated with Eastern Coalfields Ltd., and the fuel transport agreement with Northern Railways is under negotiations. For the escrow account agreement with PSEB, the matter is under consideration by the Board. On account of financial difficulties and slow progress of reform, PSEB is not able to go ahead with the escrow account, and the project is stagnating.

Transmission and Distribution Losses

Examining the facet of transmission losses, we find that Punjab is in an almost enviable position. In 1980-81, it was 19.6 per cent, and peaked to 21.5 per cent in 1991-92. It has been shown in 1999-2000, as 15.07 per cent, as against Maharashtra 32.17 per cent, Karnataka 38 per cent, and even next door Haryana and Delhi at 37.29 per cent and 47.52 per cent respectively. The state's achievement in T&D losses minimization is laudable, but it is worthwhile to mention that with one-third of the power being distributed free, where is the need for theft? It is thus possible that real T&D loss may be higher than reported, with a part of it shown in the agriculture area. By factoring in experience of Punjab's pre-free electricity days, it is safe to consider the real T&D loss at about 20 per cent. Considering the domain of possibility, there is potential to bring this down to about 10 per cent, and this can add about 1,500 million kwh per year.

Generating Efficiency

The average plant load factor (PLF) for Punjab's thermal units is about 69% (Table 4). A comparison with the other states is as under:

Table 4
Plant Load Factor of Thermal Plants

State	1994-95	1995-96	1996-97	1997-98	1998-99
SEBs	55	58	60.3	60.9	60.1
AndhraPradesh	70.2	77.4	81.4	85.0	80.7
Gujarat	60.5	65.3	65.4	66.1	64.6
Karnataka	64.9	67.7	70.2	75.2	81.6
MadhyaPradesh	58.2	58.7	74.4	74.9	77.7
Rajasthan	75.6	73.7	75.6	82.1	78.1
Central Sector	69.2	71.0	71.1	70.4	71.1
Private Sector	65.8	72.3	71.2	71.2	68.3
Punjab	56.7	55.0	65.7	69.0	69.4

Source: Annual Report, Ministry of Power 1999-2000

Punjab may seek comfort in the fact that the national average load factor for thermal units is 65 per cent, but that can provide little solace, weighed down as it is by Bihar's

35.8 per cent, and Assam's 18 per cent. The fact is that a number of states are doing very well, and Punjab should attempt an 80 per cent plant load factor. Such technical arguments as old machinery, etc, are given, but available examples in industry speak for themselves. Pre-NTPC, the Badarpur plant in Delhi was declared unmanageable, and was running at about 31.4 per cent PLF. Post-NTPC, the plant continues to be important for Delhi, and is running at 80 per cent PLF. There exists a possibility of adding about 1,500 million kwh by enhancement of PLF to 80 per cent plus.

Total Expected Availability

Even if we factor in another 1,000 million units as being made available/saved through micro-hydel and renewable energy sources such as solar power and biogas, it becomes clear that self-sufficiency in energy cannot be achieved. Even today, Punjab is buying about 7,000 million kwh from the grid, and it shall continue to do so. In fact, this will increase, anticipating further growth in demand for power, as realized from an analysis of consumption trends. The total likely availability of power from the state's own resources by about 2010 is shown in (Table 5).

Table 5
Conceptual Framework of Availability of Power from the State's Own Resources by 2010

Generation	Units
Thermal at 68% PLF	16000
Hydel	7000
Non-conventional resources, micro-hydel	1000
Enhancement of PLF to 80% plus	1500
Minus T&D losses @ 10%	2550
Total	23000

Consumption

Punjab has the highest per capita consumption of electricity among all states in India, at 904.58 kwh per year (Table 6). It achieved 100% electrification in 1980.

Table 6
Annual per Capita Consumption of Electricity by States 1999-2000 (million kwh)

State	Domestic light and small power	Commercial light and small power	Industrial	Public lighting	Agricultural	Total
Andhra Pradesh	63.57	12.77	114.05	3.97	133.4	327.80
Bihar	10.52	4.19	85.04	0.45	15.39	115.59
Gujarat	83.83	29.11	261.46	3.29	311.40	689.09
Haryana	105.93	19.74	126.66	1.57	232.80	486.70
Karnataka	63.04	10.14	90.83	3.18	181.72	348.91
TamilNadu	70.96	40.90	217.75	4.07	120.46	291.72
Maharashtra	102.81	27.68	251.02	5.59	116.24	503.34
Punjab	161.31	34.11	355.19	2.58	351.39	904.58

Source: Central Electricity Authority

A sample of the states has been taken, and Punjab is the highest in per capita consumption in domestic, industrial, and agricultural use. There are only three Union Territories of Daman & Diu, Pondicherry, and Dadra & Nagar Haveli, with a higher industrial consumption, on account of large projects. Chandigarh and Delhi have higher domestic consumption. On the overall, the per capita consumption in Punjab would definitely place it as one of the high energy-consuming societies. The sub-sectoral break-up of power consumption in Punjab is shown in (Table 7).

Table 7
Sub-sectoral Break-up of Power Consumption in Punjab,
1970-71 to 2000-01 (Percentage)

	1970-71	1980-81	1990-91	1998-99	1999-00	2000-01
Domestic	9.77	11.74	13.60	18.43	18.06	22.02
Commercial	5.22	3.29	2.74	3.85	3.82	4.74
Industrial	35.96	38.09	36.26	36.58	36.78	41.95
Public lighting and bulk	11.05	3.27	4.53	2.04	2.01	2.44
Agriculture	38.00	43.66	42.87	39.10	39.33	28.85

Source: Economic and Statistical Organisation

Domestic supply: The share of domestic consumption has more than doubled since the seventies, and is likely to rise further (Table 8). While being the highest per capita consumer, it is necessary to take note of the households with electricity (Table 8).

Table 8
Households Using Electricity in Punjab

Year	Total Households	Households using Electricity	Percentage
1980-81	2748453	1553629	56.53
1990-91	3365132	2754312	81.85
1999-00	4174410	3565857	85.42
2000-01	4267250	3699739	86.70

Source: Punjab State Electricity Board
Economic and Statistical Organisation

Thus, growth of demand from domestic households can be anticipated as we move towards real 100 per cent use of electrification. This trend will be more pronounced because Punjab is quickly moving to being one of the most urbanized states in the country. In 1951, there was 22 per cent urbanization; this had jumped to 34 per cent in 2001, and is further expected to touch 45 per cent by 2020. This implies that out of the current population of 2.25 crore, 0.77 crore are urbanized. This figure will move to 1.92 crore with the expected population of 4.26 crore in 2020, as against 2.34 crore in rural areas. Thus, while net addition to rural population will be 0.87 crore, urban figures will go up by 1.15 crore. The clear ramifications of this are:

- Domestic sector will need and demand 100 per cent electrical supply.
- Since urban consumptions are higher than rural, we can expect an increase in per capita power consumption.

The domestic sector uses 4,400 million kwh of power, and we can expect an additional annual demand of about 400 million kwh every year, doubling the total requirement to about 8,500 million kwh by 2010, while the population will double after 2020.

Commercial supply: The commercial sector consumes about 1,000 million units. With increased urbanization, such commercial activities as trading, health services, retail outlets, etc., will increase at a fast pace. Until now, this sector has remained largely stable in its power consumption, even going down at certain times. It will now add to its consumption as an important growth area in the tertiary sector. There is also a trend towards energy-consuming displays, and an affinity for air-conditioning the commercial setup to attract customers. It is anticipated that in keeping with global trends, the commercial sector will demand extra energy. Since Punjab anticipates growth in the tertiary sector services market, it would be necessary to plan for an additional requirement of 250 million kwh per year till 2010. The commercial sector will thus need 3,500 million kwh per year.

Industrial supply: No major industry, other than the Hindustan Petroleum refinery, is slated for Punjab. At present, it is planned with a captive power plant to trap released gases and byproducts and become a power-surplus unit. For the last decade, the industrial sector has been demanding extra energy at the rate of about 400 million kwh additional units every year. The consumption in 2000-01 was 8,000 million kwh, and plans should be made keeping the same in mind. Thus, the industrial sector will need 12,000 million kwh per year in 2010.

Public lighting and bulk: Public lighting and bulk-sector demand remains at 500 million kwh. The major addition to this is the bulk demand from the Northern Railway, with electrification sanctioned upto Amritsar. It is anticipated that further electrification projects will be taken up to handle the suburban and inter-city passengers of Punjab's metropolitan and other large towns. After discussions on this with the Railways, it would be wise to add 1,000 million kwh in this segment by 2010.

Supply to agriculture: The agricultural sector today needs about 5,500 million kwh. This demand has been going down in recent years, with the peak at 8,200 million kwh. Undoubtedly, it is linked to the demand for water, and thus is a correlate of rainfall and availability of assured irrigation. Its decreasing demand is on account of a succession of good monsoons, and the area under irrigation increasing from 57,81,000 hectares in 1980 to 75,44,000 hectares in 2000. However, the rains can always fail, and though the demand in this sector is not likely to increase from its peak of 8,200 million units, at least this much should be planned for as being available for this sector. At present too, with the failure of the monsoon, a large demand has been generated in the agricultural sector, and urban domestic and industrial supplies have been badly disrupted.

Total Demand: In keeping with international demand trends, over the decade from 2010 to 2020, the overall demand is likely to double, and stand at 68,000 million kwh.

Table 9
Anticipated Demand for Energy (in million kwh)

Sector	Demand in 2010
Domestic	8500
Commercial	3500
Industrial	12000
Public lighting and bulk	1500
Agriculture	8500
Total	34000

Source: *Economic Survey of Punjab*
Punjab State Electricity Board

Even for a time horizon of 2010, the anticipated demand for electrical energy is anticipated at 34,000 million units against a likely self-generation of about 23,000 million units (Table 9). To cover this shortfall, Punjab will need to put in place an additional 3,000 MW of generating potential at PLF of about 80 per cent. This large chunk is nowhere in sight, and there is no possibility of generating the anticipated 68,000 million kwh by 2020. Environmental concerns also dictate that Punjab should seriously evaluate the effects of setting up more thermal-based generation capacity.

Punjab must accept the fact that in the conceivable future, it will always be shopping for power on the national grid. This would appear to be in the interest of both the state and the nation, with a number of power surplus states, central sector generating units in a position to sell, IPPs, and the emerging road map in the power reforms sector

Shift To Commercial Basis Through Basic Reform

It is in the interest of the state to shift to a commercial basis for generation, transmission, and distribution of electricity. An examination of costs and revenues will apprise of the implicit subsidies in PSEB operations. Earlier, it was largely supplying power, by purchasing it from outside. From 1975-76, it entered the self-generation phase, and from then on, the cycle of subsidy really started. In the first phase, PSEB was a supplier, and in the second phase it became a generator (Table 10). 'In the first phase, the cost was decreasing, but in the second phase, it showed an increase.....insistence on greater power generation was confined to the second phase.....proved a costly affair. Rising coal prices and haulage costs, T&D losses, lower PLF....contributing to these cost escalations' (*Scope for Raising Agricultural Power Tariff in Punjab*, Abnash C Julka, CRRID).

The mainstay of PSEB generation is thermal power stations. The cost of coal received is lower than the transport and handling charges! The coal supplied was of such a low grade that the ash content was in the range of 40 per cent. It means that PSEB effectively paid for coal, but got 40 per cent less, and bought and transported ash at the cost of coal! In addition, lower grade coal results in excess handling, higher pollution levels, undue wear and tear of various equipment resulting in shorter life-spans and earlier replacements. The auxiliary consumption of total fuel is increased. Above all, the disposal of ash is another major problem, and constitute almost an environmental disaster. In future, power utilities may even have to pay to transport the ash back, for being disposed in redundant coal mine shafts, to prevent large scale air and ground pollution.

Table 10
Cost and Revenue per Unit of Electricity (in Rs.)

Year	Cost per unit	Revenue per unit	Subsidy per unit
1967-68	0.47	0.17	0.30
1975-76	0.75	0.18	0.57
1980-81	0.88	0.24	0.64
1988-89	1.43	0.51	0.92
1990-91	1.54	0.63	0.91

Source: Rangnekar 1990

According to the *Economic Survey of Punjab 2001-2002*, the current average cost per unit of electricity is Rs 2.93, and average revenue per unit Rs 2.07, implying a present level of subsidy at 0.86 paise per unit. While the PESB supplied power free to farmers, it supplied it to the commercial sector at Rs 3.99 per unit, and to industry at Rs 4.13 per unit. This runs counter to the policy of attracting growth in secondary and tertiary sectors.

In such a situation, there is always the possibility of wrong diagnosis. The 'resource crunch' theory is all pervasive, and somehow it appears that the only issue is that the government does not have funds to set up additional capacity. The result of this is the disastrous Independent Power Producers (IPP) programme. While these fast track IPP projects were brought on, the basic reforms in the power sector were placed on the back burner. Private power generators realized this, and forced the government into Power Purchase Agreements (PPAs), shifting the entire risk onto the SEBs. As a result, we find many of these projects in doldrums, starting with the (in)famous case of Dabhol Power Corporation, and Punjab's own Goindwal project. If basic reforms are not brought about, and if there is only an attempt to shift risk rather than decrease it, there may be a situation when the IPPs may even work to oppose power sector reform, armed as they are with guarantees, and counter-guarantees ('Power Sector Reform and Regulation: The Road Ahead,' Sebastian Morris, *India Infrastructure Report 2001*).

Thus:

- It is in the overall economic and environmental interest of Punjab not to conceive of fresh generation capacity, other than micro-hydel, and initiatives in solar and bio-gas energy areas.
- Punjab should shift to a commercial basis of electrical energy generation, transmission and distribution.
- This will mean increased PLF at the generating end, with a target of 80 per cent.
- On the transmission side, the losses will have to be limited to 10 per cent.
- At the distribution end, power must be metered and charges recovered in accordance with a tariff policy.

It is worthwhile to remember that some government-controlled PSUs have a better PLF than private operators. This only highlights the fact that mere privatization is not the solution, but increase in efficiency is the answer. Cases of power sector reform are now noticeable in India. UP has divided its SEB into generation, distribution and transmission companies, with privatization of power distribution in Kanpur under way. Delhi has recently brought in Tatas' BSES to take over distribution in the national capital.

PSEB - Reform Status

According to the Ministry of Power, the status is as under:

Unbundling/corporatization: PFC and ADB are providing technical and financial assistance for power sector reforms in the state. Reform-related studies, namely, tariff rationalization, demand-side management, and profit-centre approach to PSEB operations have been initiated.

Privatization of generation/distribution: No significant progress.

Formation of SERC: The government of Punjab notified the constitution of its SERC on 31 March 1999. The Planning Commission has noted that the Punjab Government has expressed commitment to power reforms, and proceeded with a tariff rationalization study. The status of power sector reform in some other states has proceeded much beyond, and Punjab lags behind (Table 11).

It is time that Punjab went ahead and demonstrated its resolve to reforms in the power sector. For a state with the highest per capita power consumption, and also one with its GNTP at Bathinda continuing to win awards for highest PLF (in 1980s), this could be one of the defining differences between the achievement of a flourishing Punjab in 2020, or a 'has been' status.

Table 11
Status of Power Sector Reform in Some Other States

State	Status
Orissa	<ul style="list-style-type: none"> - Reforms Act, passed and OERC set up in 1996. - SEB unbundled into OPGC, OHPC and GRIDCO with four subsidiary distribution companies, OPGC, disinvested. - Distribution companies privatized—51 per cent share of three companies WESCO, NESCO, SOUTHCO given to BSES and of the fourth (CESCO) to AES Corpn. of USA. - World Bank loan -- US \$ 350 million, DFID assistance, 64.5 million Pounds
Haryana	<ul style="list-style-type: none"> - Reforms Act notified in March,98 and HERC set up on 17 August 98. - HSEB unbundled in August 98 into HVPN (Haryana Vidyut Prasaran Nigam Ltd), a power transmission company and HPGC (Haryana Power Generation Corpn. Ltd) a generation company. - Two distribution companies, Viz.; UHBVNL (Uttar Haryana Bijli Vitran Nigam Ltd and DHBVNL (Dakshin Haryana Bijli Vitran Nigam Ltd) established. - Loan assistance of US \$ 600 million for power sector reforms programme committed by World Bank for 10 years. - Financial Restructuring Study and Asset Evaluation Study by M/s Price Waterhouse Coopers. M/s Arthur Andersen engaged as Reforms Consultants for Corporatization, commercialization and privatization of distribution.
Andhra Pradesh	<ul style="list-style-type: none"> - APERC Act 1998 enacted and SERC set up. - APSEB unbundled into Transmission Corporation of Andhra Pradesh Ltd. (APTRANSCO) and Andhra Pradesh Power Generation Ltd. (APGENCO). - Loan of US \$ 790 million committed by World Bank. US \$ 210 million released. Supplementary technical co-operation Grant of UK Pound 28 million approved by DFID

Source: www.planningcommission.nic.in/sebch5.htm

Trade on the Grid: Central Government Initiatives

After the recent amendments in Electricity Laws, transmission activity has been given an independent status and the concept of Central and State transmission utilities has been introduced. While POWERGRID has been notified as the Central Transmission Utility (CTU), the State Electricity Boards, or their successor state transmission companies, would be the state transmission utilities. It is mandated in the Act that CTU and STU would be government companies. The participation by the private sector in the area of transmission is proposed to be limited to construction and maintenance of transmission lines, for operation under the supervision and control of CTU/STU.

A Power Trading Corporation (PTC) has been incorporated as a Limited Company as per Company's Act 1956 on 16 April 1999, for the purpose of buying power from mega power projects under long-term PPAs and selling it to the beneficiary states also under long-term PPAs. Security to the PTC would be provided by means of a Letter of Credit and recourse to the state's share of central plan allocations and other devolutions. A precondition for purchase of power from mega power projects would be constitution by the beneficiary states of their Regulatory Commissions with full powers to fix tariffs as envisaged in the Central Act. They would also have to privatize distribution in the cities with a population of more than ten lakh.

Draft Electricity Bill

The draft Electricity Bill prepared by the Government of India seeks to provide a legal framework to the reform process and restructure the power sector to bring about transparency, accountability and efficiency in the system. The Bill has suggested the unbundling of the SEBs into independent managed corporations for generation, transmission and distribution, to make them commercially viable. According to the new Bill, SERCs will have to be established within three months of the Act coming into force. It will certainly push the reform programme all over the country and show the direction in which the power sector should move in future. It will also infuse confidence in foreign investors and help bring in more investments in the power sector. The Bill suggests breaking up the existing monopolist structure in the transmission sector and recognizes the need to create a power-pool and allow trading of power like any other commodity. For transmission, the Bill envisages changing the system from that of a monopolistic provider supplying electricity at regulated rates to that of a system where different companies will compete to provide electricity at competitive rates.

Key Points

- SERCs to be set up within three months of the new Act coming into force.
- Corporatized state transmission utility to be established within 120 days.
- Power pooling to facilitate establishment of a spot market for electricity to come into force from the first anniversary of the new Act.
- Generation and transmission projects not to require techno-economic clearance from the CEA.
- Applications for new projects to be processed by the regulatory commission within 120 days.
- CEA's role limited to national planning and technical development.
- All supply to be compulsorily metered within one year of the Act coming into force.

- Central commission to fix generation and transmission tariff; distribution tariff to be fixed by the SERCs. Tariff could be left to market forces to be determined at an appropriate time in future through government direction.
- REBs to be dissolved and replaced with regional transmission centre.

Punjab to be Ready

The Electricity Bill is a clear pointer of things to come, and the Punjab Government should be ready, by taking the envisaged steps right now. These steps include unbundling of generation, transmission and distribution activities. Groundwork needed to take all the stakeholders into confidence must be finalized and completed. Since in the conceivable future, Punjab will always need to purchase power from external sources, it will have to go to the Central Transmission Utility, and buy power through the Power Trading Corporation. Two preconditions are legally mandatory for trading on the GRID:

- Set up SERC, with full power to fix tariffs, and it is obvious that the Central Government will look for demonstrated action in this area; and
- privatize distribution in cities with populations in excess of ten lakh.

The Move Forward – with People Sector Participation

In the 'privatization-is-a-cure-for-all-ills' mind-set, PSP has come to mean Private Sector Participation. Let Punjab give it a new meaning and bring in People Sector Participation in the power reforms arena. We have said that mere privatization is no panacea, but the endeavour should be to pursue efficiency. With this, we also factor in the recent experiences of many states in power reforms. Of note is also the recent agitation in Haryana's Jind district, where government functionaries were held captive by farmers, in response to certain power sector reform issues. It is essential that the power sector reform be made a people's issue, to be achieved through people's participation, and not be seen as a legal / bureaucratic diktat. At present, the reform process is only causing alienation, and becoming one more sore point in government–people relationship. While ultimately the patient of power sector may be cured through reform, why make the medicine bitter, and have a confrontation with the people?

There is also another important issue to be considered. Punjab's current T&D losses are believed to be low, and point to the fact that power theft is not rampant, unlike in Delhi at 47 per cent. That may be so, but where is the need to steal with free power being given to half the citizens comprising the agriculture sector, accounting for nearly one-third of total consumption? It is felt that when SERC finally announces the revised tariffs on the agriculture sector, not only will it raise a resistance to pay, but will also raise the level of theft. In this situation T&D losses will also start mounting. Today, the agricultural sector only enjoys free power, but without theft, but if the reforms are not implemented through the people, they will also become party to theft. This will take the problem of vigilance for the power industry in Punjab to a new level.

Involve Local Bodies

In 2001, a series of workshops on Involvement of Consumers in Power Sector Reforms in Rajasthan, were held by the Centre for Consumer Action Research & Training (CART) at Chittorgarh, Abu Road and Alwar. They involved farmers, rural domestic consumers, members of the Panchayati Raj Institutions, engineers and linesmen from

the local power distribution company, namely, Ajmer Electricity Distribution Company Limited, and from the local district administration. The salient points that emerged were:

- Consumers expressed their willingness to pay if they were given assured quality and quantity of power.
- This was proved by the fact that many of the farmers today have generators and they had estimated that the generating one unit of power through generators cost them as much as Rs. 10 per unit.
- Willing to take collective responsibility – formation of committees to monitor and help in reducing thefts, to monitor the activities of linesmen and bring to the notice of appropriate authorities in case a linesman or engineer/s was found to be corrupt, monitor and ensure bill collections and timely payments, etc.
- People were in favour of installing a community meter outside the village so that theft of power, if any, can be identified and measured. The village-level committee can be formed to take care of that, and some incentives can be given for good results.

The panchayats, zilla parishads, and urban local bodies can become the drivers of power sector reform in Punjab.

Proposed Model

A working model can be set in place as under:

- Retain self-generation at present levels, keeping in mind high costs of generation, and the rising environmental costs.
- Initiate steps to fall in line with the Electricity Bill, and take advantages of the proposed system of trading power on the grid.
- Start an initiative to begin people's participation in the reform process. Engage GOs and NGOs in an exercise of dialogue with the people; SERC can co-ordinate such an exercise. The exercise must be precisely planned, and executed with clear blessings from the highest level. The aim is to build up a consensus for the reforms process by ensuring good quality and assured supply of power at reasonable prices.
- Involve PSEB employees in the reform-related decision-making process. Employees must be told that they will not be forced to quit their jobs.
- Incorporate a power generation utility consisting of PSEB's generation wing. Evolve procedures to decentralize decision-making to this generator, while retaining general policy initiative through the Board level, by retaining majority equity capital share. If possible, disinvest through employee stock option plans, further broad-basing the success factor. Build in procedures to ensure efficiency, with minimum PLF achievement at 80 per cent. *Do not* offer employee-incentives for generation, otherwise plants may refuse to back off, when asked, raising grid frequency to dangerous levels. Rather, build in disincentive for not producing as per target. The disincentive will not apply when the generator is asked to back off by the Regional Transmission Centre.
- Incorporate a power transmission utility, as envisaged under the Electricity Bill. Begin talks with CEA, PowerGrid, and neighbouring states for establishing and participating in the Regional Transmission Centre/s. Evaluate possibility of multi-lateral assistance from national and international bodies for strengthening the

state's transmission backbone. The plan should envisage setting up a transmission backbone for handling the anticipated 68,000 million kwh demand for the year 2020. While Punjab can trade in power from the Power Trading Corporation, it is the state's responsibility to have a transmission tier in place.

- Hand over local distribution to panchayats, zilla parishads, and urban local bodies. The transmission company will hand over power at the local sub-stations, in a metered quantity. The following methodology can be considered:

Power is metered in to the local sub-station, and effectively handed over to the local body. The locally available distribution infrastructure is brought on to the books of the local body. The local body becomes a franchisee for distribution, and is paid a fixed *ad valorem* charge for maintenance of its distribution infrastructure, and a percentage commission for collection of user charges. The number of linesmen and other staff required to be stationed should be worked out in advance, along with the fixed contractual remuneration that will be paid. The local body will have to be assured that technical hand-holding will be done when needed.

Employees of PSEB can be offered a VRS proposal, linked with a choice of a village / town in which they would like to be associated with the local body in maintenance of distribution infrastructure, distribution of electricity, and collection of user charges. After VRS, they will be working with the local body for a fixed lump-sum on a contractual basis. Considering the bi-annual 'harvesting' absenteeism in linesmen and other staff, if the scheme is worked out thoughtfully, it is likely to succeed.

Implement rigorous training to local bodies, and the PSEB staff involved, to take on the new role.

Involve the private sector in upgrading of distribution systems wherever necessary. Funds for this will come from the user charges for higher loads, etc., and can be collated at a level sufficiently large enough to offer economies of scale.

The entire package of *ad valorem* maintenance charge, fixed contractual moneys, etc., will be worked out in a financially secure manner, with no input from the government.

- Place a cap on any new recruitment in PSEB, and strictly implement the same. Special VRS offers should be linked to the distribution scheme as mentioned earlier. Re-deployment of staff will be required in accordance with the new corporatized structure.
- Move for long-term PPAs from the Grid, based upon initial experiences.

By exposing the public to the advantages of clean, reliable power supply at reasonable rates (no stabilizers, no inverters, a better quality of life), and with people's involvement at the grassroots through local bodies, Punjab can pioneer the process of reforms in the power sector.

Other Initiatives

Fluorescent lighting: In the domestic lighting sector, people still use incandescent lighting. It would be desirable to impose a higher slab of local tax so that the incandescent bulb becomes an expensive proposition. At the same time, taxes on fluorescent lighting should be brought down to encourage its use, and it should also be

mandated that only electronic ballasts (chokes) are used. This should be coupled with a public awareness programme, and a targeted drive to wipe out incandescent bulbs within a two year period. This step will reduce the total lighting load by a margin of 50 per cent.

Energy saving equipment: It should be mandated by law that for day to day appliances, such as fans, cooler fans / pumps, food processors ('mixies'), agricultural motors, etc., BIS certification is a must. The market is full of cheap, but power-guzzling appliances. They actually cost the buyer much more total life-cycle cost, in a heavy running charges, and place a great strain on the power system of the state. An awareness campaign should be run for this, and manufacturers asked to seek BIS certification for their products. The energy consumption of the product should be compulsorily mentioned prominently for consumer guidance, and surprise checks of products in the shops conducted to ensure that they adhere to the specifications laid down. This should be achieved in a total target time of two years.

The effect of this will be two-fold:

- It will reduce the load on the power system
- It will raise the level of technical competence in the small industry manufacturing sector (fans, pumps, 'mixies', etc.), making Punjab's products better placed to compete in the market.

IT & TELECOM

Considering the very nature of these sectors, they are heading towards convergence, and policy initiatives must address them together, at the same time. Telecom is infrastructure-oriented, and IT represents a value-added service. The networked world has now made it mandatory for IT services to be based on telecom connectivity, since stand-alone IT applications will dwindle in the future. Thus, telecom is largely viewed as providing support for information interchange, and IT represents the basic operating systems, along with the higher level user-interfaces required.

Telecom India

India's 2.16 crore-line telephone network is one of the largest in the world and the third largest among emerging economies (after China and the Republic of Korea). Given the low telephone penetration rate -- 2.2 per 100 people of the population, which is much below the global average, India offers a vast scope for growth. It is, therefore, not surprising that it has one of the fastest growing telecommunication systems in the world, with the system size (total connections) growing at an average of more than 20 per cent over the last four years.

The industry is considered as having the highest potential for investment in India. The growth in demand for telecom services in the country is not limited to basic telephone services. India has witnessed rapid growth in cellular, radio-paging, value-added services, internet and global mobile communication by satellite services. This is expected to soar in the next few years. Recognizing that the telecom sector is one of the prime movers of the economy, the government's regulatory and policy initiatives have also been directed towards establishing a world-class telecommunications infrastructure

in India. The telecom sector in the country, therefore, offers an ideal environment for investment.

The Ministry of Communications, through the Department of Telecommunication & Department of Telecom Services and its undertakings, leads the telecommunication initiative in the country for provision of basic telephone services, national and international long-distance communications, manufacture of complete range of telecom equipment, research and development, and consultancy services. The sector has been progressively opened for private sector participation not only in value-added areas, but even in basic services, National Long Distance/ International Long Distance, and internet telephony. The Telecom Commission performs the executive and policy making functions and the Telecom Regulatory Authority of India those of an independent regulatory body.

A Convergence Bill is anticipated, to promote, facilitate and develop, in an orderly manner, the carriage and content of communications (including broadcasting, telecommunication, and multimedia), for the establishment of an autonomous Commission to regulate all forms of communications, and for establishment of an Appellate Tribunal and to provide for matters connected therewith or incidental thereto.'

The Bill proposes to repeal the following legislations.

- The Indian Telegraph Act, 1885.
- The Indian Wireless Telegraphy Act, 1933.
- The Telegraph Wires (Unlawful Possession) Act, 1950.
- The Telecom Regulatory Authority of India Act, 1997.
- The Cable Television Networks (Regulation) Act, 1995.

The telecom sector is thus poised for a major paradigm change, and Punjab should launch itself into a preparatory mode to take care of the advantages likely to accrue from this co-ordinated approach.

The telecom infrastructure in Punjab is as follows:

- Total equipped capacity of 10,52,065 lines.
- Total number of telephone lines working in Punjab Telecom--8,90,495.
- Number of telephone exchanges—1,004.
- Trunk Automatic Exchange (TAX)--56Klines.
- Subscriber Trunk Dialing facility available from 794 exchanges.

Value-added services available:

- Inet
- Internet
- ISDN
- Paging
- Cellular

Punjab has formulated and announced an IT policy. A reading and analysis of the policy shows that the role of the government in this area is highly over-emphasized, and this anomaly will have to be addressed head on:

Vision statement of IT Policy

'To use Information technology towards accelerated overall development of a knowledge-rich society'.

Information Technology is being viewed as of vital importance by the state because of two main reasons.

- First, IT will be used to enhance quality, reduce costs and improve overall efficiency and effectiveness of the government machinery. IT can enable the government to dramatically re-engineer and improve its processes and services delivery systems for the benefit of the common people. Effective use of IT would bring about much needed radical changes in the functioning of the government, leading to better efficiency, transparency, accountability, and objectivity and ensure 'A better government which is cost-effective and capable of serving the needs of the citizens better.'
- The second reason is economic. IT can dramatically help improve the economy of Punjab, generating more jobs and export revenues. In short IT is an effective tool for catalyzing accelerated economic growth, effective governance and human resource development.

The thrust of the government is towards provision of IT services, and it does not embrace hardware. In this regard, the statement must be complimented on being realistic, by not intending to waste any time and money on trying to establish any hardware initiatives. This clarity is unfortunately lost when laying down detailed objectives for the IT policy. Indeed, India is basically an assembler base, and the funds required for R&D, manufacturing, and marketing of hardware, are not in sight. Globally, the IT network has established itself around R&D in US and Japan, basic mother board level assembly in China / Taiwan, etc., higher level system assemblies in consumer countries like India, and software porting from select source countries. India scores high as a preferred source of software, and Punjab is right in concentrating on and defining HRD as a premier issue involved.

IT is thus to be furthered by:

- Increased organizational efficiency of the government.
- Building a successful domestic IT and knowledge-based Industry and business.
- Producing globally competitive IT-enabled human resources for jobs within and outside India/ Punjab.

The following objectives are laid down by the IT policy:

- Improve the overall economy of Punjab by generating more jobs, as well as domestic and export revenues and ensure, even spread, such benefits to one and all in the state, including the poor and the rural population.
- Create employment potential through human resource development through IT literacy, education and training for creation of high-value employment.
- Empower citizens through deployment of IT, e-governance and freedom of information, particularly in social and public service sectors.

- Provide public-centred governance, which is efficient, cost-effective, transparent, friendly, affordable, convenient, effective and accountable.
- Encourage private-sector participation in IT-related infrastructure and public services on a self-sustaining revenue model basis.
- Make Punjab globally competitive in the globalized, privatized and liberalized economy and the changing business environment of the new millennium.
- Make Punjab a favoured industry-destination for attracting investment from outside the state by creating world-class infrastructure, institutional framework and an enabling environment for the clusterization of high-tech industry in general and IT Industry in particular.
- Turn Punjab into a smart and intelligent state and a knowledge-society through IT-education and e-governance, by promoting knowledge as the key resource for economic progress of individuals and institutions.

The Punjab Government will bring into existence the following frameworks for implementing its IT vision:

e-Institutional Framework

To create the required institutional framework, like the Department of Information Systems and Administrative Reforms, IT-related corporations, joint ventures, agreements, strategic partnerships, etc., for framing the IT strategy, enabling policies, action plans, standards, methodologies, and to facilitate the effective implementation of this IT Policy.

e-Infrastructure

Basic infrastructure: Create world class IT Infrastructure to make Punjab a favoured IT- and knowledge-Industry destination.

e-Governance

To deploy IT for providing an efficient and cost effective government and improve its processes through administrative re-engineering, modernization through IT. This will ultimately lead to the creation of an 'Intelligent' state.

e-public interface: Citizen-IT Interface: Provide a public-service oriented government and improve the public-service delivery. Make information more accessible through an affordable, friendly, shared and widely used IT infrastructure at the front end. Encourage private sector participation in providing IT-based public services. To provide a productive government-citizenry interface.

e-Employment

Employment generation: Generate more jobs in the area of IT and other sectors through rapid development of IT Industry, business and economy.

e-Human Resources Development

Human resources development in IT: Invest in people, tools, methods and partnerships necessary to improve the knowledge and skills of human resources. Produce a high quality and competitive IT-enabled workforce of world-class capability at all levels, who are welcomed as an asset by the IT industry within and outside the country.

e-Education

IT and IT based education: Improve the quality, reach and effectiveness of delivery systems of education through the use of IT. Enhance the value and employability of the youth of the state by equipping them with the knowledge of IT both at school and college levels. Create an IT-friendly culture, enabling a knowledge-based society.

e-Industry

Knowledge industry: Encourage and promote the IT industry by providing an institutional framework and an enabling environment for the clusterization of high-tech industry in general, and IT industry in particular, to strengthen the economy of Punjab. Stress should be on creativity, innovation, entrepreneurship and creation of R&D clusters.

e-Business

Generate more domestic and export revenues through development of e-business for improving the overall economy and thus the quality of life of the citizens of Punjab. Make the state globally competitive through the use of IT to respond quickly to the changing business requirements and border-less marketing.

Paradigm Problems

An examination of these framework statements points to a lack of clear direction to the IT policy, which appears to be an attempt to achieve everything.

- It is alarming to note that the government intends to create a bureaucratic structure of 'Department of Information Systems and Administrative Reforms, IT-related corporations, joint ventures, agreements, strategic partnerships, etc.' This is ostensibly for 'for making the IT strategy, enabling policies, action plans, standards, methodologies and to facilitate the effective implementation of this IT Policy'. Punjab would do well to keep in mind that this kind of bureaucratization is exactly what is to be avoided, and worldwide experience clearly demonstrates that IT producers and consumers remain equipped and capable of providing direction to each other. It is a fact that IT is one industry that grew the maximum, without any such 'framework'-based support from the government.
- The new IT bureaucracy envisages the following:
 - IT Vision Group - The Apex Envisioning Body.
 - Cabinet Sub-Committee on Information Technology.
 - Department of Information Systems and Administrative Reforms (DISAR) IT Resource Acquisition and Disposal Policy.

- Procedure and responsibility for implementation of IT projects.
- IT initiative fund for e-governance.
- Empowered Committee on Computerization (ECC).
- Departmental Committee on IT/ Computerization (DC-IT).
- Punjab IT Corporation.

This level of governmental intrusion into the sector is unwarranted, and is not borne out by the history of the development of this sector worldwide.

- It should also be kept in mind that the Convergence Bill and the Communications Commission of India will provide the necessary regulatory control at the national level, and Punjab would do well to avoid setting up any parallel organizational structure in this regard.
- There is talk of 'clusterization' of high-tech industry. The world over it is clearly proven that it is better to provide a communications network that allows 'de-clusterization' of knowledge workers. It should be possible for a future IT person in a Punjab village to tele-commute to his principal's office in Los Angeles or Tokyo, and conduct business and service transactions.
- There appears to be an idea that we should provide infrastructure in a specific area, get some 'industries' in place within those confines, and climb aboard the IT band-wagon. This is not going to happen, as has been proved in various such 'clusters' developed earlier. In Mohali, a number of corporations have shut shop and given a drastic blow to this whole idea.
- There still appears to be hope of attracting the hardware industry. This should be given up. From computers to televisions, factories have shut shop in Punjab. It should be realized that this is not the most ideal place to invest in hardware. The state will welcome any initiative, but its policy should not be based on this expectation.

Punjab should immediately give up these hackneyed concepts and re-examine its position, factoring in the latest IT industry scenarios.

Give IT a direction

The need for IT in Punjab arises from its near total absence in its most important activities -- agriculture and agro-processing. The success of IT is almost assured if it can address the issues in these areas, and this will provide employment to people becoming surplus from these mother areas.

The Punjab Government should concentrate on the following:

- e-Infrastructure
 - Ensure that from every village upwards, there is reliable broadband connectivity, backed with reliable electricity to keep the telecom infrastructure up and running.
 - Take cognisance of the issues in the Convergence Bill while designing the network
 - Involve the private sector and step in only when unavoidable. And even for these areas, evaluate and execute BOO (Build-Own-Operate) projects.
 - Involve the Panchayats and other local bodies in the management of services for their communities.

- e-HRD
 - Proliferate IT knowledge
 - Introduce computers and IT as a way of life from school onwards, so that the future population is IT-savvy. This will wipe out the digital divide in the state, and build an excellent foundation for advanced IT training.
 - Assist Punjab Technical University, and other training initiatives to impart the latest education, since the obsolescence factor in this area is very high.

- e-Governance
 - Re-engineering of government processes by effective deployment of IT.
 - Any-where, any-time services to citizens.
 - Better accountability, responsiveness and transparency of all systems.

Set an example

In this regard, Punjab should commence upon a targeted and time-bound initiative, bringing e-governance to the citizens' doorstep.

A broad framework that can be adopted is listed below.

Need for IT in social sector

For government: As the corporates are under intense competition, governments around the world are also under tremendous popular pressure to perform better, and in a more professional manner. This necessitates faster processing, decision-making and communication. The systems for delivery of services and grievance-redressal in the social sector have to be efficient and responsive. It is imperative to put in place an IT regime, which is as real-time and on-line as local conditions permit. A simple interface should capture raw data, and a user-transparent processing mechanism should deliver decision-making information to administration. It is often seen that field officers at the district level are forced to spend an inordinate proportion of their time in information collection and transmission. While IT implementation will empower them with quick and reliable monitoring tools on local social-delivery systems, they will also be freed from the usual drudgery of information collection and transmission. The administration will have increased time for positive action, and be able to provide a prompt and positive public interface for grievance-redressal and free and easy access to services and information, while bringing about transparency in the system. Information technology can enhance the capability of the local, regional and top-level governmental machinery and local bodies to make use of relevant information, take informed decisions and plan, execute and monitor in a better and productive manner.

It also needs to be clearly understood that since financing the social sector through government revenues depends upon regulatory issues of excise, taxation, etc., it is necessary to implement effective IT interventions in these latter areas too. While the social sector expenditure and actual results will be analysed in relation to targets, the availability of revenues according to plan to ensure continued support to the social schemes can also be monitored.

For people: The social sector is beset with inadequacies and inequalities. These features are present in many forms, such as inequality of infrastructure, resources, education, employment, development opportunities, etc. This is manifested among the people, societies as well as regions. At the root of these inequalities, more often than not, is the lack of education and accessibility to information. Information technology has the potential of providing prompt and easy access to relevant and quality information and opportunities and occasions to the common man at affordable costs. This is a great tool to bridge the gap and instantly reduce the divide between those who have access to facilities and services and those who do not. This technology has got the potential of proliferating the high-quality services and advanced knowledge for value addition in important matters in the field of education, health, markets, technology, agriculture and a host of other issues. The hitherto restricted treasure of knowledge gets opened up to one and all at the same time, at an equal footing, at a very reasonable cost and with manageable effort. In the present context, there is urgent need to empower the common man with IT in the social sector, and to prevent the syndrome of 'digital have-nots'.

Existing IT intervention

The present IT intervention in the social sector revolves largely around the NIC's NICNET connecting the districts. The exercise is well known, and the relevant data can be taken from NIC. However, being designed essentially as an in-house database, the system has not proliferated to the smaller constituent units, and does not interact with the people. For a meaningful and futuristic implementation, we should now look to the village level, and also keep public-system interface as a priority area.

Measures for Strengthening Existing Practices

Since IT grows in clear jumps, the concept of 'strengthening' cannot be used in the conventional sense. Such strengthening of existing systems is time-consuming, costly, and can never entirely do away with prevalent handicaps. Considering the overall life-cycles of specific information technologies, in both hardware and software, it is prudent to design new systems. These can be extremely cost-effective, and also raise the level of corporate and societal knowledge to current standards. The new system should be proliferated to the village level (in phases), be as real-time and on-line as possible, with ease of use and maintenance. It should stress on transparency, and save the environment by being largely paperless. When implemented well, it can easily pay for itself by cutting administrative costs, while lowering the overall cost of service delivery.

While generic database engines available in the market can be used in the back-office setup, the front end for the user will be application driven. This will cut down training costs, and also reduce time required for actual implementation. The field data on ambient conditions, non-availability or non-reliability of electric supply / transmission media will be studied, and area-specific designs perfected. In the pilot phases, villages with varying degrees of system-hostility – equipment- and attitude-based will be taken up to gain experience for final implementation. It is desirable to build the system at the village level around the existing school, which already has teachers available. The teacher's skill-level will be upgraded for IT basics, and application usage. Since the services and the railways have already implemented IT in a big way, resource persons in the village can be ex-servicemen or ex-railwaymen with IT-exposure. In the event of there being no school, the Panchayat house will be used, with the above-mentioned

resource persons. In case resource persons are not available, necessary training can be imparted to suitable person/s recommended by the panchayat.

It is necessary that IT should not create new costs by employing fresh people, and it must be structured as part and parcel of the job. The requirement is to draw a suitable person from the existing setup, and train him for the job. The jobs that IT will create will be in the IT services sector – software, hardware sales and maintenance, and upgradation. Keeping the above in view, the following improvements over the existing system can be achieved after detailed study:

- System requirements.
- Clients: external and internal.
- System design, networks.
- Processes, inputs, outputs, replies.
- System management, maintenance.
- Feedback.
- The public interface, its user friendliness.
- Generation, sharing and using a information.
- Impact on public and officials, corrections and updatation.
- Innovation, improvement for better results.
- Making it a way of life for staff, public

Area of Use – Monitoring and Evaluation System

IT can be used for a complete monitoring and evaluation of social sector schemes. Detailed possibilities in each area are listed below, including for regulatory bodies, in order to monitor both the schemes and the revenue needed for their financing.

Regulatory Bodies (e.g., Taxation, revenue collection, transport licensing, etc.):

- Providing interface with the people.
- Information and feedback centres.
- Registry, receipt and despatch.
- Feeding the system, the inputs.
- Processing, delivery and follow-up.
- Inputs, outputs and reports.
- Levels of decision-making.
- Status of disposal and pendency.
- Monitoring disposals, time limits.
- Linkage with key functionaries.
- Decisions and replies: putting online.
- Representation, queries and appeals.
- Feedback, impact and corrections.

Development Organizations (e.g., Education, Employment Programmes, etc.)

- Study of a developmental goals.
- Organizational setup to realize it.
- Digitization of the setup, linkages.
- Interface with the beneficiaries.

- Interface with the people's bodies.
- Flow of information, inputs-outputs.
- Analysis, updation, feedback.
- Corrections and modification.

Public Utilities (e.g., Health, Electricity, Water, Sanitation, etc)

- Agenda of the utility.
- People's expectations.
- Resources, infrastructure.
- User charges: rates and recovery.
- Providing the services, monitoring.
- Redressing grievances, replies.
- Quality and competitiveness.
- Response, reporting and feedback.

Monopoly services (e.g. Mandi Boards, etc)

- Agenda, services systems.
- Expectation of clients, users.
- Efficacy in services, bottlenecks.
- Improvements through digitization.
- Inputs, processing and reporting.
- Grievance-redressal systems.
- Reply and responses, feedback.
- Corrections and updation.
- Setting up virtual mandis and commodity exchanges.

Welfare Organizations (e.g., Sainik Boards, Animal Welfare groups, etc)

- Interface with target groups, goals.
- Interface with other organizations.
- Policies, their implementation, monitoring.
- Processing and reporting, feedback system.
- Corrective measures, modification.

Role of NGOs and IT industry

It is important to realize that pure IT organizations cannot conduct effective implementation in the social sector. Non-governmental organizations have the benefit of being close to the people, sharing their experiences and having a feel of the pulse of their perceived needs. At the same time they have the capacity to organize people and also muster assistance from government in their initiatives. NGOs help by working on core issues in the social sector, and focusing to both the government and the people on the pitfalls and the possibilities. There can be partnership between NGOs and IT companies in taking IT to the grassroots.

Focusing Government Initiative

The biggest limitation of a government set-up working in social sectors is the lack of constant presence of its organs at the places where they are supposed to deliver results.

There are issues of staff motivation, skills and information. Consequently, the operation, monitoring and supervision of the activities at the grassroots level needs improvement. Ambitious policies and plans are devised but results do not match targets on account of delayed monitoring, or improper implementation by lower-level functionaries. Leakage of required inputs to non-target groups is another important variable. There are always the plaguing questions of missing links, i.e., low inputs, ill-equipped personnel, poor infrastructure, outdated technologies and inadequate information. Correct and timely feedback thus does not reach the planners and implementers through normal channels, and NGOs fill this vital gap for the government.

Focusing Peoples' Initiative

Individually and collectively, people have the best historical experience and wisdom to identify about the best options for their development and betterment of the services. What they lack is the timely support from the system, better forward and backward linkages and knowledge about the latest methods of value addition. Those who are able to cope with such issues, have taken initiatives for their welfare and have surprised all others concerned. However, a large section is still struggling with the issues which can easily be solved with the induction and adoption of the tools provided by information technology. People's bodies, such as municipalities, panchayats, town areas, co-operatives, marketing and banking institutions, societies, unions and organizations are to benefit immensely if they go this way. In a way, this is becoming essential because they have to deal with large numbers of clients and with multiplicity of information and data.

Possible Intervention of NGOs

Government organizations are busy with issues of governance. Their main concern is to satisfy the public and have a positive impact on their lives. An objective approach and expert input is required to study the real requirements and to suggest solutions. An outside body will view the entire process objectively, rather than looking at it defensively. While the basic requirement of systems largely remains the same for all kinds of public organizations, the finer differences in their objectives and functions require specific solutions. Keeping this in view, strategies may have to be separately evolved for various kinds of public organizations. While the activities may seem to be similar and overlapping, their nature differs when they are implemented in a particular type of organization.

NGOs can also partner an IT organization in inducting IT in social-sector development schemes, and undertake activities of counselling, enabling and supporting public organizations to go digital.

Suitably equipped NGOs can provide the following services:

- Study of key Issues.
- Study of functions and obligations.
- Expectations of the public, clients.
- Processing, delivery and reporting.
- Requirements of policy/statute.
- Requirements of public good.
- Requirements of transparency.

- Systemic strengths and weaknesses.
- Scope of improvement through digitization.
- The actual digital system details, including hardware, software, network.
- The public interface.
- Psychological factors, management of change.

The clear recommendation for the IT sector is to provide the backbone broadband connectivity to village levels, preferably through private initiatives, or through BOO schemes, and other such vehicles, and create a climate of convenience for wooing service providers. This should be built upon by focusing on strength in HRD aimed at this sector. IT should be used to bring about a quantum improvement in the quality of life of citizens, through committed implementation of e-governance programmes, based not merely on automation, but a re-engineering of the government-citizen contact apparatus. Great potential exists in inducting IT into the agricultural and agro-processing sector, and in implementing genuine e-governance.

Note on Commodity Exchange and Virtual Mandis

In this mode of trading a commodity may be 'bought' but delivered at a future date. For instance, if a trader/farmer quotes Rs 7,000 for a tonne of wheat in December 2002 for a delivery to be made in February 2003, the buyer stands to gain if the price of wheat goes up by February. In case prices fall, the trader/farmer harvests the profit. This leaves no scope for big manipulations. The seller is bound to keep his commitment and release the item at the pre-fixed rate. Forward trading bridges the gap between what the farmers get and what is charged from the consumers. So futures trading helps in stabilizing prices in times of shortage, assuring sales at a steady price, and it ensures a continuous supply of commodities.

The Forward Contracts (Regulation) Act, 1952, governs futures trading in commodities in India. According to its provisions, futures trading in commodities can be conducted only by such Commodity Exchanges, which are recognized by the Forward Markets Commission (FMC) under Section 6 of the Forward Contracts (Regulation) Act and have got specific permission from FMC to launch futures trading in specified commodities.

A list of some functioning commodity exchanges in India is given in Table 12.

Table 12
Functioning Commodity Exchanges in India

EXCHANGE	PRODUCTS		
India Pepper and Spice Trade Association, Kerala Email: jpsta@vsnl.com	Pepper-Domestic	Pepper- International	
<u>The Bombay Oil Seeds and Oils Exchange Ltd., Mumbai, Maharashtra</u> Web site: http://www.booe.org , Email: booeind@bom3.vsnl.net.in	Castor oil- International, Rapeseed/Musta rd Oil, Sunflower Oil	Castorseed, Refined Sunflower Oil	Groundnut Oil, RBD Palmolein
The East India Jute & Hessian Exchange Ltd. West Bengal-700001	Hessian Raw Jute-TSD	Jute Goods Sacking	Jute-NTSD
Vijay Beopar Chamber Ltd., Muzaffarnagar, Uttar Prudish Email: vbc@nde.vsnl.net.in	Gur		
The Chamber of Commerce Hapur Uttar Prudish Email: coc.hapur@optonetwork.com	Gur	Potatoes	
Bathinda Om and Oil Exchange Ltd. Punjab Email: omexbathinda@hotmail.com	Gur		
The Meerut Agro Commodities Exchange Company (P) Ltd. Uttar Prudish	Gur		
SOPA Board of Trade Ltd. Madhya Pradesh Email: sbot@satyam.net.in / sbot@mantrafreenet.com	Rapeseed/Musta rd Oil	Rapeseed/Mus tard OilCake	Rapeseed/ Mustardseed
	Soya Cake Meal	Soya Oil	Soyabean
The Spices & Oil seeds Exchange Ltd. Maharashtra	Turmeric		
The East India Cotton Association Ltd. Maharashtra Email: eica@bom8.vsnl.net.in	Cotton		
The South India Cotton Association Tamil Nadu Email: sicacoimbatore@vsnl.com	Cotton		
The Ahmedabad Cotton Merchants Association Gujarat	Cotton		
The Central Gujarat Cotton Dealers Association Gujarat	Cotton		
The Southern Gujarat Cotton Dealers Association Gujarat	Cotton		
Coffee Futures Exchange India Ltd. Bangalore Karnataka Web site: http://64.176.70.72/cofei.htm Email: cofei@vsnl.com	Coffee-Plantation A	Coffee- Robusta Cherry AB	Raw Coffee Arabica Parchment
Ahmedabad Commodity Exchange Ltd. Gujarat Email: info@acecastorfuture.com	Castorseed		
Kanpur Commodity Exchange Uttar Pradesh	Rapeseed/Musta rd Oil	Rapeseed/Mus tard OilCake	Rapeseed/ Mustardseed
The Rajkot Seeds Oil and Bullion Merchant Association Gujarat	Castorseed		
The Rajdhani Oils & Oilseeds Exchange Ltd. Delhi Email: rajdhanioil@satyam.net.in	Gur		

Source: UNDP Report on *Commodity Exchange, 2000*

It was surprising to note that Bathinda Om and Oil Exchange Ltd. in Punjab, were willing to exchange e-mails and transact on the Internet.

Punjab should immediately proceed with a commodity exchange framework, with Punjab Agricultural Marketing Board and Markfed, identified as lead agencies, to start the programme. There should be a gradual phasing out of physical mandis as they exist, and replaced by an emphasis on a warehousing system, piloted by the Punjab Warehousing Corporation. Punjab can make tremendous gains with this initiative, cutting out wastage and market congestions, and lowering overall costs.

TRANSPORT

The data on transport statistics are not easily available, and even at the national level, remain a matter of dispute. In fact, it was surprising to note that Economic Surveys of Punjab do not include transport as a sub-head in the sectoral analysis. Estimates for transport output in the country are produced by separate ministries. The data for road transport are released by the Ministry of Surface Transport and for railway traffic by the Ministry of Railways. Both these Ministries question the data for their sectors, released by Planning Commission and the World Bank differs with all of them in this regard, 'The Transport Sector', G Raghuram, *India Infrastructure Report 2001*). We will examine the existing transport infrastructure, the agenda before it and arrive at a blue print for the future.

The average annual compounded growth rate of Gross Domestic Product in Punjab is shown in Table 13.

Table 13
Sectoral Annual Compound Growth Rate of Gross Domestic Product in Punjab

Sector	Sixth Plan 80-81 84-85	Seventh Plan 85-86 89-90	Eighth Plan 92-93 96-97	1998-99	1999-2000	2000-01
Primary	5.37	5.24	3.10	3.06	7.02	2.07
Agriculture	5.44	5.29	3.07	2.92	7.00	1.97
Secondary	5.04	8.65	7.12	11.78	5.90	5.73
Tertiary	5.14	5.22	5.79	4.94	7.74	7.14
Overall	5.23	5.98	4.83	5.79	6.99	4.78

Source: Economic & Statistical Organisation, Punjab

Note: Sixth & Seventh Plans at 1980-81 prices, other at 1993-94 prices

It can be seen, therefore, that the major growth component is in the secondary and tertiary industry sectors at about six per cent and seven per cent respectively. The AACGR of Gross State Domestic Product in Punjab is around five per cent. It can thus be presumed that the transport capacity, both passenger and freight, will have to be doubled over the next decade to accommodate this growth rate.

It is significant that Punjab has one of the highest vehicle density per 100 km of road at 3,102.7; only Delhi, Haryana and Gujarat are higher. Punjab's capital Chandigarh has the distinction of the national highest in this regard at 2,1587 (*Motor Transport Statistics in India*, Ministry of Surface Transport, 2000).

The existing transport infrastructure in Punjab is as follows:

National Highways

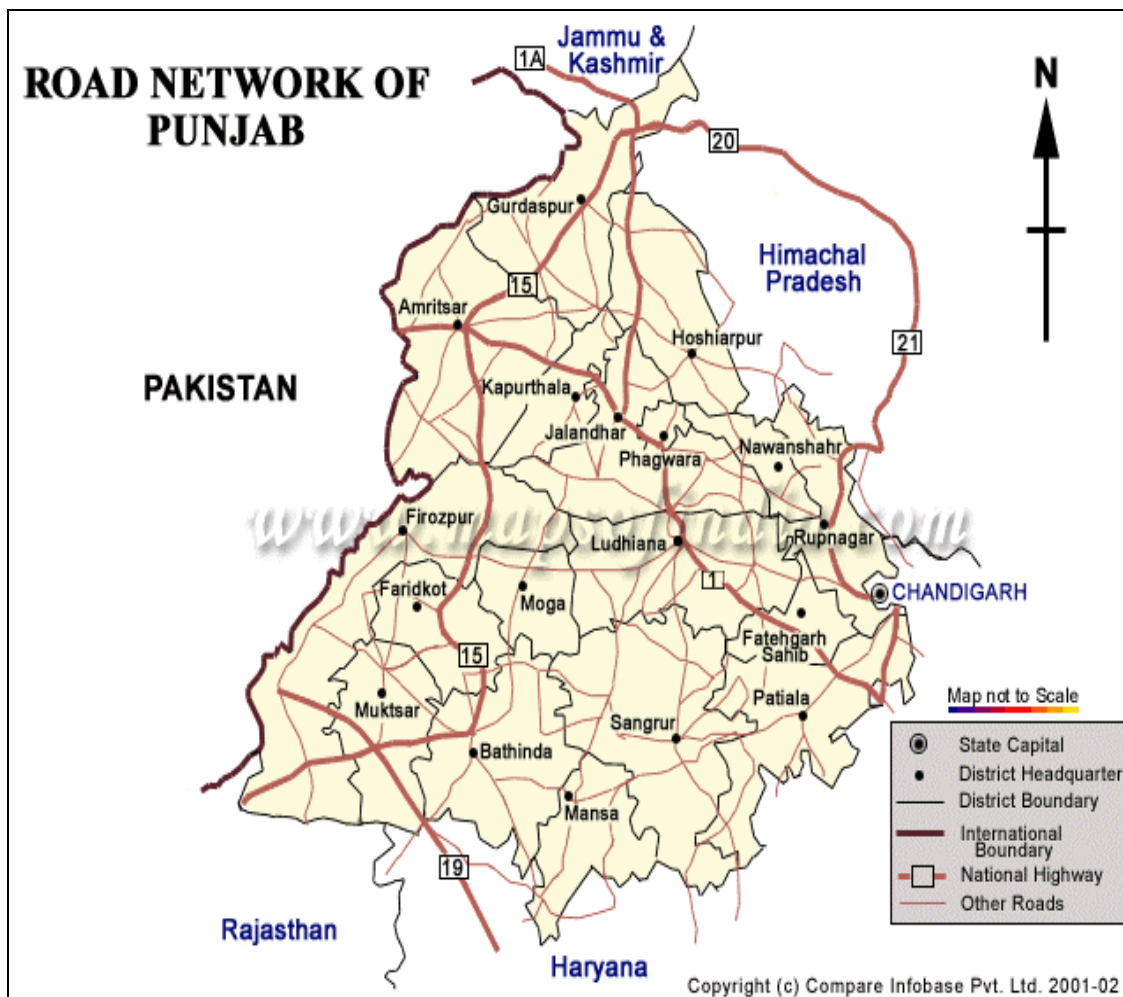
The following National Highways serve Punjab (Table 14):

Table 14
National Highways Serving Punjab

NH No.	From	To	Length (kms.)
1	Shambu (Haryana Boundary)	Ludhiana - Jalandhar - Amritsar - Pakistan Border	279.42
1-A	Jalandhar	Tanda - Mukerian - Pathankot Samba (excluding Himachal Pradesh Portion)	104.734
10	Dabwali (Haryana Boundary)	Malout -Abohar - Fazilka (Pakistan Border)	109.06
15	Pathankot	Gurdaspur-Amritsar-Zira-Faridkot - Bajakhana-Bathinda-Malout-Abohar-Usmankhera (Rajasthan Boundary)	363.67
20	Pathankot	Chakki (Himachal Boundary)	11.975
21	Zirakpur (Excluding U.T. Area)	Mohali-Kharar-Ropar-Kiratpur-GarhaMora (HP Boundary)	76.88
22	Ambala Barrier (Haryana Boundary)	Zirakpur-Kalka (Haryana Boundary)	30.99
			Total = 977 kms.

Source: www.Punjabgovt.nic.in, (PWD Department, B.R.)

The major artery is national highway No. 1, also known as the Grand Trunk Road or Sher Shah Suri Marg. Entering at Shambu, it runs through Punjab, and right accross to the Wagha Border with Pakistan. This connects the major towns of Ludhiana, Jalandhar and Amritsar along with the industrial townships of Sirhind and Govindgarh. A number of state highways also branch of to other major towns, such as Ferozpur, Patiala, Bhatinda, Hoshiarpur, etc.



Map 1

The total length of these national highways in Punjab is 977 kms. These highways are also of a strategic nature, considering the status of Punjab as a border district, important for the defence of the nation. National Highway No. 1 also connects Jammu & Kashmir, approached via Jalandhar and Amritsar. National Highways are maintained by the government of India and serve Punjab well.

State Highways and Major District Roads

These arterial roads, referred to as plan roads, are maintained by the PWD Department of the Punjab Government and are spread over the total length of 7,305 kms. Of these, 2,166 kms are state highways, 1,799 kms are district roads, and 3,340 kms are other district roads. As can be seen from the map, the state highways network is fairly extensive. Some of these roads, owing to their importance, are being elevated to the status of national highways. The important plan roads under this account are likely to be:

- Kiratpur Sahib-Anandpur Sahib-Nangal Road.
- Chandigarh-Patiala-Sangrur-Barnala-Bhatinda Road.
- Kharar-Ludhiana-Moga-Ferozepur Road.
- Ropar-Hoshiarpur-Dasuya-Mukerian-Gurdaspur-Kathua Road.
- Jalandhar-Nakodar-Moga-Sangrur-Patran-Narwana-Rohtak-Delhi Road.
- Bathinda-Fatehabad Road.

Link Roads Connecting Villages

All villages of Punjab are connected by link roads, running for 31,657 km. The standard design is that the link road touches the village, goes around it and leaves to connect the next village. The part of the road going around the village is called 'Phirni', with usually two or three bus stoppages located at convenient points. Rarely do these link roads enter the village. The village is served by brick-laid lanes that connect to the Phirni.

Railways

There are 3,664 track km. of railway track in Punjab. As can be seen from the railway system map of Punjab, the major double line railway artery runs parallel to National Highway No. 1, all the way from Shambhu to Amritsar. From here there are two main branches, one going towards Patiala, Bhatinda, Abhohar and the other moving towards Moga and Ferozpur. The third branch takes off from Jullundhar and moves towards Jammu. There are many other small branch lines connecting the foodgrain-producing mandis of Punjab, primarily to assist in loading and movement of wheat and rice to other parts of India. The capital city of Chandigarh is connected by a line branching off from Ambala and moving towards Chandigarh via Lalru. One of the major sanctioned projects for new railway works under execution by Northern Railway is the Chandigarh-Ludhiana rail link, scheduled for completion upto Morinda junction by 2003.



Map 2

Waterways

There is no planned movement of passenger or freight by using inland waterways. The major river systems of Sutlej and Beas are not found suitable for transportation, the water being effectively used for power generation and irrigation purposes. The well-developed canal irrigation system could have offered some opportunity, but none of the bridges, etc., were designed for permitting any water vessels to move under them. As such transportation by inland waterways in Punjab is negligible, and future growth possibilities uncertain.

Air Transport

Punjab is served by Raja Sansi International Airport at Amritsar and the domestic airport at Chandigarh. There are smaller airstrips at Patiala, Ludhiana, etc., but only Amritsar and Chandigarh are capable of handling large commercial aircraft, with others only capable of small aircraft and helicopters. There are no mass-based air taxi services available in the state. Considering the overall socio-economic scenario and the defence requirements of air space in the border state of Punjab, this sector cannot be banked upon for any mass movement in the near future.

Importance of Road and Rail: An Agenda

Punjab is, therefore, wholly dependent on roads and railways for its transport requirements. It is these two sectors that must provide the necessary transport infrastructure to look after the needs of the state. An agenda for the transport sector in Punjab could be set as follows:

- Considering its length and breadth, it should be possible to move across the state between major towns in three to four hours.
- The state capital houses the legislature, the judiciary and the administrative government centres. In addition, it houses Punjab University, and the Post Graduate Institute of Medical Education and Research. It also has engineering, architecture, medical and management institutes which attract students and professionals.

Thus movements to and from the state capital to other parts of the state will continue to remain important. However, Chandigarh is situated at the edge of the state and, therefore, transport infrastructure must provide a quick and reliable mode, that ensures that people can go back after business in the state capital in the same day.

- One of the largest causes of unnatural deaths in Punjab is road accidents. Transport infrastructure of the future must ensure quick, safe and reliable movement, while enhancing overall speed.
- Punjab will continue to need a large amount of coal for feeding its thermal power plants. Other bulk requirements would remain in the areas of cement, steel and fertilizer. The transport sector should be capable of moving these large quantities towards the consumption centres.
- Considering the strength of Punjab in agriculture, and the push towards agro-processing, the transport sector must facilitate the movement of processed food out of the rural areas to near urban areas for final processing and/or consumption

food. There will also be need to move these quickly out of Punjab towards consumption areas in other parts of India. There would call for the availability of refrigerated containers, called 'reefers'.

- With the advent of virtual mandis, foodgrains and other agricultural products will need to be moved from villages towards aggregation centres, for movement in bulk. The roads must be capable of handling container trucks to facilitate the same.
- With the rapid urbanization of Punjab, expected to touch 43 per cent by 2020, it would be desirable to put in place frequent services between major towns, and suburban transportation systems in the bigger towns of Amritsar, Jullundhar, Ludhiana and Patiala.
- Cycling remains an important mode of transport for distances upto five to six kms. While being good for the health, it also helps protect the environment. On pre-identified routes, leading from surrounding villages of the major towns, dedicated cycling tracks must be put in place to facilitate commuting by cycle. This will also provide market-demand for the well-developed cycle industry of Ludhiana.
- Considering the large number of accidents on the road and related deaths and increasing instances of cardiac diseases, trauma-management will become important in the future. Patients will need quick attention, and transport services should be in place to respond to these health emergencies in the future.

With this agenda for the transport sector, a blueprint for future development can be laid down.

Road Sector

The plan and link-road network is serving Punjab well. However, the design of these roads and technical specifications do not permit regular movement of heavy vehicles. As a result these roads usually become unserviceable during the monsoons, and consume large amounts of money in their maintenance. It is desirable that the concept of life-cycle costing instead of immediate cost should be applied, which will show that the long-term cost of building a more expensive road may be lower than a cheap road with high maintenance cost.

It should also be appreciated, that as in the telecom sector, in the road sector too, the last mile is as important as the major back-bone. It is found that while much attention is being paid to national highways and state highways, the links of these roads to the rural areas leave much to be desired. In a future scenario, where the Punjab Government is targeting growth in agro-processing industries, the village has to be well linked and integrated into the road transport infrastructure, through wider roads that are capable of taking heavier axle loads than at present. The link road also witnesses a large movement of tractors. The tyres of these vehicles are intended for off-road use and, therefore, exert greater wear and tear on metal roads than other vehicles. Therefore, it is all the more important that the village roads are designed well and built to last for taking these demanding loads. A number of road improvement projects are in hand, with commissioning promised shortly (Table 15).

Table 15
Road Construction Projects

Major Road Construction Projects near Completion	Cost Rs. in lakh
Bridge over Choe on Badowan Sardulpur Sakrulli Paldi link road	118.97
Bridge over Langerpur choe on Dasuya Rampur road	115.00
Replacement of old submersible bridge on Patran-Moonak Tohana Road	130.00
H.L. Bridge over Sutlej river creak crossing Pala Megha Pir Berian Road	97.64
H.L. Bridge over river Ghaggar near Makraur Sahib	147.05
Bridge over Sirhind Canal xing Ludhiana Chandigarh road near Neelon	233.44
H.L. Bridge over river Ghaggar on Annadana to Nawangaon link road	196.96
Southern Bypass at Ludhiana.	850.00
Ring Road around Hoshiarpur Phase II	250.72
Ring Road around Hoshiarpur Phase II	356.11
Raising/widening Hussainpur Saidpur Mangupur Road Km 0.01 to 13.72	228.02
Improvement of Dasuya Hoshiarpur Road	113.62
Raising Gurdaspur Dera Baba Nanak Road	93.20
Raising Jalandhar Hoshiarpur Road	68.88
Raising Hoshiarpur Phagwara Road (Km 19.20 to 21.00)	80.00
Raising/strengthening Ropar Bela Road (4.00 Kms)	75.00
Raising/Strengthening Dehlon Raipur Gujjar Pakhowal Road	108.00

Source: www.Punjabgovt.nic.in, (PWD Department, B.R.)

Private Participation in Roads

Punjab has invited private parties to participate in the road sector, and has defined a policy with the following salient features:

- The highway sector has been declared as an industry to enable easy borrowing terms and floating of bonds.
- The provisions of MRTP Act have been relaxed to enable large firms to enter the highway sector.
- Customs duty on import of construction equipment has been reduced and procedures streamlined.
- For projects taken up on BOT basis, the state government will permit entrepreneurs to charge toll that market forces will bear.
- The land will be made available at a nominal lease to the entrepreneur taking up the projects.
- The entrepreneur will be permitted to exploit commercial potential of the sites under rail overbridges for a period of 30 years.
- Any other compensation package can also be considered to make the projects viable.

Other features are:

- Invitation of 'Licence Period' competitive bids
- Government will bear the cost of pre-feasibility studies, and acquisition of land for the project will be time-bound. The government may acquire the land through negotiations with the land-owner
- Suitable provision for adjustment of the toll-fee structure for inflation/exchange rate variations.
- Permitting development of highway facilities alongside, to provide predetermined revenue sources for the entrepreneurs within the framework of Rules/Acts.
- Dispute resolution under the Indian Arbitration Act, 1996, in the event of losses arising out of exceptional circumstances or *force majeure*, the government may suitably compensate the entrepreneur on the basis of fair and balanced allocation to risks.

It must be pointed out that there is the usual misconception at work about the role of the private sector in this area. The Government of Punjab says that 'due to resource crunch, it has not been possible to upgrade road infrastructure in the state commensurate with the ever increasing traffic volume'. The issue is not resource crunch, but the absence of a sound technical and economic basis to road sector policy. Under such conditions, the private sector will conduct 'cherry picking', and leave the unprofitable roads in the government sector. The clause of compensating the entrepreneur on the basis of risk is particularly dangerous and amenable to misuse. If the risks are to be borne by the government, then what is the role of private business? A number of projects have already been proposed on the Build-Own-Transfer Model (Table 16).

Table 16
Road and Rail Bridges

Name of Bridge	Estimated cost (Rs. in lakh)
District Ropar	
Bridge over Kishanpur choe in Km 19 on Ropar Balachaur road	127.00
Rail overbridge at level crossing No. 24-B at Morinda on Sirhind-Nangal Dam Rail Line(Section crossing Ludhiana-Chandigarh road(SH-18) in km 65.100	1756.72
H.L. Bridge over river Sutlej at Kiratpur Sahib	3500.00
District Ludhiana	
Rail overbridge Ludhiana-Dhuri rail line in replacement of level crossing No. 2A/2 near Preet Palace at Ludhiana	2204.00
District Mansa	
Rail overbridge at Mansa on Mansa Sardulgarh Sirasa Road	1000.00
District Bathinda	
Rail overbridge at Bathinda on Bathinda Sirsa Road	1000.00
District Fatehgarh Sahib	
Rail overbridge on Sirhind Chuni Road	335.00
District Sangrur	
Jandali Bridge near Ahmedgarh over Bathinda Branch	70.00
Rail overbridge on Dhuri Bypass	
a) Over Dhuri Ludhiana road	500.00
b) Over Dhuri Barnala Road	500.00
District Gurdaspur	
Rail overbridge on Amritsar Pathankot Road in Gurdaspur town	1000.00
H.L.Bridge over River Beas on Gurdaspur Kathua Road,	4575.00
H.L.Bridge over River Beas on Gurdaspur Mukerian Road,	3550.00

District Jalandhar	
H.L.Bridge over River Sutlej 24 span 25 mtr. each on Mehatpur Sidhwan Jagraon Road	4000.00
H.L.Bridge over Sutlej parallel to Rail-Road bridge 24 span 25 mtr. each near Gidderpindi on Jalandhar Makhu Road	4000.00
District Nawanshahr	
H.L.Bridge 24 span 25 mtr. each including guide bund, etc., on Rahon Mattewara Ludhiana road over River Sutlej	4000.00
H.L.Bridge 24 span 25 mtr. each including guide bund etc. on Rahon Machiwara road over river Sutlej	4000.00
District Patiala	
Rail overbridge 22 No.Phatak Patiala	1500.00
Rail overbridge in Rajpura Town	1500.00
District Amritsar	
Rail overbridge on Amritsar Batala Road near Verka	1200.00
District Faridkot	
Bridge near Abohar Branch on Mukatsar Malout road	60.00
District Kapurthala	
Rail overbridge at Phagwara on Phagwara Nakodar Road.	1000.00
Total	41699.34

Source: www.Punjabgovt.nic.in, (PWD Department, B.R.)

Punjab should propose maximum rail-bridge projects, since, according to a recent policy directive of the Ministry of Railways, they will provide the required 50 per cent of the project cost for all such proposals (Table 17).

Table 17
Road Projects

Name of Road	Estimated Cost (Rs. in lakh)
District Ludhiana	
Northern Bypass connecting Ludhiana-Ferozepur road to Ludhiana-Jalandhar Road	1000.00
Widening/Strengthening of Ludhiana-Ferozepur Road	
a) Four laning Ludhiana Mullanpur Section	2000.00
b) Widening/Strengthening of Mullanpur Jagraon section	1000.00
Four laning of Ludhiana-Chandigarh road	40000.00
District Hoshiarpur	
Widening/Raising of Hoshiarpur-Dasuya Road with H.L. Bridges on choes	2000.00
District Faridkot	
Ludhiana Moga road Section Ajitwal to Moga	1000.00
Four-laning Moga bypass including railway overbridge on ludhiana-ferozepur railway line	1400.00
Four-laning bypass at Mukatsar	200.00
District Sangrur	
Amargarh bypass (23 wide) including cost of land	100.00
District Gurdaspur	
Improvement of Batala-Beas road (Laying B.M. and P.C.)	200.00
District Jalandhar	
Four-Laning Jalandhar Kalassanghian Tashpur road Km 0 to 32.10	3200.00
Four-Laning Phagwara Nawanshahar Balachaur road Km 0 to 48.73	4880.00
4-Laning of Jalandhar Kapurthala Makhu Road	4720.00

District Nawanshahr	
Nawanshahr bypass	1500.00
District Patiala	
Four-laning Bahadurgarh-Rajpura road	1500.00
Raising Banur Tepla road	700.00
Stg. Patiala-Khanauri Road	60.00
District Amritsar	
Four-Laning of Amritsar to Rajasanasi road(Airport)	700.00
Additional bypasses	
Bypass at Banga	1000.00
Bypass at Phagwara	1000.00
Bypass at Balachaur	1000.00
Inter District Roads	
Four-laning of Zirakpur Patiala Sangrur road	3440.00
Ropar Nawanshehar Phagwara Road	3173.00
Kharar Morinda Ludhiana Jagroan Moga road	3744.00
Total	79517.00

Source: www.Punjabgovt.nic.in, (PWD Department, B.R.)

Efforts are also under way to obtain assistance from multi-lateral agencies for four-laning projects, valued at Rs 1,600 crore. These include Zirakpur-Patiala-Sangrur, Rupnagar-Nawanshahr-Phagwara, and Kharar-Morinda-Ludhiana-Jagroan-Moga corridors.

Cycle Tracks

Punjab uses the cycle, and this healthy habit should be encouraged. From about 10 km from major towns, dedicated cycle tracks should lead in, from multiple radials selected on the basis of settlements nearby. At present, the cyclist shares the national highway or district road with heavy and medium vehicles. He risks fatality, and is forced off the road quite often by motorized vehicles. Cycle tracks will relieve road congestion, reduce pollution, and keep up a healthy practice at a negligible cost to government. With the provision of these tracks, demand for Punjab's indigenous cycle industry will also increase.

Fund Generation

Collating funds requirements, it is seen that about Rs. 2,800 crore are needed to upgrade the road infrastructure to desirable standards. The toll-road model is a bag of mixed success, and the initial euphoria over the scheme has been much tempered. While efforts to attract private investment should continue, for Punjab, it is suggested that local taxation on petroleum products should be considered as a route for capital building. The consumption of motor spirit (petrol) and high speed diesel was 5,97,130 and 25,08,438 kilolitres respectively in 2000-2001. (*Economic Survey of Punjab*). There is thus a possibility of raising Rs 300 crore per year by imposing a special cess of just one rupee per litre. The cess should be deposited in a non-lapsable Road Development Fund, which would provide the required capital inflow over the next ten years.

Railway Sector

The railway system should open up three main arteries connecting the rest of the state with Chandigarh:

- Chandigarh-Lalru-Rajpur-Patiala-Sangrur-Bathinda-Malout-Abohar.
- Chandigarh-Morinda-Samrala-Ludhiana-Jagraon-Moga-Talwandi-Ferozepur.
- Chandigarh-Ludhiana-Phillaur-Phagwara-Jalandar-Amritsar.

For this, two projects have to be considered:

- Completion of the sanctioned work of Chandigarh-Ludhiana corridor.
- Fresh sanction and completion of Lalru-Rajpura link.

Punjab should immediately lobby with the Ministry of Railways in this regard. While the target for connecting Chandigarh to Morinda has been laid down as 2003, the final leg to Ludhiana should be commissioned by 2005. For this, land acquisition and other assistance from Punjab should be provided expeditiously.

The railways should also sanction afresh and commission by 2005 the Lalru-Rajpura link, techno-economic surveys for which have already been done.

Table 18 lists proposals for railway development along these corridors.

Table 18
Conceptual Framework for Railway Development along Different Corridors
(With diesel traction), (at current prices)

Corridor	Phase I (2005)	Funds needed (in Rs.)	Phase II (2010)	Funds needed (in Rs.)
Chandigarh-Abohar	Complete Lalru-Rajpura link	100 crore	Doubling of Chandigarh-Bathinda	400 crore
	Upgrade Rajpura-Abohar to 110 kmph	100 crore		
Chandigarh-Ferozepur	Complete Chandigarh-Ludhiana	250 crore (already sanctioned by Railways)	Doubling of Chandigarh-Ludhiana	200 crore
	Upgrade Ludhiana-Firozepur to 110 kmph	100 crore	Doubling of Ludhiana-Firozepur	200 crore
Chandigarh-Amritsar	Complete Chandigarh-Ludhiana	Already accounted above	Line capacity enhancement works on Ludhiana-Amritsar	100 crore

Considering the power-deficit situation in Punjab, it may be desirable to plan for diesel traction mode for train operation on these corridors. The popular perception that electric traction is superior to diesel is not correct. The whole of US and Canadian system is still based on diesel traction. The choice of traction is a techno-economic variable, and should be based on a rational analysis. Considering the overall energy situation, and the

type of requirements in Punjab, it may be desirable to move with the diesel mode for the present on these alignments. This will also lower the cost by upto one crore rupees per km of track.

In Phase I, the funds requirement is Rs 550 crore, out of which Rs 250 crore is already committed by the Railways. In Phase II, the need is for Rs 900 crore. Over the next eight years, fresh funds needed are thus about Rs 1,200 crore.

According to the Railways Act, no local taxation can be applied upon railway services, unless notified by the Central Government, but the possibility of this nevertheless exists. Punjab should propose raising half this sum through a local service tax to be recovered from passengers, originating journeys from within Punjab. The potential to raise fares exists in Punjab, where ticketless travel is a rare phenomenon. A comparison of current road / rail fares is quite revealing (Table 19).

Table 19
Comparison of Current Road/Rail Fares

Corridor	Mail Rail Fare (in Rs.)	Ordinary Bus Fare (in Rs.)
Chandigarh-Bathinda	58.00	99.00
Chandigarh-Ferozepur	64.00	101.00
Chandigarh-Amritsar	62.00	102.00

Thus, bus fares are about 75 per cent higher than rail, and there exists a possibility of increasing rail fares in Punjab through special purpose taxation, without substantially affecting the travel mode.

The Ministry of Railways should be negotiated with to collect the tax and credit it to a Punjab Rail Development Fund to be maintained by them and used for the development of the railway infrastructure in Punjab. It can be so negotiated that the Ministry of Railways would give a matching grant every year, to develop rail corridors as outlined above. Since nowadays Railways ticketing is networked, and a ticket can be purchased from any station, and even on the Internet, special procedures will need to be evolved for crediting the money to the fund. However, since it is already computerized, it should not be difficult to implement it on the reserved segment. Unreserved sales will take place from stations within Punjab, and this can be accounted at these very stations.

At current traffic levels, a 10 per cent surcharge would raise about Rs 60 crore every year, and with a matching support from the Indian Railways, rail development in Punjab can proceed on schedule. It may also be mentioned that the infusion of this investment in the transport sector will lead to large-scale multiplier effect on the overall growth of Punjab's economy.

Multi-modal Approach

There is a prevalence of transport myopia in our planning paradigm and this flows from a compartmentalized and sectoral approach to transport infrastructure. Various modes plan future projects in isolation, and fail to achieve a synergy that would have come out of a multi-modal approach. When a passenger steps out of his home, he uses a pavement to walk on, takes a bus to the railway station, covers part of his journey by

trains and may use a taxi to reach his final destination. It is evident that to the passenger, all are modes of transport and he uses them one after another in the same journey. Problems arise when the planning process fails to see this inter-connection of various legs of a journey, and thus cannot provide a well co-ordinated answer to the passengers' itinerary. This myopic view also causes an adverse effect on the safety aspect. It is of no comfort to the user that an accident is more or less likely to happen in this or that mode of transport. The user would like to be uniformly safe over the various modes that he uses.

Having said that, however, analysis reveals that the roads remain the most unsafe mode of transport. Despite having 1/7th the vehicles per km, road deaths per 10,000 vehicles each year are more than 14 times in India, as compared to United Kingdom. (Ministry of Surface Transport 1998). Poorly maintained roads, in addition to causing accidents, also cause heavy wear and tear on vehicles, and the goods in transit. It has been estimated in various reports that the loss being incurred in such wear and tear is nearly two per cent of Gross Domestic Product. The impact on pollution is also high in such cases. Bad roads and the wear and tear on vehicles lead to low average speeds, subsequently reducing the productivity of vehicles. Users and planners alike in Punjab are aware of these problems. It is essential that we perceive the concept of users, requirements and plan for servicing these in a holistic and multi-modal manner.

Passenger Transport Plan

There are six important movement arteries for passengers in Punjab.

1. Chandigarh-Rajpura-Patiala-Bathinda-Malot-Abohar.
2. Chandigarh-Morinda-Samrala-Ludhiana-Jagram-Moga-Firozpur.
3. Chandigarh-Ludhiana-Phagwara-Jalandhar-Amritsar.
4. Rajpura-Sirhind-Govindgarh-Ludhiana-Jalandhar-Amritsar.
5. Amritsar-Tarantaran-Patti-Jeera-Firozpur-Fazilka.
6. Chandigarh-Rupnagar-Nawanshahr-Hoshiarpur-Pathankot.

Each of these corridors represents distances more than 200 km, with an average of 130 km. The movement represents cross-state moves and is presently largely road based, except on the Rajpura-Ludhiana-Jullundhar-Amritsar corridor, where competing rail services are well patronized. The last corridor is not amenable to rail service, since it is a hilly terrain and would require large infusion of capital for starting fast rail services.

The smaller segments of passenger moves are less than 200 km, and essentially move as a bridge between these major corridors. It is, therefore, suggested that the major corridors should provide reliable and fast rail-based service for moving across the state and between towns on these corridors. The cross-state services should move in the morning towards Chandigarh from Abohar/Firozpur/Amritsar, and return in the evening. Maximum travel time should not exceed about three hours or so. The stoppages on these fast cross-state services will be at the major towns. Suburban services on these corridors, stopping at every station, will provide connection to these services. The frequency of the suburban services can be planned to run at about an hourly interval in the morning and evening and a few services in the intervening hours. Services on less than 100 km segments between major corridors will be looked after by the road sector.

The following essentials should be provided for:

- Common ticketing
 - A ticket purchased for a journey which entails travel on both road and rail modes will be issued as a single ticket providing access to both.
 - An authority to look after road fares, and the issue of joint ticketing, will be formed. A framework to share revenues for railway journeys will need to be decided.
- Multi -modal terminals
 - Road and rail terminals at major towns to be co-located in a manner facilitating easy transshipment. Such services as rest rooms, parking, refreshment areas, etc., can be planned jointly for both modes.
- Use of information technology
 - System information, tracking of road transport moves through GPS, issuing of smart cards, acceptance of credit cards, etc., to be implemented on the network to help customers.

Freight Sector

On date, multiple handling of commodities, rising wastages, and transport cost characterize the freight sector. For example, harvested wheat is stocked in the farmer's house, then brought to the mandi and dumped, then bagged, then transported to a godown, then taken to the railway station and dumped, and then loaded into railway wagons. The reverse is also true for inward commodities for consumption in Punjab. The same multiple handling is true of cement, steel, fertilizers, coal for public use, etc.

In keeping with the thrust sector of the Government of Punjab, a transport system will have to meet the requirements of agro-processing industries too. This will demand assured transit for rural and semi-urban areas to the consumption centres in Punjab and outside, and may also need refrigerated wagons.

Need For Warehousing

In keeping with the need to minimize handling, correctly-sized warehouses will have to be established at the consumption/production centres, and at major railheads in Punjab.

The farmers can be encouraged to bag the wheat at source in their farms, and stock them at the local warehouses. These local warehouses can be reasonably priced and scientifically designed to ensure the stocking of foodgrains, and assist in subsequent movement directly to consumption centres/railheads. At the railheads, commodities moving in for consumption in Punjab can be stocked in the warehouses linked to the rail terminals. Commodities can move directly from these warehouses to the consumption points. The Railways, being the custodians of bulk transport and also having land at most places, should invite the private sector to participate in the management of such warehouses, attached to railheads. It is learnt that schemes are already being readied in the Ministry for such an endeavour.

IT and Telecom a Must

To implement this paradigm of decreased handling, lower wastage and lower overall cost, the freight transport and distribution sector will have to be backed by a reliable IT and Telecom setup. It has earlier been mentioned that the physical market or mandi, should be replaced by a virtual market, where commodity exchanges permit trading on line. The farmer in the village, or a co-operative setup will trade directly with the buyers. At the same time, the village co-operatives and other local bodies and individuals will also be in a position to source their requirements of other commodities, which may be stocked at the railheads, etc.

These schemes can be implemented as pilot projects in one district in the first phase and then proliferated quickly over the whole state. The advantages that will accrue in terms of stemming wastages and lowering costs will bring about a monumental change in the method of movement of distribution of commodities. Additionally, it will open up the entire world to Punjab villages to trade with and become an engine for development.

The implementation of this system will also reduce the overall transport cost by cutting down superfluous moves. For example, when commodities move from the village, during the multiple-handing cycle, they may be travelling repeatedly over the same stretch. In the proposed commodity-exchange, in a virtual mandi situation, there will only be precise movements from one point to another without any repetitive or unnecessary movement. While lowering the cost of transport, this will also reduce the congestion on the road network.

It is also seen that tractors, which are essentially designed for off- road application, move on the roads and provide, initial 15 km. approximately of transport, when moving to the mandi. The design of their tyres places heavy stress on the road surface leading to damage both to the tyre and the road. In the proposed setup, freight movement will be through vehicles designed for this purpose, which will ensure that roads last longer.

Move Towards Containerization

Movement by containers will be the standard scheme in the future. The proposed setup will start facilitating the induction of this modern system in commodity-transport in Punjab. Refrigerated containers, called 'reefers', are now commonly available and can become helpful too in the development of the agro-processing industry in Punjab. Containers will also ensure a seamless movement from production to consumption centres, whether intra-state, inter-state or international.

CONCLUSION

Punjab has pride of place among the states of India and its economic success story has stood out as an example to others. In recent times, the going has not been good, and it is high time that the state moves once again towards a cycle of sustainable growth.

It is anticipated that Punjab will move towards more economic cropping patterns, and into the area of agro-processing. This will be coupled with a conscious effort to develop the knowledge-base in information technology, and other segments of the tertiary sector.

Punjab should announce putting in place an infrastructure base that will help to meet these ambitious requirements. It is recommended that:

1. The state should give up a subsidy-based approach and move towards a techno-commercial basis for infrastructure projects.
2. Realize that users are willing to pay for services, provided the overall quality of services meets their requirements. People would rather pay for good services, than suffer a defective free service.
3. Major reforms should be brought through people's participation, not governmental diktat.
4. Induction of new technologies should not give rise to new bureaucracies, but should result in enhanced service-deliveries through process-re-engineering.
5. While the rural sector will remain important, a policy shift emphasizing the increasingly urban character of Punjab should be built into the decision-making processes.

While specific recommendations with regard to Energy, IT and Telecom and Transport have been detailed, it is strongly recommended that the above-mentioned paradigms should be embedded in the infrastructure-planning process. This will ensure the resurgence of Punjab's infrastructure, propelling it onto a sustainable growth curve.

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