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Final Report

Volume II Infrastructure Development and Growth Management Strategies

Study on Potential Development of Kutch, Gujarat

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B. Institutional Strengthening

Executive Summary: Infrastructure Development

The adequacy of infrastructure helps determine one region's success and another's failure in diversifying production, expanding trade, coping with population growth, reducing poverty and improving environmental conditions. Good infrastructure raises productivity and lowers production costs. According to a study of the World Bank, one percent increase in the stock of infrastructure is associated with a one percent increase in GDP across all the countries.

Objectives in Formulating Infrastructure Development Strategies

- To bridge the existing gaps
- To facilitate future development
- To attract investments
- To create higher standard living and working environment

Infrastructure Classification

Infrastructures			
Sr. No.	Economic Infrastructure	Sr. No.	Social Infrastructure
	Ports and Navigation		Education
	Roads		Health
	Railways		Sports and Recreation
	Airports		
	Water		
	Power		

Ports and Navigation

Ports and port related development in the region is extremely important for development of the region. The region has the second largest port of India i.e. Kandla Port, and the newly developing state of the art private port Mundra of GAPL and Mundra International Container Terminal (MICT) of P&O.

GAPL and MICT have one of the deepest drafts in the world (18.5 meters) to allow navigation of Post-Panamax Vessels and are equipped with most-modern infrastructure. Futures of these ports are bright and their impact on regional economy is envisaged to be very high with subsequent industrialisation and agglomeration.

Principal characteristics of the ports in Kutch are:

- Large, deep water and all weather ports,
- Private participation and FDI,
- Associated regional development potential.

The ports in Kutch are of great economic importance due to several advantages they possess: proximity to landlocked northern hinterland, better connectivity by upgraded National Highways System, congestion in the other large ports in the western coast and on the highways leading to these, proximity to the Middle Eastern countries and Europe, capability of capsizing large vessels for cost competitiveness, etc. The landlocked Northern India forms 42 percent of India's international trade;

ports in Kutch are the fastest approachable from this massive hinterland. The ports in Kutch are also capable of transhipment of cargo from Europe and Middle East to Far East and Australia.

A good number of port based industries such as timber and wood products, steel tubes and pipes, fertilizers, castor and edible oil manufacturing, salt and salt products etc. have been established in a surprisingly short duration of time (past three years) due to available port logistics supported by incentives in the region. It is estimated that more than 50 percent of the total future investments in Gujarat are likely to be in the coastal areas near to the ports.

Traffic in the ports of Kutch is constantly increasing. Kandla has handled 19.6 million tonne cargo in 1990 to 41.58 million tonne in 2003. This second largest port in India after Vishakhapatnam is yet not at par with the largest and fastest growing Asian ports such as Hong Kong, Singapore, Shanghai, Kaohsiung and Dubai. But Kandla will be playing a very important role with increase in foreign trade of India and have potential of transforming itself as a global major. Traffic in Mundra under GAPL also has grown several times since its inception in the late 1990s. Increase in traffic volume creates lot impact on economy of the surrounding regions. With demands for sophisticated highways and speedy rail links and creation of enormous supporting activities and their agglomeration along with ample employment opportunities can transform a region such as Kutch at par with many rapidly growing regions in the world.

Kandla, Mundra and MICT all have impressive master plans for future. Kandla is trying to make itself ready for handling a traffic of 51 million tonnes by the year 2007. It has expansion plans at Tuna with draft of 14m for handling post panamax capsizing facilities.. Similarly Mundra is planning for facilitating a capacity of 40.58 million tonnes by the year 2011 and 81.86 million tonnes by 2015. It has proposals for massive reclamation, development of at least 20 new berths with a harbour and jetties. MICT will be a container port of 1.3 million TEUs, when the second phase of its expansion plan will be executed.

Up-gradation of existing infrastructure at smaller ports at Mandvi, Jakhau and Koteshwar can support local economic development. The traditional ship building at Mandvi should be documented well for international exposure and can be a potential tourist destination and Jakhau can be a specialised small fishing port.

Development Potential: Continuous Increase in Demand

Continuous demand for traffic in the ports of Kutch is envisaged due to:

- Increasing trends of India's total demand
- Congestion in the ports in Maharashtra

Demand Supply Gap

According to the sources from KPT, the port is running at 90 to 95 percent capacity and is at higher side of capacity utilisation and potential to lead towards saturation. International norm prescribes an acceptable capacity utilisation rate at 60 percent.

Sr. No.	Years	Capacity 2004 / Planned by 2007 in mill tones	Traffic Handled 2003-04 / Projected 2007 mill tones	Utilisation Rate %	Required Capacity as par Norms mill tones
	2004	44	41.5	95	69
	2007	--	51	60	85

Capacity augmentation and achieving at the target is possible at Mundra as the port is efficient enough in handling the post panamax vessels with a deep draft of 18.5 meters.

Sr. No.	Years	Capacity 2001-02 / Planned mill tones	Traffic Handled 2001-02 / Projected 2011 mill tones	Utilisation Rate 2001-02 %	Required Capacity as par Norms mill tones
	2004	9	3.47	38.5	Adequate
	2011-12	--	40.58	60	68
	2015	--	81.86	60	136
	2027-28	--	118.60	60	198

Major Problems in Ports of Kutch

- Kandla is operating at a very higher side of port capacity
- Lack of dedicated berths for export of local commodities such as salt
- Comparative slow handing of commodities such as salt in Kandla
- Degradation of port infrastructure in Kandla – old handling system, degraded storage areas, office complex, etc.
- Slow implementation of proposed container terminal and additional berth projects in Kandla.
- Degraded living environment in the labourers' colonies in Kandla.
- Lack of township infrastructure at Kandla.
- Kandla SEZ is small and a typical old industrial park and suffers from lack of better infrastructure and living and working environment.
- The access road to Mundra is still in dilapidated condition, some portions of it are narrow and potholed.
- Lack of better road and broad gauge railway line connectivity to ports such as Jakhau.
- Lack of modern systems such as GPS (becoming unsafe due to proximity to Pakistani waters) and modern boats at the fishing harbour at Jakhau; integrated vision for development along with fish processing industries is required to be developed.
- Lack of natural draft within the traditional ports such as Mandvi and Lakhpat acts as impediments for their future development.
- Proximity to Pakistan's border is creating difficult and unsafe conditions for traditional fishermen community at Jakhau; due to lack of modern facilities and boats these are vulnerable.

Actions for Development

- Development of specialised and dedicated berths
- Modernisation of Kandla and development of Kandla – Tuna – Kandla Special Economic Zone Complex
- Feasibility and location study for a third specialised port
- Feasibility study for ship breaking, repairing and building yards
- Feasibility study for Mundra – Bhuj, Gandhidham – Bhuj road corridors

Roads and Highways

Roads are extremely important infrastructure for regional development. Industrialisation follows the best available highways and areas with the best network. On the other hand Kutch suffered for lack of a good network of roads for decades. Forget about the connectivity to its medium sized cities, small towns and villages, it was till the year 2000, when country's one of the largest ports Kandla was connected with an intermediate road with other parts of the country, which was badly congested then.

But there is a sudden transformation of the scenario since the National Highway connecting Kandla was converted into a four lane well maintained highway in 2001-02 under the National Highways Development Project. The road connecting Mundra Port has been also converted into a National Highway and has been widened and strengthened. Moreover, under earthquake reconstruction projects and under loans from the World Bank many of the state highways in the region have been recently strengthened and widened.

Today, length of roads is the longest in Kutch among the districts in Gujarat and it has 8 percent of the state's total road length. Moreover, the region also possesses the longest network of the national highways which is approximately of 11 percent of the National Highways in Gujarat. But density of roads is still lower in the region due to its large size and massive uninhabited stretches.

The western parts of the region, which is rich in terms of mineral resources still suffer from a better road network as important roads, strengthened during past few years are concentrated in the eastern and south-eastern parts of the region. On the other hand looking at the potential of the ports and recent trends of industrialisation, even in the eastern parts there may demand for more sophisticated highways with better design speed and safety parameters. The recently widened roads are not yet par to the kind of infrastructure available in the rapidly growing Asian regions.

Demand Supply Gap

Due to port related and growing industrial activities, apart from the NH8A and NH 15, traffic on many of the roads have crossed 10,000 PCU per day, which justifies their conversion into four lane highways. Few of such important stretches are Anjar- Mandvi, Bhuj-Lakhpat, Bhuj-Khavda and Bhuj-Kandla. Moreover, in many of the roads traffic volumes have been transcending the traffic capacities.

Problems Related to Road Development

- Inadequate capacities in major roads
- Requires better and sophisticated regional roads linking major cities within the region for rapid industrialisation
- Sometimes access road development for newly established industries is a problem due to land issues
- Connectivity in the western mineral rich Kutch is a problem
- Lack of internal roads in the mining areas
- Lack of internal roads in the salt pan areas

Road Development Strategies and Actions

- Strengthening trade and agglomeration support and industry linkage roads
- Strengthening port connectivity
- Salt and mining area roads

- Improving general regional rural roads
- Speed and quality; major criteria
- Feasibility for privatisation
- Integration with land development or corridor development

Actions, Required

Sr. No.	Corridors	Actions	Approximate Cost INR bill.
1	Anjar – Mundra	45 km, converted into a national highway, requires to be converted into four lane highway.	1.8
2	Bhuj – Kandla	52 km, requires to be converted into four lane highway. Comparative cost is higher as an access controlled expressway is considered.	3.1
3	Bhuj – Bhachau	70 km, requires to be converted into four lane highway.	2.8
4	Bhuj – Jakhau	84 km, requires to be converted into a standard two lane highway from existing 3.6 / 4 m. wide road.	1.2
5	Bhuj – Lakhpat	116 km, requires to be converted into a standard two lane highway from existing 7 m. wide road.	1.7
6	Mandvi – Gadhshisa – Nakhatrana	58 km, requires to be converted into a standard two lane highway from existing 3.6 / 4 m. wide road.	0.87
7	Rural Roads	Surfacing 306 km of rural roads.	0.8
8	Salt Pan Area Road Network	Form salt pan infrastructure committee with government participation. Length to be decided by salt pan area plans prepared in co-ordination.	NA
	Total All Roads		12.27*

* 8 not included.

Railways Infrastructure

Similar to the road infrastructure Kutch also suffers from lack of better rail connectivity. The region only had a metre gauge network till the late 1990s connecting the medium sized cities and small towns. The first gauge conversion was carried out by the Indian Railways, which converted the Bhuj-Gandhidham-Kandla-Ahmedabad metre gauge line to a broad gauge one. It provided direct connectivity to long distance passenger trains and carriage trains from Kutch to other parts of the country. Subsequently a new station at Bhuj and up-gradation of the stations at Gandhidham and Bhachau was taken up.

Typical characteristics related to development of railways in Kutch are:

- Low passenger traffic demand
- Very recent development
- Interests of private companies and other organisations for railways development
- Great potential of cargo traffic to be generated by the ports

Within a short duration of time Gujarat Adani Port Ltd has built the country's longest private railway track (67km) from Mundra Port to Adipur near Gandhidham and recently in late 2003 a new special purpose vehicle called Rail Vikas Nigam has been established with participations from Indian Railways, Kandla Port Trust, Gujarat Adani Port Ltd and Government of Gujarat to develop a broad gauge railway line connecting Gandhidham to Palanpur for a distance of 313km.

But after these developments, the situation in the western Kutch has yet not changed with the same old metre gauge network and insufficient related facilities.

In the recently held Vibrant Gujarat Investor's Summit 2005, the Rail Vikas Nigam has also signed a MoU for Bhildi-Samdari Gauge Conversion, 300 Cr., 223 km, which will substantially shorten distances to North India.

The railway budget of 2005-06 also has allocated funds for Bhuj – Naliya Extension to Baranda in the Lakhpat taluka to connect major mining areas in the western Kutch.

Problems and Potentials

- Due to smaller and scattered settlement pattern and lack of threshold population, passenger transportation in all parts of Kutch will not be viable
- Viability of railways in the region will be dependent only on goods transportation
- But gradual agglomeration of activities and increase in population in Bhuj and Gandhidham shall push passenger rail transportation demand upwardly
- Due to development of Mundra port and Mundra SEZ along with other industries in the region a primarily cargo based sophisticated rail transportation system can be viable and it may later provide opportunity for running some passenger trains as social responsibility.

Possible Measures

- Extension of BG line to connect, Bhuj - Naliya – Jakhau
- Possibility of double decked goods transportation system for efficient cargo transportation
- Possibility of RVN's role with more partners

Airports and Linkages

Bhuj is the only operational airport in Kutch and handled 60,000 passengers in 2001-02, which is only 5 percent of the state. Bhuj airport handled 44 tonnes of cargo in 2001-02, which is only 0.4 percent of the total cargo movement by air from the state.

During past few years Kutch has experienced rapid inflow of investments. New initiatives such as the Mundra Special Economic Zone shall create demand for better aviation infrastructure and connectivity in near future. Many investors in the region have demanded renovation and revitalisation of the Kandla Airstrip. Moreover, with privatisation, and entry of cheap airlines in to the market these airports are potential of generating better demand.

Estimates of Air Traffic at Bhuj Airport

The aviation master plan has incorporated historical trend analysis and best judgment through stakeholder discussions for forecasting traffic at airports with scheduled flights such as Bhuj and O-D Survey results, model shift potentials and stakeholder discussions for predicting potential air traffic from the new airport sites. The estimates given below are based on the model shifts of traffic from road and rail to air.

Table 9.86: Aviation Traffic Forecasts for Bhuj Airport (PAX)

Type	Projection		Probable Growth Rate
	2005	2015	
Passenger	68300	101100	4%
Cargo (tonne/annum)	50	80	

Source: GIDB, Aviation Master Plan for Gujarat State 2004

Air traffic from individual airport is related to sub-state level economy such as city economy or regional economy. For Bhuj airport traffic, therefore economy and investments in Kutch will be more important determinant than Gujarat's economy.

The estimates for 2011 envisages a total investment of around INR 320 billion potential of generating additional 1, 50,000 total employment. This will significantly change regional economic dynamism inclusive of demand for air traffic. GDP and per capita income for Kutch have been estimated for 1998-99 and 2001-02 and it shows annual per capita income increase of around 7 percent. A relationship has been established between per capita income of Kutch and aviation traffic of Bhuj (Kutch as Kandla airstrip's share was less and was for only few years) and the basis of it the air traffic is estimated at 1, 37,719 in the year 2011. Therefore, it is envisaged that the investment of INR 150 million for up-gradation of Bhuj Airport proposed by 2015 in the plan may be reconsidered for 2007-08.

Airport Infrastructure and Air-linkages Development Strategies

- Development of Kandla air-strip and private sector participation
- Luring cheaper airlines
- International airport by 2020 (development process starts from 2015).

Power Infrastructure

In Kutch the existing Panandhro thermal power plant under Gujarat Electricity Board (GEB) has an installed capacity of 215 MW, which is a lignite based plant. Expansion of Panandhro plant with an additional capacity of 75 MW is presently under consideration. GMDC is also currently implementing a lignite based power plant in Akrimota with a capacity of 250 MW. Moreover, Adani group, which is developing an SEZ in Mundra, may opt for or facilitate setting up an imported coal based power plant and distribution activities.

Continuously increasing power demand at the state and national level and increasing industrialisation in the region with ambitious special economic zones justifies utilisation of imported coal and LNG for increase in power generation capacity in the region. Private players can be also attracted due to advantages in the special economic zones and available resources. Wind power is also a great potential in the region. The region has become one of the important regions on Wind Energy map of India. Few large wind power projects have already been proposed in the region (500 MW Project by Suzlon Energy and 250 MW by NEG Micon). NEG Micon is in fact implementing 50 MW wind farm at Surajbari. Suzlon Structure (Division of Suzlon Energy) is implementing a project to manufacture tubular towers in the region.

From the situation analysis, it can be concluded the he high power densities and wind speeds (at 50m) at following sites are well suited for large wind power generation projects.

- Adesar
- Kukma
- Surajbari

The option of proliferating wind power generation to meet energy needs of rural Kutch is full of promises. A 500 MW Wind power project at 20% CUF have potential to generate about 1000 Million Units, which along with other renewable energy options can meet the energy needs of the rural regions of Kutch to a large extent.

Apart from generating wind power, the prospects are also there for the wind turbine manufacturers to set up their manufacturing base (for turbine and turbine parts manufacture) in Kutch in view of special incentive package available to projects in Kutch.

Moreover, due to unique geomorphologic conditions Kutch also enjoys potential of tidal energy production. World energy council has enlisted two sites in India viz., Gulf of Kutch and Gulf of Khambhat for tidal energy production. The studies estimate around 915 MW of potential energy capacity.

Assessment of Power Demand – Supply Gap

Demand for power has been estimated through developing two separate scenarios. Firstly samples of industrial consumption patterns have been studied and relationship between industrial investments and power generation requirements is established. It is estimated that at a safe side, for every INR 200 million investments 1 MW power generation capacity should be established. In that case by 2011 for an estimated investment of INR 320 billion additional requirement for generation of power for only industrial purposes will be approximately 1600 MW, which will be increasing to 2100 MW in 2015.

Satisfying future industrial demand for power in the region will be extremely important. Due to availability of ports and also due to favourable natural conditions, power generation in Kutch can be based on imported LNG, coal and wind power. The future industrial requirement for the year 2011 can be fulfilled adding new capacities through the following ways:

Sr. No.	Source	Capacity (MW)
1	LNG based power plant (refer LNG terminal)	1000
2	Imported coal based plant	500
3	Wind power	500 (20% will be available)
	Total	1600

Water Infrastructure

The region is water scarce and basically ground water dependent. But a major project taken up to supply piped water from Narmada canal has created a lot of hope in the region. The project is funded by the Asian Development Bank and being implemented by the state agencies, Gujarat Water Supply and Sewerage Board and Gujarat Water Infrastructure Ltd. The first phase which is under implementation is to develop a piped water supply network with related infrastructure covering 227 villages and towns in central, central western, south eastern and in eastern Kutch. The trunk lines and majority of the distribution network have been constructed. During mid-2003, water supply commenced in Bhuj and is awaited in other towns and villages in a short duration of time. By the year 2006, the second phase of the project will be implemented covering the western parts of the region.

There is great potential of establishing desalination plants in the region. Sanghi Industries ltd has already established its desalination plant and is successfully operating.

Assessment of Domestic Water Demand and Supply Gap

Due to scare supply from surface and ground water sources, in future it is anticipated that the Narmada water will be the major potential source of water in the region. The design flow of Narmada pipe line is 236 MLD (year 2021), which is sufficient to fulfil the projected domestic demand.

Table 9.87: Assessment of Demand Supply Gap of Domestic Water in Kutch

Year	Demand (MLD)			Supply Status	Remarks
	Urban	Rural	Total		
Present (2004)	71.8	75.5	147.3	Adequate	Ground water, surface sources and Narmada water is used
2011	93.8	80.5	174.3	Adequate	Narmada water based project will be completed by 2006 to cater to the whole district
2021	122.1	86.7	208.8	Adequate	Narmada pipe's design flow for year 2011 is 236 MLD

Source: DMM estimates, GWSSB, gidb.org
Note1: Estimates for 2011 are based on GWSSB population projections.2 Source for 2021.estimates is gidb.org

Assessment of Existing Industrial Water Demand and Supply Gap

As per data on October 2004, a total 60 connections, fulfilling a water demand of approximately 60 MLD has been approved by GWSSB and GWIL for different industries located in Bhuj, Gandhidham, Anjar, Bhachau, Mundra and Mandvi talukas. Main corridors along which industrial connections are being commissioned are Malia- Samakhiali- Bhachau- Gandhidham, Bhachau- Sikra- Amardi, Varsana- Bhimasar- Varsamedi- Anjar- Kukma and Loria- Bhirendiara- Khavda. Except this Narmada water is also supplied to some other industrial establishments like Kandla Special Economic Zone, Kandla Port Trust and IFFCO, Gandhidham etc. Many of the industries have their own bore wells and some of the large industries like Sanghi have their own desalination plants.

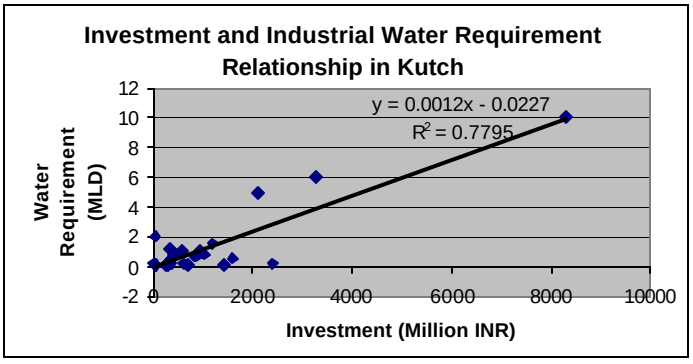
Table 9.88: Assessment of Demand Supply Gap of Industrial Water in Kutch

Year	Demand (MLD)	Supply Status	Remarks
Present (2004)	94✦	Inadequate	Demand has been estimated for projects commissioned and under implementation from 2001 to 2004
2011	380	Inadequate	Reservation for Industrial water in Narmada supply is 45 MLD for year 2021

Source: DMM estimates, GWSSB, INDEXT-b
✦Industrial demand has been estimated on the basis of water requirement pattern of existing industries

Assessment of Future Industrial Water Demand

A linear regression model has been developed on the basis of industrial investment and demand of water looking at present trend. As per iNDEXTb data from August 2001 to June 2004, projects worth of investment of INR 78943.2 million has been either commissioned or under implementation in Kutch. Substituting this value in the following equation, derived from the linear model (see. scatter diagram) below the water demand generated by the new industrial projects (commissioned and under implementation) in Kutch is estimated to be 94 MLD till June 2004. As per this relationship, for the estimated investment of approximately INR 320 billion in the year 2011, the water demand is likely to be approximately 380 MLD. On the other hand, studies of various industrial estates and stand alone units in Gujarat suggest 1 MLD of water demand is usually generated by an investment of around INR 1000 to 1500 Million of investment. Assuming that water intensive industries will not be attracted to the Kutch due to comparative higher cost of water, therefore, additional water demand can estimated at 300 MLD of against an estimated investment of INR 320 billion by 2011.



Y = 0.0012 x -0. 0227, Value of R2 =0.7795

Strategic Options for Fulfilling Industrial Water Demand Supply Gap

- Increase reservation of industrial water from total supply of Narmada pipe line. This can be a short term temporary solution and may result into shortfall of domestic supply by 2021.
- Increase reservation of Narmada water for Kutch as a whole. Although it has a limit of 236 MLD for year 2021, a substantial may fulfil the requirement.
- Set up desalination plants, at least with a capacity of 150 MLD. For long run solution of the industrial water desalination plants are the most viable option. Estimated cost for a 150 MLD plant is approximately INR 6 billion.

Issues and Action

- Supply to stand alone industries is a problem, with duplication and un-necessary extension of supply lines. Industrial area plans or zoning is an urgent necessity. The corridor development plans proposed in the spatial development strategies can help in mitigating the problem.
- Setting up of desalination plants is a viable option. Initiative of setting up of desalination plants may be promoted in public private partnership. Large stand alone units can develop their own requirements or group of large and medium or even small units may participate in development of a large-scale plant. A good amount of water can be also spared to domestic demand for industrial workers and near by villages. Sanghi industries ltd has already set up an example.
- Prepare water supply and use policy for industries. Industrial approval in Kutch should be based on water use policy for industries. To ensure a sustainable industrial development it is necessary to keep a check on the water intensive industries in the region. The industrial proposals should be reviewed for their water demand and

probable sources of water to be used by the industry. Exploration of ground water by industries should be restricted, especially in already overexploited areas. But provision of industrial water is essential for attracting industries.

- Generate degraded water resources. Region, which is known for overexploited ground water resources, needs immediate attention for ground water recharge. Rainwater harvesting by industrial units and residences may contribute to fulfilment of micro level demand of water till some extent.

Case of Desalination

Currently over 12,500 industrial scale desalination units are operating worldwide. Continuous progress in desalination technology makes it a prime, if not the only, candidate for alleviating severe water shortages across the globe. Moreover, desalination costs are competitive with the operation and maintenance costs of long-distance water transport systems.

The current installed capacity of desalination plant has been estimated at about 10,000 MGD globally. Different technologies have been in operation depending on effectiveness and economics in local conditions, i.e. Membrane Processes (Reverse Osmosis and Electro-Dialysis) and Thermal Processes (Multistage Flash Evaporation, Vapour Compression and Multi effect evaporation).

Desalination Plant in Kutch: Sanghi Cement Experience - Case Study

M/s. Sanghi Cement Limited is operating 5.5 MLD desalination plant. Out of the total capacity of 5.5 MLD, approximately 3.3 MLD is for meeting captive needs and 2.2 MLD for supply to nearby villages to meet their drinking water requirements.

The ballpark estimate of unit cost of desalination water (worked out on the basis of basic details provided by M/s. Sanghi Cement) from Sanghi Plant has been as estimated in the following table.

Unit Cost of Desalination Water (Sanghi Cement)

Capacity	5.5 MLD
Investment	20.00 Crores
A. Operating Cost	Rs/KL
- Chemicals	1.89
- Power	6.53
- Steam	25.16
- Maintenance @4% of Capital Cost	3.99
- Labour	0.5
- Administrative Charges	0.2
Sub-Total (A)	38.26
B. Fixed Cost	
- Finance Charges	9.86
Sub-Total (B)	9.86
Total Cost (Rs/ KL)	48.12
Basic Data / Assumptions:	
- Power Consumption	2.21 KWH/KL
- Steam Consumption	0.117 MT/KL
- Power Cost	Rs.2.90 /KWH
- Steam Cost	Rs.215 / MT
- Maintenance Cost	4% of Capital Cost
- Finance Cost	15% Interest on 2/3 Investment

The option of desalination is no longer considered as an expensive luxury. With the advent of different technology options to suit different local conditions, desalination has become a viable and economic solution for ensuring water supplies in different regions. Desalination costs have been continuously decreasing over the years as a result of advances in system design and operating experience, and the associated reductions in specific unit size and specific power consumption.

So far, the experience of desalination plants operating in Gujarat (i.e. M/s. Reliance and Sanghi) has been very encouraging. These plants, apart from meeting their captive requirements, are supplying drinking water to number of villages in the vicinity.

Telecommunication

Teledensity of Kutch was 6.4 in 2002 (Ahmedabad 10, 2002). Kutch constitutes only 3.5 percent of state's telephone connections. Number of pending connections in Kutch was 17.8 percent of the state's total pending connection, which reveals comparative regional inefficiency.

Table 8.21: Comparative Scenario of Telecommunication, Kutch and Gujarat

Region	No. of Exchs.	No. of Stns.	Equppd. Capacity	Working Conn.	Obs Pending	Waiting List	Demand	STD STA	% Utilization
Kutch	227	157	131540	103696	3995	3995	107691	157	78.83
Gujarat	3236	2168	3496664	2833880	22370	52725	2856250	2136	81.05

Source: Gujarat Telecom Circle, 2002

Problems

- Land line connectivity to the potential industrial areas is not available completely.
- Many of the stand alone industries even in a taluka such as Bhachau ar e not yet provided telephone connections.
- Single unit and lack of residential density does not make land line connections viable in majority of the areas.
- Inadequate coverage of mobile telephony network.

Possibilities

- The corridor development plans shall create sufficient agglomeration of industrial units and residential population, which will create conditions for commercial viability of providing land line telephones and broad band internet.
- Attract mobile telephony players through demonstration of industrial growth and its potentials.

Social Infrastructure: Health

Kutch has 37 PHCs; only 3.83 percent of the total of in Gujarat. But the region has 2.4 PHCs per hundred thousand persons, against the same for Gujarat at 1.94, which is a better figure. There are also 8 community health centres and 217 sub centres (2002). The total number of hospital beds available in the region is 1305, Hospital beds to population ratio in the region is 0.82 per thousand population, slightly higher than state's at 0.79.

But the recent annexure of hospital infrastructure during the earthquake reconstruction period has the potential to lead the region towards a sophisticated and modern health care age. In Bhuj a 300+200 bedded hospital with two nursing schools, 50 seated medical college and a tertiary care unit has been

completed. In Gandhidham a 100 bedded hospital has been reconstructed at a cost of INR 40 million. 3 community health centres, one each in Bhachau, Rapar and Lakadia have been constructed with a cost of INR 30 million each. The mental hospital in Mundra has been reconstructed by JICA at a cost of INR 4 million. As per an estimate INR 4.2 million has been channelised through GSDMA towards revival of health care facilities in the district, while a total of INR 264 million have been received by the NGOs for the same.

Assessments of health infrastructure show that maximum facilities are available in Bhuj, Gandhidham, Anjar and Bhachau taluka. Abdasa, Nakhatrana and Lakhpat talukas are backward in term of health infrastructure. But there is deficit of health infrastructure in the region, if UDPFI norms are considered. There will be demand for 11 general hospitals and 21 intermediate hospitals in Kutch by 2011.

Health Infrastructure Requirement Based on UDPFI Norms

	Population per unit
Dispensary	15000
Intermediate Hospital	100000
General Hospital	2,50,000

Table 9.95: Health Infrastructure Demand in Kutch 2011

	Requirement of units
Dispensary	140
Intermediate Hospital	21
General Hospital	8

Actions Required for Health Infrastructure

- Industrialisation in Kutch will influx population in Gandhidham, Bhuj and other urban areas it will necessary to provide access to quality of medical facilities. Initiative can be taken by encouraging renowned hospital chains to set up state of art hospitals in strategic locations through providing incentives in the form of making land available at concession rates. If using the available infrastructure, a world class hospital specialised in few aspects can be created and foreign patients can be attracted such hospitals can be made feasible.
- Facilities, amenities and sophistication created in the Bhuj Hospital are normally not present in the very good hospitals in larger cities. It is even better equipped than many of the famous hospitals in cities such as Mumbai. Partnership with doctors and medical institutions in these cities can be created through providing space for operations and treatments of higher order.
- A health infrastructure management plan can be a good option for running available non-functional infrastructure and in maintaining these. Industries in the region and those willing to enter into the region can participate in such an initiative, as these will bring demand for health facilities for their workers.
- Mundra SEZ and other future large scale/ Mega industrial initiatives would promote better health care facilities. This added advantage to society if such large plants are attracted to the region

Social Infrastructure: Education

In 2001-2002, there were 1388 primary schools in Kutch. There are 92 primary schools per hundred thousand persons in the region which is the 9th highest amongst the districts in Gujarat and is much

higher than the state's figure at 79. The teacher to primary student ratio in the region is 40, which is slightly lower than that of state's figure at 42.3.

Intra-regional distribution reveals that number of primary schools per hundred thousand persons is the highest in Lakhpat Taluka (183) and the lowest in Gandhidham (17). In 2001-2002, numbers of secondary and higher secondary schools were 174. The secondary/higher secondary teacher to student ratio is 37, which is almost the same as of Gujarat. The figure is the highest in Abdasa taluka (44.1) and the lowest in Rapar (25.2).

Kutch has limited higher educational institutes; only one engineering college (degree level) in Bhuj with an intake of 113 students per year, two diploma level engineering colleges, a pharmacy college, a diploma business school. Moreover, there are 5 industrial training institutes located in Gandhidham, Lakhpat, Mandvi, Bhuj and Rapar, with a total intake of 672 students. A Kutch University is recently established in Bhuj.

Reconstruction of 3603 schools has been completed by the NGOs (January 2003). Expenditure of INR 638.9 million has been carried out including INR 551.6 million by the state government (31 December 2003) through GSDMA for reconstruction and strengthening of educational infrastructure in Kutch. A total of INR 59.7 million has been raised by different non government organizations for education sector, out of which 56 percent has been utilised.

But there are vacant teacher's posts and non-functional school buildings. As per a survey conducted by FICCI-CARE 22 percent of the posts of teachers in Anjar, 40 percent in Bhachau and 30 percent in Rapar are vacant. Another survey conducted by the Setus, approximately 10 percent of schools having permanent building and 17 percent of the schools having interim structures are not functional.

Assessment of Educational Infrastructure in Kutch

Assessment of primary and secondary schools at the taluka level indicates that there is a serious deficit in the number of secondary schools in Bhuj and Rapar taluka (13 against 46 required in Bhuj and 2 against 26 required in Rapar). According to UDFPI guidelines, for every 7500 population 1 secondary school is needed with strength of 1000 students. According to the norm, Kutch requires 211 secondary schools as against a present total of 49 present in the district.

UDPFI Guidelines

	Population Per Unit
Primary School	2,500
Senior Secondary School	7,500
College	125,000
Engineering/ Medical College	1,000,000

Table 9.94: Taluka-wise Assessment of Availability of Primary and Secondary Schools

Taluka	Population (2001)	Primary School			Secondary School		
		Required	Present	Surplus/ (-) deficit	Required	Present	Surplus/ (-) deficit
Lakhpat	50120	20	92	72	7	2	-5
Rapar	198000	79	224	145	26	2	-24
Bhachau	147891	59	129	70	20	3	-17
Anjar	160292	64	84	20	21	3	-18
Bhuj	345013	138	258	120	46	13	-33
Nakhatrana	129249	52	154	102	17	4	-13
Abdasa	97508	39	161	122	13	2	-11
Mandvi	170573	68	159	91	23	7	-16
Mundra	83010	33	92	59	11	1	-10
Gandhidham	201569	81	35	-46	27	12	-15

Source: District Statistical Handbook Kutch, 2001-2002 and DMM Analysis

On the other hand, the problem area in education in Kutch is according to a survey carried out by the FICCI-CARE is vacant teacher's posts and non-functional schools. 33 percent of the total teachers post in primary schools is vacant. Situation is the worst in Bhachau, where 40 percent post are vacant.

Actions, Required

- Extension of primary education in the hamlets and stress on higher secondary education should be the basic focus area for the region. Approximately 150 new higher secondary schools are required in the region.
- Education infrastructure has been improved after the earthquake. Many funding agencies and non government organization are engaged in repair and construction of new school buildings in urban and rural areas.
- A permanent structure for grass-root level initiatives (by various NGOs, CII, etc) for education extension is required to continue these initiatives for long run.
- Building up of linkages between the existing technical institutes and industries within the region is an important aspect to be considered.
- Quality schools such as Delhi Public Schools and Amity Schools should be encouraged to establish their branches in strategic locations. Industrialisation will lead to influx of skilled workers from out side, which will increase the demand for new quality schools. Industries can also participate in this attempt if an integrated policy is derived and an effective platform is created. Mundra SEZ and other future large scale/ Mega industrial initiatives would promote schools. This added advantage to society if such large plants are attracted to the region
- A long term strategic plan for tertiary education with the perspective of industrialisation should be prepared, before designing courses and curriculum of Kutch University. Specialised courses of national level demand under Kutch University through participation of industry and business (e.g. furniture design, marine engineering, industrial design, engineering, etc) can be introduced and brilliant students from all over the country and other South Asian countries can be attracted for improving quality and increasing income. Research and industrial linkages is extremely important.

A marine and geologic research institute of higher excellence can be a viable option for satisfying tertiary education needs in the region

Social Infrastructure: Sports and Recreation

The region suffers from sports and entertainment infrastructure. In 2000-2001 there were only 13 cinema halls in Kutch, with 5300 total seat arrangements. These halls are old and insufficient in terms of infrastructure and better environment. Recently a modern multiplex with three screens has started functioning in Gandhidham.

The region also suffers from lack of sport infrastructure. Only Gandhidham has an indoor stadium and a good playground in Kandla Port Trust colony. Development of Special Economic Zone in Mundra can play an important role in development of sports and entertainment infrastructure in the region.

The museum in Bhuj was one of the best in Gujarat, with many valuable displays, but the earthquake has severely destroyed its building.

Actions Required

- A Kutch International Desert Car Rally is good option for taking up as an annual mega-event, which will not only develop sport enthusiasm, but also assist in tourism development and creation of regional impression.
- Water sport facilities are a viable option if Mundra and Kandla SEZs or any private group participates. Places like Mundra, Mandvi and Jakhau may be good options for these. In development of such sport, there is a great potential for integrating with tourism development.
- Moreover, initially an indoor stadium each in Gandhidham and Bhuj will be able to cater to needs for sports. A participatory framework with private partners can be derived to develop such facilities.
- All higher secondary schools to be built with a medium sized playground (minimum) and sport utilities.
- New course on physical education is a good option to introduce in Kutch University, which will increase interest of youths in sports.

Proposed Infrastructure Development Actions, Timescale and Implementation Procedure

The proposed infrastructure development initiatives are arranged in a timescale for project integration and effective implementation. These follows logical need based sequencing. Refer the Annexure I for the detailed infrastructure development actions, timeline and implementation procedure.

Executive Summary: International Models and Adaptability

Defining a Trade / Business Hub

A tertiary activity predominant region with highly agglomerated economies developed due to fiscal policies, successful international trade (with large volumes of exports and re-exports), large investments, a strong manufacturing activities (hi-tech manufacturing and research within and general in surrounding region) and usually a city of international order with state of the art infrastructure, conglomeration of educational and cultural activities and a major destination of tourists.

Trade Hubs in Asia and their State of Development

Trade / business hubs in Asia are the wonders of the later decades of 20th and 21st century and their growth is unprecedented in the economic history of the world. The trade hubs in Asia can be divided into two groups, firstly the well established ones in Japan, South Korea, Taiwan along with Singapore, Hong Kong and Dubai and secondly the emerging hubs in the countries such as China, Malaysia, Indonesia and Thailand.

Table 10.2: Development Time Scale

Sr. No.	Regions	1950	1960	1970	1980	1990	2000
1.	Tokyo-Osaka						
2.	Seoul Capital Region						
3.	Taiwan: Taipei						
4.	Singapore						
5.	Hong Kong						
6.	Dubai						
7.	Shenzhen / PRD						
8.	Shanghai Region						
9.	Beijing City Region						
10.	Bangkok						
11.	Kuala Lumpur						
12.	Manila						
13.	Jabotabek						

Key Observations, Strategies and Their Concept Details

The key observations from the detailed cases and also from literature review of other trade hubs in Asia lead to identification of nine key strategic areas or conditions required for development of these regions. These are:

- Availability of mega-cities and urban focus for development
- Adoption of international trade and export driven growth model
- Support from national level economic policies
- All the regions and transformed or transforming towards tertiarisation from initial manufacturing base
- Availability of fiscal incentives, systematic industrialisation and business agglomeration
    - Strategies for developing FTZs and free ports

  - Strategies for developing Special Economic Zones
  - Strategies for developing technology parks and knowledge parks
- Heavy investments in infrastructure
- Availability of international standard urban quality of life
- Stress on institutional planning and development
- Adoption of place marketing and branding strategies

Key Strategic Areas Identified for Kutch

- Focus on spatial agglomeration and urban development
- Creation of a regional trade accounts system
- Strong relationships between regional resources (as additional advantages) to the economy of the proposed business hub
- Integration of regional economy with Special Economic Zones
- Stress on development of manufacturing including agro-processing
- Systematisation of development of manufacturing activities (for large units) with parks, zones, etc
- Tourism development
- Infrastructure development
- Urban planning (also new towns) and development
- Regional leadership and co-ordination among the stakeholders
- Place marketing and branding Kutch

A Vision for New Kutch; the 21st Century Business Hub

Kutch will be a vibrant region with multi-nuclei hierarchical urban areas as enterprise hubs / business nodes with high speed linking corridors and modern ports. Manufacturing clusters and specialised manufacturing clusters with state of the art infrastructure along the high-speed corridors ultimately to intensify tertiary activities in the nodes and increase population concentration. State of the art urban and port based recreational activities and eco-tourism shall bring large-scale tourists and related activities.

Kutch is a competitive region, where people love to live and work; a new Asian leader in trade with productive economy and is the envy of the South Asian regions; comprises of cleanest cities and industrial areas. It is easy to get around and is a place with a soul. Regional development initiatives facilitate identifying common values, build trust, develop collaborative solutions and engage the community at all levels. Everything in Kutch means business and higher quality of life. It's about a vision. But it's also about practical application, hard work, being able to measure the results and show that they contribute to making Kutch the place one loves to live and work.

Development Strategies

Kutch requires, spatial agglomeration of economic activities and population concentration, as dispersed, low population and scattered industrialisation will not be able to provide the optimum condition of exploiting the maximum advantages.

It also requires strong integration between local resources available as an additional advantage with the new environment of intensification of new activities, it requires integration of SEZ's and regional economy, systematic development of manufacturing and special facilitation, focus on tourism, infrastructure, urban planning and development, regional leadership and co-ordination, branding and marketing system, regional trade accounts, etc.

We propose a hyper-growth model; hyper-growth as we aspire to achieve it by 2021. The hyper-growth model is dependent on three basic strategies: continuous flow of minimum 5 thousand crores of annual investments in the potential sectors till 2021 and on 15 years of infrastructure planning and development and a growth management programme.

Three focus areas are identified:

- Firstly, strategies for urbanisation to support specialisation and diversification of trade, attracting investments in hi-tech and quaternary industries and for developing areas with higher quality of life.
- Secondly, to adopt corridor development strategies for attracting manufacturing investments and cost effective and systematic facilitation of ind infrastructure
- Thirdly, institutional strengthening for attracting investments and supporting and manage systematic growth.

The development actions have been identified under three separate groups addressing of all the sectoral development needs, a development support system and spatial policy and planning initiatives.

Table 10.6: Development Action Groups

Sr. No.	Action Groups	Strategies
1	Sectoral Actions (Volume I, Part - II)	Attract minimum INR 50 billion / INR 5000 Crores of investments per annum till 2021. The potential sectors of investments are identified in the agricultural, industrial, tourism and business potential studies (Volume I, Part II). Investments to be attracted through: ▪ Vibrant Gujarat ▪ Vibrant Kutch ▪ Strategies through branding and place marketing (proposed in Action Group 3) ▪ Infrastructure and urban development projects (in Action Group 3) to support.
2	Infrastructure Development Actions (Volume II, Part I)	Develop infrastructure to support attracting and sustaining the proposed pattern of investments.

		Infrastructure development strategies and actions are included in the infrastructure Development chapter. Projects, according to specific sub-sectors in a time line have been identified along with an implementation procedure.
3	Growth Management Actions	
	▪ Framework for Spatial Development and Strategies (Volume II, Part III- A)	Focuses on spatial system's development through zoning, Hierarchical urban system, environmental protection, equitable social justice and spatial development management system and works in an integrated way with the sectoral strategies. ▪ Urban development and agglomeration strategies ▪ Corridor development strategies Section 1.01 Corridor cadastral information system Section 1.02 Corridor land uses and transportation plan Section 1.03 Corridor infrastructure development plan
	▪ Actions for Building up of a Development Support System / Institutional Strengthening (Volume II, Part III- B)	Institutional strengthening covers institutional support arrangements and prime actions to be undertaken. Brand development for Kutch and initiation of place marketing for tourism and investments attraction for industries and services. Development of a Kutch Resource Information System.

Executive Summary: Urban and Corridor Development

Spatial organisation is the most important criteria for a systematic and strategic attempt for developing Kutch as a business hub with intensification of businesses, attracting investments and allowing manufacturing to grow.

The actions are to be taken are under two specific types of strategies:

- Urban development strategies and
- Corridor development strategies.

These strategies will primarily depict how systematically land uses and transportation decision can be taken, how industrial location decisions can be facilitated and how infrastructure development cost can be optimised and increase tertiarisation through agglomeration of population and activities.

Urban Development Strategies

Urban development strategies are important as massive investments in secondary and tertiary activities shall lead to unprecedented increase of non-agricultural population. Non-agricultural population and higher density due to agglomeration will create growth of urban population. Present trend of industrial location decision making supports that such a phenomenon in and around Gandhidham and Bhuj are to be of very high intensity.

Advantages of Urban Development Strategies

Urban development strategies are to be extremely advantageous for the region. The principal advantages are:

- Growth of urban population is certain; pre-conceptualising it and being prepared for will assist in preventing negative forces related to urban population growth such as infrastructure inadequacy, growth of slums, costly development, congestion, etc.
- Formulation of urban plans will provide framework for land uses and transportation decisions; commercial and trading areas can be specifically planned, regionally important industrial areas can be systematically developed within the cities.
- The strategies shall provide precise land information if the base map for the urban areas are prepared considering precise cadastral data.
- Specific strategies can be formulated for attracting certain activities, services and investments.
- High class urban infrastructure and built-environment can be facilitated in a limited area; on one hand limiting cost of development and on the other creating state of the art places.
- This will also boost private investments in real estate and infrastructure development.
- Provides quality social infrastructure for original population, investors, skilled labourers, etc.
- Provides opportunity for international business dealing and negotiations.
- The strategies will promote urban tourism and increase in regional income.

- Good cities to increase overall attraction to the region as a whole and will create a brand identity and pride.

Key Urban Development Strategies

- Strategy to plan and develop the Greater Gandhidham Urban Complex.
- Strategy to integrate Bhuj Urban Development Authority's initiatives with regional economic development policies and timeline for revised plan for Bhuj.
- Strategies for other urban areas.

Major Components

Greater Gandhidham Urban Development Plan (GGUDP) to incorporate:

- A base map with cadastre details, land use and transportation and city infrastructure development planning
- Delineation of CBD area and town planning scheme areas
- Bye laws for development for GGUDA area

Greater Gandhidham Central Business District planning to incorporate:

- A base map with cadastre details, land use, transportation and traffic planning, CBD infrastructure development planning
- Specific bye laws for development and urban design and guidelines for architectural designs and landscaping
- Privatisation and marketing plan

Town planning schemes are to be prepared for suitable areas in the GGUDA area in a phase wise manner prioritising development options. These schemes can be of following types:

- General TP Schemes.
- TP Schemes prepared for only industrial or institutional uses areas

The components of Bhuj urban development strategies are:

- BhADA develops partnerships with industries, business houses or any other investors for area specific development plans and programmes.
- Prepares a separate tourism development plan for the city.
- Create land mark structures or places and sport infrastructure.

The components of urban development strategies in other towns:

- Preparation of sustainable urban development plans for Mundra, Mandvi, Rapar, Nakhatrana and Lakhpat (Bhachau and Rapar have plans and area development authorities) with tourism development strategies (wherever applicable).
- Adopt local institutional strengthening programmes.

Proposed Urban Development Actions, Timescale and Implementation Procedure

The proposed urban development initiatives are arranged in a timescale for project integration and effective implementation. These follows logical need based sequencing. Refer the Annexure I for the detailed urban development actions, timeline and implementation procedure.

Corridor Development Strategies

There is a typical pattern of industrial location decisions in Kutch. A closer look on the pattern location decision of the commissioned and under implementation industries (2001 to 2004) reveals that it follows a typical pattern of corridor alignments connecting the major urban areas. Bhachau – Gandhidham, Gandhidham – Anjar – Bhuj and Bhachau – Bhuj are the most important three corridors, where majority of the industries are being located.

Advantages of the Corridor Development Strategies

- Corridors shall provide precise land information to the entrepreneurs.
- Limited area of the corridors shall provide cost effective and quicker development of the land information system.
- Shall provide framework for land use, transportation and infrastructure planning.
- Limited and defined area shall provide cost effective planning and implementation of infrastructure.
- Shall avoid duplication and unnecessary costlier extension of infrastructure.

Key Corridor Development Strategies

- Identification and delineation of six corridors and areas under these and notification
- Develop three highways (also refer road section of infrastructure development)
- Preparation of corridor development plans.
- Using land pooling as the technique wherever applicable (as per the development plan guidelines) and preparation of detailed industrial zone plans.

Content of a Corridor Development Plan

- A base map with cadastre details and a corridor land information system
- Land use and transportation planning and corridor infrastructure planning
- Delineation of land pooling areas for industrial zones (as in the land use plan).
- Bye laws for development for corridor area and a privatisation and marketing plan.

Proposed Corridor Development Actions, Timescale and Implementation Procedure

The proposed corridor development initiatives are arranged in a timescale for project integration and effective implementation. These follows logical need based sequencing. Refer the Annexure I for the detailed corridor development actions, timeline and implementation procedure.

Focus on the Intensive Activity Zone

In the later stages the urban areas and the industrial corridors together shall form an intensive activity zone in the talukas of Gandhidham, Anjar, Bhachau, Bhuj (southern part), Mundra and in Mandvi. Advantages of this intensive activity zone shall be:

- Creating conditions of urban and industrial agglomeration.
- Preventing haphazard industrial growth and ensuring environmental sustainability.
- Lowering down of infrastructure development and management cost.

Therefore, focus on this intensive activity zone shall be beneficial for meaningful spatial organisation of activities in the region and shall create a condition of rapid sustainable development.

Executive Summary: Institutional Strengthening

Development is a continuous process. Planning and development management must go hand in hand. One point planning without an effective management system is going to only lead towards waste. The system will support identification of planning areas, preparation of plan for detailed development along with participations from local population, will support development decisions, attract investments through branding and place-marketing and will manage growth. The components of the planning, decision support and development management system are:

- The concept of a Kutch Economic Region
- Formation of a Temporary High Powered Committee
- Kutch Economic Regional Development Committee under 74th Constitutional Amendment
- Kutch Land and Spatial Data Information System
- Marketing and Branding

Institutional Development Strategies for Kutch

Two steps are proposed to be followed for institutional strengthening in Kutch:

- Establishment of a temporary high powered committee and
- Establishment of a District Planning Committee

Establishment of a Temporary High Powered Committee (HPC)

For rapid initiation of and implementation of the proposed sectoral, spatial and other institutional development actions, establishment of a temporary high powered committee has become an urgent issue. A temporary committee can be formed within a span of two years and can specifically provide attention to development and development facilitation in Kutch. Such a high powered committee can settle the legal issues related to land and land development, initiate corridor development and urban development actions and also can attempt for investment attraction.

Possibility of Formulation of a District Planning Committee (DPC) under the Article 243 ZD under the 74th Constitutional Amendment

There is a scope for formation of a permanent district planning committee to take charge of the high powered committee in future. Another Constitutional provision, Article 243 ZD which is introduced under 74th Constitutional Amendment provides suitable support for formation of such an institution. According to the Amendment a District Planning Committee (DPC) to be formed as per the following provisions:

1. There shall be constituted in every State at the district level a District Planning Committee to consolidate the plans prepared by the Panchayats and the Municipalities in the district and to prepare a draft development plan for the district as a whole.

2. The Legislature of a State may, by law, make provision with respect to-

   - the composition of the District Planning Committees;
   - the manner in which the seats in such Committees shall be filled:
   - Provided that not less than four-fifths of the total number of members of such Committee shall be elected by, and from amongst, the elected members of the Panchayat at the district

level and of the Municipalities in the district in proportion to the ratio between the population of the rural areas and of the urban areas in the district;

- the functions relating to district planning which may be assigned to such Committees;
- the manner in which the Chairpersons of such Committees shall be chosen.

3. Every District Planning Committee shall, in preparing the draft development plan,-

- have regard to –

  (i) matters of common interest between the Panchayats and the Municipalities including spatial planning, sharing of water and other physical and natural resources, the integrated development of infrastructure and environmental conservation;

  (ii) the extent and type of available resources whether financial or otherwise;

- consult such institutions and organizations as the Governor may, by order, specify.

4. The Chairperson of every District Planning Committee shall forward the development plan, as recommended by such Committee, to the Government of the State.

If the provision is critically examined, it provides for and gives power to the State Government to legislate with a power to

- to decide composition of the committee
- to provide for local representation
- to decide and fix the functions of the committee
- the control and appointment of the chairperson of the committee
- to provide for consultation of other institutions and organisation as and when required
- to plan for matter related to common interest, natural resources and integrated development of infrastructure and environmental conservation
- to provide for extent and type of available resources whether finance or otherwise

Such an institutional setup with allocation of development and implementation functions with power and duty to consult other expert institution or organisation is necessary. It is desired by the Constitution as the words used are "there shall be constituted in every State at the District level a District planning committee". This is altogether a different type of District setup enforced under the Constitution to meet with the requirement at District level. The present setup established by the State as district planning committee may be discarded and or reconsidered/ reviewed under the requirement of Article 243 ZD of the Constitution law of India.

It may also be noted that such committee can take assistance or direct other institutions to implement the schemes proposed by it. The State can also provide that all financial assistance received from State or Central Government will be placed under the disposed of such committee, which shall have power to converge the funds for utilisation in implementation of its plans prepared by the committee for District Development.

The powers of the committee may include

- to enter into contract if agreement with any person or institute or ogranisation for performing it duties and discharging its functions

- to raise finance through borrowing of loans
- to direct any urban or rural local bodies, other district agencies or State agencies to take suitable actions so as to assist the committee in implementation of development plan or to implement the part of the action plan for the area within its jurisdiction.

The objective of developing Kutch as a business hub can be facilitated substantially through initiating an institutional arrangement as prescribed in the 74th Constitutional Amendment in India.

The Kutch Economic Regional / District Planning Committee aims to improve the way the region works - delivering quality regional intelligence, effective partnership and increased influence. Building on the region's strengths and then lobbying for additional investment and grant; further understanding the region's opportunities and ensuring broad support for agreed regional priorities are key activities that will underpin the committee's work at regional level.

Functions of the District Planning Committee

In general, the committee's priorities will be to

- encourage an integrated, partnership approach to economic development;
- improve the effectiveness of regional lobbying and advocacy at Gujarat, national and international levels;
- improve understanding of the region's social, environmental and economic conditions.

The statutory functions of such a District committee can include

- preparation of comprehensive development proposal of the district keeping in view the natural resources including utilisation of minerals
- to prepare resource mobilisation plan
- to converge all financial aids, grants and subsides available from State and Central Government and prepare Plans and Schemes for its optimum utilisation
- to prepare, execute and finance the action plans & programmes envisages under the comprehensive strategic plan of development prepared by if for the district

Moreover, the committee may perform non-statutory functions as follows:

- Concretisation of Regional Development Agenda
- Support Business Growth
- Management of Regional Development Work
- Regional Scheme - Regional Development Strategy
- Responsibility for Regional Development
- Responsibility for Regional Land Use Planning
- Providing Sites and Premises
- Promoting Innovations
- Regional Infrastructure Development
- Investment Promotion
- Skills and Learning Development
- Financing through formation of a Kutch Regional Holdings

Land and Spatial Data Information System and Management

A system for capturing, storing and using data which is spatially referenced data. Usually not associated with specific technologies and in the NT used as the generic term for land / geographic / spatial information systems including the institutional framework and standards established to create and manage the LIS across the government and community. Land and resource information management is the activity of capturing, organising, integrating, managing and distributing digital land related information and derived products for use by government, private entrepreneurs and the community.

The Information System Kutch (ISK) is a whole of government integrated land information infrastructure with a web based delivery system. The ISK is a showcase of what can be achieved through cooperation, leadership, smart technology and smart thinking.

Key Issues are:

- Creation of a regional data base and its management procedure
- Establishment of a land information and management system and its linkages to planning and business development

Branding and Marketing Kutch

Branding and marketing of Kutch shall be specifically carried out by the Kutch Economic Regional / District Planning Committee.

Objectives of Place Marketing

- Often a well-known name creates good opportunities to fix associations, and build a place brand, which acts as the catalyst for investment attraction.
- Places in general have to perform many objectives at the same time: attract new companies (domestic and foreign), retain their industrial base and develop the tourist and business visitor industries.
- At the same time, places need to develop their internal services like transportation or health care for the demanding community. Increasing investments will increase sources for income for the region.

Key Strategies

- Detailed proposal preparation for establishing a temporary high powered committee within a span of two years (by 2007).
- Detailed proposal (organisational and financial) for developing Kutch Economic Regional Development Planning Committee under 74th Constitutional Amendments by 2012.
- Development of a web based Kutch Information System (to be linked to integrated land and resource information and management system for the proposed corridors and urban areas – refer framework for spatial development and actions).
- Preparation of branding and marketing strategy development plan for Kutch

Proposed Institutional Development Actions, Timescale and Implementation Procedure

The proposed institutional development initiatives are arranged in a timescale for project integration and effective implementation. These follows logical need based sequencing. Refer the Annexure I for the detailed institutional development actions, timeline and implementation procedure.

Vol. II, Part I

Infrastructure Development, Strategies and Actions

2.1

Mott MacDonald

Dalal Mott MacDonald

1. Infrastructure, the Key Factor for Growth

The adequacy of infrastructure helps determine one region's success and another's failure in diversifying production, expanding trade, coping with population growth, reducing poverty and improving environmental conditions. Good infrastructure raises productivity and lowers production costs. According to a study of the World Bank, one percent increase in the stock of infrastructure is associated with a one percent increase in GDP across all the countries. Regional development is an integrated process incorporating the aspects of regional economic growth, modernisation and equitable distribution of social justice. The relationships between the key components of development and infrastructure are:

- Economic growth is determined by nature and type of investments in a particular region, which ultimately generate income and employment through development of various economic activities. Economic infrastructure[1] (as per the definition of the World Bank) plays a vital role for economic growth. Economic output grows step for step with infrastructure capacity.
- Modernisation takes place, when a society experiences benefits of economic growth and enjoys a minimum level of social justice ensured through equitable distribution of social infrastructure and services.
- Equitable distribution of social justice is completely dependent on strategies for distribution of social infrastructures such as health and education and their accessibility to people.

Therefore, policies to develop infrastructure are not independent of overall objectives of development in a region. On the other hand, infrastructure development has to be sensitive to appropriate and potential economic activities a region possesses. Therefore, understanding the best possible and favourable economic activities and formulating strategies for their development are pre-requisites for any infrastructure development initiative. Through a regional development plan, planners understand and solve problems, evaluate and seize opportunities and use comprehensive approach also covering growth management aspects. But detailed scope for such a plan may vary from one plan to another according to the variations in regional development requirements of different regions. When plans are prepared at regional level, but the issues are considered with those that affect the world: the preservation and enhancement of the quality of life in a community, the protection of the environment, the promotion of equitable economic opportunity; and the management of growth and change of all kinds.

1.1 Vision for Infrastructure Development

Infrastructure is the key for development. Initially infrastructure requires facilitating higher level of industrial investments in the region gradually leading to agglomeration of activities and development of tertiary activities in the nodes. To be one of the most attractive business or trade hubs in Asia, Kutch will have to have infrastructure of global standards. The ports in the region already have shown

[1] The World Bank, The World Development Report 1994, classifies economic infrastructure under three sub-categories: 1. Public Utilities inclusive of power, telecommunication, piped water supply, sanitation and sewerage, solid waste collection and disposal and piped gas, 2. Public Works inclusive of roads and major dams and canal works for irrigation and drainage, and 3. Other Transport Sector inclusive of urban and inter-urban railways, urban transport, ports and waterways and airports.

significant potential in this respect. It is envisaged that by 2011, Kutch will be having at least three major ports (including MICT) of international standards and will be able to contribute to intensification of economic agglomeration. The highway systems in the region will be envy of other regions. Water and power will be adequately managed. Urban dynamism will find a new momentum and will flourish.

1.2 Objectives in Formulating Infrastructure Development Strategies

- To bridge the existing gaps
- To facilitate future development
- To attract investments
- To create higher standard living and working environment

1.3 Infrastructure Classification and Availability

Internalisation of the state of the infrastructure development in Kutch, identification of the potentials and strategy formulation have been carried out following the infrastructure classification provided below:

Infrastructures			
Sr. No.	Economic Infrastructure	Sr. No.	Social Infrastructure
	Ports and Navigation		Education
	Roads		Health
	Railways		Sports and Recreation
	Airports		
	Water		
	Power		

Note: Also Refer Volume I Part II, Potential Identification Process

2. Ports and Navigation

2.1 Role of Ports and Navigation in a Globalised Economy

Ports are playing extremely significant role in increasingly globalised economy.

- International trade has become most important growth driving factor and sea borne cargo traffic forms the major part of international trade.
- In India, private participation, entry of post panamax vessels and containerisation are the major changes after liberalisation of its economy.

In the era of globalisation, economic prosperity of a region is less dependent on its resource base but more on trade performances and on the level and quality of maritime connectivity. Competitive advantages have become increasingly important than comparative ones. An efficient port plays important role in international trade and is a prerequisite for economic competitiveness of a region. More than 90 percent of the global trade today is seaborne. Therefore, a port is a crucial infrastructure for enhancing business environment and subsequent economic development and has become important for a country or for a region aspiring for rapid economic growth to facilitate development of efficient and state of the art ports.

From the onset of economic liberalisation, and with increasing participation of private sector in port development and operation, there have been significant changes in navigational environment and trade. Competition has increased to see the entry of 'super and post-panamax' vessels and rapid containerisation. KPT sources reveal that from 1991-2001 traffic at major and minor ports in India has grown at compound annual growth rate of 6.2 percent and 22 percent respectively. Subsequently, up gradation and expansion of existing ports and development of new ones have become prime matters of concern. However, such a changing scenario is capable to create significant influence in the rate at which national or regional economy is growing.

Internalisation of such a scenario has led to gradual increase in public expenditure patterns in the port sector. In the 10th Plan outlay (2002-07) the total investment envisaged in the port sector in India is INR 54182.90 mill. Gujarat has a large share in the port projects and related investments.

Table 2.1: Number of Port Projects and Investments in Gujarat and in India

	Number of Projects			Investment INR billion			
	Announced/ Proposed	Under Impl.	Total	Announced/ Proposed	Under Impl.	Total	% of total
Gujarat	15	7	22	165.43	54.91	220.34	42
India	59	14	73	455.00	65.57	520.57	100

Source: CRISIL

With growing Indian economy and with its newly found dynamism and Gujarat being an important industrial business hub, ports in the state are extremely important for tapping global business opportunities and regions where ports are located have become focus of attention.

For Kutch, especially with one of the largest ports in India and with another rapidly growing state of the art private port, it is extremely important for attempting a regional economic integration with its port base. Exploitation of regional development potential will be more or less dependent on such integration. It has been already noticed that after having shaken by series of natural disasters, development and expansion of ports and a port base and incentives have helped in injecting a new dynamism in the regional economy.

Principal characteristics of the ports in Kutch are:

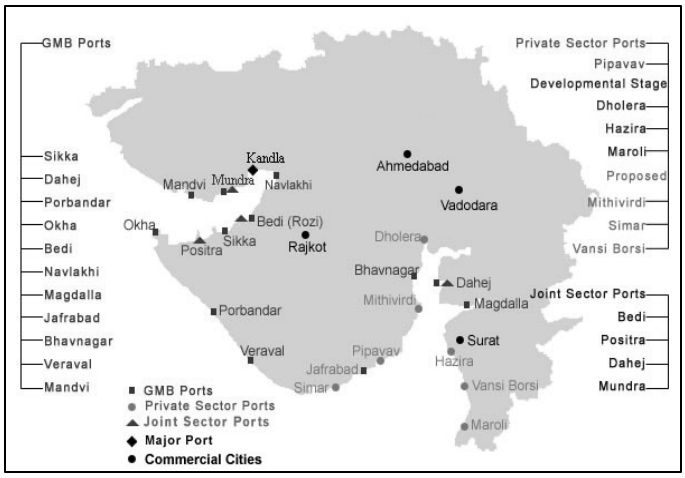
- Large, deep water and all weather ports,
- Private participation and FDI,
- Associated regional development potential.

2.2 Spatial Distribution of Ports and Locational Advantages

The crescent shaped Gulf of Kutch is providing favourable locations for deep water ports:

- Kandla, India's second largest port is located in Kandla Creek in proximity to Gandhidham.
- Mundra – GAPL and MICT are potentially large ports located in Navinal Creek in proximity to Mundra town.

The physical setup of Gujarat enables it to enjoy the longest coastline in India. Amongst the coastal states in India Gujarat is second in number of ports after Maharashtra (Maharashtra: 53 ports; 2 major ports) with 40 intermediate and minor and 1 major ports.



Similarly, Kutch is blessed with the longest coastline amongst the districts in Gujarat and its typical geomorphic conditions with Gulf of Kutch and many of its creeks provide ample opportunities for establishment of ports in Kutch. Since historic past, ports in Kutch are well known for their trading with Middle Eastern countries and for coastal trade with Karachi and with other important ports in the sub-continent. Mandvi, Mundra, Jakhau, Koteshwar are the minor ports operating in Kutch since distant past.

Kandla was the first modern port established in Kandla creek 90km from the mouth of the Gulf of Kutch. Today, Kandla is the second largest port in the country and is being developed and managed by the Government of India. On the other hand Gujarat Maritime Board (GMB) manages the minor ports of Mundra, Mandvi and Jakhau, out of which Mundra and Mandvi are the only operational ones.

Table 2.2: No. of Ports and Coastal Length

Areas	Length (Km)	Coast-Share of India %	Number of Ports			Ports-Share of India%
			Total	Major	Intermediate and Minor	
Kutch	332	6	5	1	4	3
Gujarat	1600	27	41	1	40	21
India	6000	100	192	12	180	100

Source: Gujarat Maritime Board, Gandhinagar

In the late 90s the Adani Group, a leading business house in the state has come forward to develop a state of the art port in Navinal Island in between Navinal and Baradimata creeks in close proximity to the old Mundra Port (apprx 50 km from Gandhidham and 60 km from Bhuj). For past half a decade, the port is operational and constantly growing. It is being managed by Gujarat Adani Port Limited (GAPL), a private sector company with 11 percent share of the state government. A state of the art container terminal has been also established recently in the new Mundra Port and is operational since

2003, which is being managed and developed by internationally renowned container handling group P&O.

Locations of the ports in Kutch are of extreme significance due to:

- Available natural harbour and deep draft and
- Favourable location in international maritime route

Kutch has potential areas for development of ports with deep natural draft capable of capsizing post-panamax vessels. Mundra has a deep natural draft of 18 mt, while Kandla is preparing to increase its draft to more than 13 mt. Kandla also plans a deep draft post panamax capsizing facility at Tuna. Moreover, Gulf of Kutch and its creeks facilitate natural harbours. Such natural advantages are not usually found in the coastal belts in India.

Location of the ports in Kutch, when considered the international maritime route is also proved to be of extreme importance. Kutch is close to the oil-rich Middle Eastern countries as well as to trading hubs and important ports such as Dubai. These ports can also play a dominant role at international scale for transhipment of cargos from European countries to Far Eastern countries as an alternative to Dubai.

2.3 Accessibility to Hinterland

Accessibility to hinterland is an important aspect of development of ports and for their integrity to regional and national economy. Ports in Kutch today are in privileged to being connected to the recently developed highway system in India and possess a massive hinterland with 10 states in the western and northern India.

Typical characteristics of hinterland of the ports in Kutch are:

- Covers more than 10 states,
- Covers important urban centres such as Delhi and NCR, Ahmedabad, Bhopal, Indore, Jaipur, Jodhpur, Chandigarh, Ludhiana, Amritsar, etc.
- Has major portion of the country's population and is a massive region of mass production and consumption.
- Moreover, there is possibility of diverting traffic from hinterlands of Maharashtra and Southern ports through ensuring better performances and connectivity.

Major roads connecting the ports of Kutch to their hinterland and status of development projects on these roads are:

- Work for four laning of the port link NH 8A from Kandla via Gandhidham to NH 15 has been completed in 2002, which provides basic connectivity between Kandla and North and Central Indian cities and rest of Gujarat. The highway is also going to be the backbone for regional economy in Kutch in near future.
- The extension of the NH 8A to GAPL-Mundra Port and further to Mandvi has been also carried out and the link is awaiting four laning within a short period of time.

- With the ambitious East-West and North-South Corridor and Golden Quadrilateral Projects, over all connectivity of Western, Northern and Central Indian states are going to be improved in an unprecedented way.
- Jaipur- Delhi and Udaipur- Ahmedabad portion of the Golden Quadrilateral has been already completed along with their extensions in Gujarat.
- East-West Corridor from Porbandar to Silchar in Assam is under construction.
- Within Gujarat there are extensive improvements in connectivity to various cities within past half a decade, which also going to play significant role. Halol-Kalol Expressway, Ahmedabad-Mehsana Toll Road, Ahmedabad - Vadodara Expressway, etc definitely improves overall connectivity in the region.

Within next five years, it is envisaged that goods from ports in Kutch will be able to travel non-stop in four lane highways to nick and corners of the country.

Moreover, ports in Kutch have comparative distance advantages from the northern Indian states in comparison to other west coast ports. Comparative distance advantages for the ports in Kutch. J& K, HP, Punjab, Haryana has 20 to 30 percent, UP and Uttranchal has 10 to 20 percent, Ahmedabad almost 50 percent distance / cost savings if considered the ports in Kutch over Mumbai, JNPT or Nava Sheva. Rajasthan has easy accessibility to Kandla being a neighbouring state and well connected via national highways. Although the distances from the major cities in Madhya Pradesh to Kutch are more in comparison to the same to Mumbai, JNPT and Nava Sheva, but the ports in Kutch may be still be preferable due to increasing congestion in Mumbai, JNPT and Nava Sheva and on the roads leading to these ports.

Table 2.3: Comparative Advantages of Ports in Kutch

Sr. No	Cities	States	Road Distance (Km)		
			Kandla	Mumbai	Comp. Advtg.*
1	Jammu	J&K	1602	1982	24
2	Shimla	HP	1439	1742	21
3	Chandigarh	Punjab	1334	1637	23
	Ludhiana		1401	1704	22
4	Gurgaon	Haryana	1066	1393	31
5	New-Delhi	New-Delhi	1096	1407	28
6	Jaipur	Rajasthan	838	1202	43
	Jaisalmer		628	1140	82
	Jodhpur		604	984	63
	Kota		885	998	13
7	Gwalior	MP	1220	1086	-11
	Bhopal		933	779	-17
	Indore		747	593	-21
8	Agra	UP	1070	1197	12
	Meerut		1161	1408	21
	Moradabad		1337	1464	9
9	Dehradun	Uttranchal	1331	1578	19
10	Vadodara	Gujarat	478	448	-6
	Surat		581	263	-55
	Ahmedabad		365	545	49

** indicates additional length to be travelled to Mumbai.*

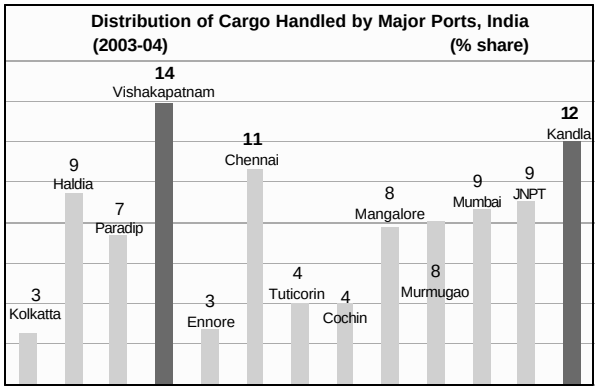
Source: Data generated from Maps of India website

Moreover, conversion of broad gauge railway line till Bhuj via Bhachau, Gandhidham and Anjar has been also completed in the late nineties. Recently Railway Vikas Nigam, a private rail company jointly established by Gujarat Adani Port Ltd., Kandla Port Trust and Indian Railways have constructed country's longest private broad gauge railway line (57 km) from Anjar to Mundra Port, which is operational since mid-2004.

2.4 Ports and their Performances

Performances of the ports in Kutch are to be evaluated through separate studies for Kandla, Mundra and for other minor and intermediate ports. Kandla is a major port, while Mundra is a sophisticated and a growing intermediate port. Minor ports also have significant advantages for regional economy.

2.4.1 Kandla, the Second Largest Port in India



Kandla Port was constituted in 1955 after the loss of the Port of Karachi to Pakistan. It is situated at the eastern end of the Gulf of Kutch and on the western bank of Kandla creek on the west coast of India. Kandla is an all weather port with sheltered harbour in the Kandla Creek with a maximum draft of 11.5 m is the nearest Indian port to the Middle East and Europe. The port is additionally facilitated by an oil handling terminal at Vadinar located near Jamnagar.

2.4.1.1 Infrastructure Availability

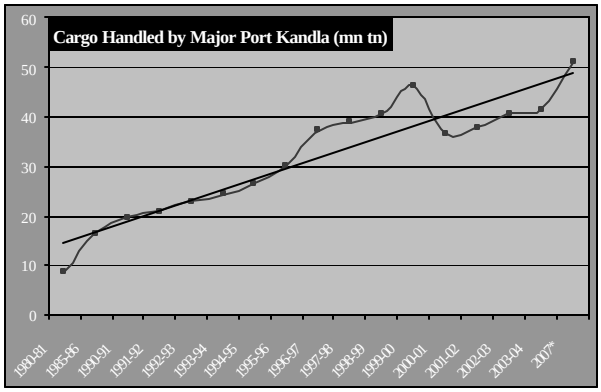
Among the terminals in Kandla port, there are 10 berths, 2 SBM (at Vadinar), 6 oil jetties, 1 maintenance jetty, 1 dry dock and small jetties for small vessels, which can accommodate 11 to 12 medium sized vessels. Cargo berths are situated in a straight quay line in sheltered creek with a total length of 1987 meters. The port follows a berthing policy supporting allotment of two berths for container vessels, four for export cargo, three for import cargo and one for senior most vessels.

Kandla presently has 630248kl liquid cargo storage capacity and an additional capacity of 141500kl is being developed, which are suitable for A, B, C, LG, NH, EO, Classes of Liquid and Chemicals. Stainless steel pipeline networks, Gantry Loading System, etc are other features of Kandla's liquid cargo handling system. The port has a 109480 sq. mt. container yard and a 6480 sq. mt. container freight station. The safety system in Kandla is constituted with AFFF Fire Fighting, foam line, pressurized fire hydrant system, water spray system, and fire extinguishers.

Moreover the port is equipped with fresh water supply, bunker supplies to ships, ship repairs, supply of ship stores, marine surveyors, fumigation services, pollution and oil spill control system, port health services, etc.

2.4.1.2 Growth of Traffic and Traffic Handling

The total cargo traffic at Kandla Port has grown at CAGR of 6.4 percent from 1990-91 to 2000-01 (all ports 6.2% and Vishakhapatnam 8.6%). Traffic in Kandla has grown from less than 20 mill tonnes in 1990-91 to more than 41mill tonnes in 2003-04.



Kandla is the second largest port in India with 12 percent share of total cargo in Indian ports. Out of the various products handled at Kandla Port, petroleum and allied products forms the major share (57% in 2003-04). It stands first in handling petroleum vessels (19% share of India in 2002-03).

Box 2.1: The Largest Ports in the World

Rotterdam in the Netherlands is the largest port in the world with a total throughput of 327.8 million tonnes and is 8 times larger than Kandla (41.52 mt). In terms of container traffic Hong Kong was at number one place (2003) and is 120 times larger than Kandla.

Global Traffic Trends

World port traffic in 2001 - 11.93 bn tn @ 3% growth pa. Projected Growth: @5% per annum till 2010. Cargo composition: 45% liquid, 23% dry & break, and 32% container. Break bulk shifting towards containerization. World container traffic in 2001 was 225.3 m TEUs @ 15.4% growth pa.

Source: World Bank, UNCTAD & UNESCAP

Table 2.4: Port Traffic in Major Ports in the World in Comparison to Kandla

Sr. No.	Ports	Country	Throughput 2003	TEUs 2003
1	**Hong Kong ***	China	5.0	**120**
2	Singapore	Singapore	7.7	108
3	Shanghai*	China	7.6	66
4	Shenzhen	China	Na	62
5	Busan	South Korea	2.9	61
6	Daohsiung	Taiwan	Na	52
7	Los Angeles	USA	Na	42
8	**Rotterdam**	Netherlands	**7.9**	42
9	Hamburg	Germany	2.6	36
10	Antwerp	Belgium	3.4	32
11	Dubai**	UAE	1.1	21
12	Nava Sheva	India	Na	7
13	JNPT	India	0.8	6
14	**Kandla**	**India**	**1.0**	**1**

**including river trade, ** 2001 figures*
Figures are in number of times of Kandla
Source: Port statistics. 2003. Port of Rotterdam

Kandla also handled 92000 containers in the year 2000-01. The total cargo handled by the ports in Kutch is 34 percent of the Gujarat's total and alone by Kandla was 31 percent of the state in 2001-02.

Kandla is a large Indian port in terms of its capacity and handled traffic. But by considering the large maritime ports in the world and their development during past few decades, growth in Kandla is not significant. Particularly, growth of ports recently in the countries such as China, South Korea and Taiwan is extra-ordinary. On the other hand Hong Kong and Singapore has grown to be the largest ports during past few decades.

Large ports often create massive impact on regional economy through development of logistics and trade. Port based industrialisation is also directly related to growth and efficiency of ports. Kandla can be expanded and for Kutch it can be what the ports in Shenzhen are meant for industrialisation, trade and urbanisation in the Pearl River Delta Region.

2.4.1.3 Income and Expenditure Patterns

Table 2.4: Financial Performance of Ports of India 2000-01

Port	Total (Rs in crores)		I/E ratio	Surplus
	Income	Expendit.		
Kolkata	1028	1036	0.99	-8
Paradip	284	212	1.34	73
Vishakhapatnam	398	378	1.05	19
Chennai	475	437	1.09	38
Tuticorin	131	94	1.40	37
Cochin	206	240	0.86	-34
New Mangalore	192	149	1.29	43
Mormugao	215	193	1.12	22
Mumbai	621	1095	0.57	-474
JNPT	443	342	1.30	101
Kandla	**327**	**174**	**1.88**	**152**
Total	**4319**	**4349**	**0.99**	-29

Source: KPT Gandhidham

Amongst the major ports of India, the financial performance of Kandla is the best among all the ports. In 2000-01, INR 1520 mill of surplus was generated, which is 8 times larger than Vishakhapatnam and 1.5 times of JNPT. Therefore, the income to expenditure ratio is the highest across all the ports. Such a performance can enable the port to be cost competitive and attract more trade.

2.4.1.4 Future Plans

In the tenth plan (2002-2007) the traffic of Kandla is envisaged to be 51 million tonnes by 2007, an increase of 28 percent over 2002-03. Out of this the total, POL traffic is estimated to be 29.3 million tonnes (projected share of Kandla @ 19%), when India's total is estimated at 154.3 million tonnes. The present POL handling capacity at Kandla port is 33 million tonnes, which is well above the set target.

The port proposes a container terminal with 3.6 million tonnes capacity at a cost of INR 1500 million in near future. It has also commissioned the increase in draft from 11.5 meters to 12.5 meters at a capital cost of INR 500 millions and establishing high capacity 'wharf' cranes at a cost of INR 600 millions.

The port has ambitious master plan to let the port into next generation for handling post and super post panamax vessels. It has an expansion plan for developing post panamax vessel berthing facilities in Tuna approximately 6 km south-west of Kandla.

Envisaged investments in Kandla port in 2004 is INR 375 crore with more than 40 percent private investments. By 2014, Kandla will have an investment of INR 1564 crore and it is estimated that around 54 percent of it will be private.

Table 25: Kandla; Commissioned Projects by 2005

Project Details	Inv
Increasing draft from 11.5 m to 12.5 m.	50
High capacity cranes (16tn to 25 tn)	60
Developing container terminal (3.6 mn tn capacity, approx 600 thousand TEU)	150
2 rail mounted quay side gantry (2 RMQCs, of 50 tn upto 50 meters)	50
Container freight station (140 thousand TEU)	40
Information and technology at port	10
Augmenting covered storage space of 148 thousand sq.m.	na
Expansion of KSEZ	na
Total Investment Commissioned	**375**

Note: Inv = investments in crore INR

Source: Kandla Port Trust

2.4.2 GAPL-Mundra, the Maritime Masterpiece

The promoters and developers of the new Mundra Port demands and sells it to be 'the maritime masterpiece'. It is a multi-purpose all weather port that can receive dry, liquid cargo and container ships up to 1,30,000 DWT with a clear and deep water approach and a minimum natural depth of 18mt at any state of the tide.

Gujarat Adani Port (GAPL) is a joint venture company between Adani port Ltd. and Government of Gujarat represented by Gujarat Port Infrastructure Development Company Ltd. It is in charge of overall development of the Mundra Port and conservancy functions.

Table 26: Kandla, Announced Projects for 2014

Project Details	Inv.
Increasing draft to 13.5 m	na
Construction of 12th cargo berth with a draft of 13.5 m.	50
Construction of 13th and 14th berth	150
Development of satellite port off Tekra near Tuna, with 14 m draft, added capacity 6 million tonnes.	na
Development of SBM with capacity of 9 mmtpa.	na
Marine terminal (Essar oil ltd) additional throughput of 10.5 mmtpa	na
Shortening of distance to hinterland; Gauge conversion Palanpur-Gandhidham	52
Vessel traffic management system	42
Total Investment Announced	1564

Note: Inv = investments in crore INR

Source: Kandla Port Trust

2.4.2.1 Infrastructure Availability

The total berthing length of all four multi-purposes operational berths is 895 m equipped with night time navigation facilities.

Mundra Port's liquid cargo handling facilities includes 65 liquid storage tanks of 271900 kl suitable for vegetable oils, aggressive and normal chemicals, POL products, 7 pipelines with state-of-the-art imported cup pigging system to ensure full product recovery and total integrity, heating facilities, weighbridges, 74 tank loading bays, computerised inventory management system and a safety system with independent fire control, installation systems, including fresh water, foam, nitrogen systems and portable extinguishers.

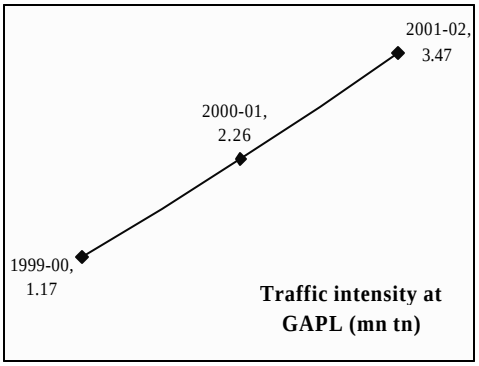
For dry cargo the port has 15 covered godowns for agricultural Commodities, fertilizers, etc, bitumen surfaced and concrete open hard stands and open stands with a total capacity of 524240 sq mt. There is an export conveyor and ship loader with rated capacity 1000 TPH for handling bulk commodities like DOC, bauxite, Bentonite, Wheat, Rice (Food grain) Cement-clinker, salt etc. with matching ship loader and also an import conveyor. The rated capacity is 1500 TPH for bulk handling of coal, coke, fertilizers, raw materials and food grains.

Moreover there are 2 Nos. Gottwald (model hmk -300EG) mobile harbour cranes for handling of bulk cargos. Cranes are fitted with 27 cbm electro hydraulic grabs and can handle vessels up to 80,000 DWT. The cranes are rated at 750 TPH each.

There are computerized weighbridges and handling equipments and a safety system with independent fire control installation comprising pressurized water hydrant systems, portable extinguishers and fire tenders.

2.4.2.2 Growth of Traffic and Traffic Handling

The traffic handled at GAPL in 2001-02 was 3.47 million tonnes of which import were 2.25 million tonnes and export was 1.22 million tonnes. The port registered an increase of traffic to 53 percent over the previous year. The traffic at Mundra (GAPL) has grown at CAGR of 72 percent during 1999 and 2001. GAPL has estimated the traffic in the port to be 40.58 million tonnes by 2011 growing at a CAGR of 28 percent (considerably higher than the other major ports of the country). Further, a study by CRISIL estimates this traffic as 81.86 million tonnes by 2015.



2.4.2.3 Future Plans

The port has an ambitious master plan for developing new jetties and berths. It proposes to reclaim a massive area of 300 acres for expansion of logistics and towards west of the existing development near Baradimata Creek has plan to construct at least 4 jetties and a basin to facilitate around 20 new berths for dry, break bulk, liquid and container cargo.

2.4.3 Mundra International Container Terminal (MICT)

The Peninsular and Oriental Steam Navigation Company (P&O) has acquired the Mundra International Container Terminal Limited in $195mill from Adani Group. MICTL has a 28-year concession to operate the new deep water, 1.3 mill teu capacity container terminal. MICT is the closest

deep water port to Delhi. Currently, the industrial hinterland is mainly served via Nhava Sheva International Container Terminal, which is now capacity constrained. MICT provides the deepest draft in the region and it can accommodate the largest container ships that operate the international deep-sea container trades.

2.4.3.1 Infrastructure at Mundra International Container Terminal

The container terminal is provided with 1100m of quay line for direct berthing of vessels, where 4 vessels can be berthed at any time. The draft available is 18.5m at quayside, which permits vessels of 8000+ TEUs.

There are Port Craft facilities for vessel handling with 3 Tugs, one of 3240 BHP and 47 Tons bollard pull; one of 3100 BHP and 45 Tons bollard pull and of 802 BHP and 15 Tons bollard are currently available and additional mooring boats will be contracted for future requirements and 2 mooring boats for line handling are currently available with provisions for developing additional mooring boats in future.

There is also on terminal rail facility with initially one main line and three loop lines will be capable of handling 8 to 10 container trains per day. In due course this will increase to six loop lines for 16 to 20 container trains per day. RMGCs are being installed for direct loading/unloading of containers on flat bed wagons. There are also high powered reefer facility with 180 terminal slots for reefers (total capacity 10708 TGS) and automated gate system with 8 lane gate house for easy handling of traffic and traffic monitoring and controls. It is also connected to large parking area for trailers and other vehicles.

Most modern and highly reliable special purpose, Rail Mounted Quay Cranes (RMQC) suitable for post panamax container vessels and also Rubber Tyred Gantry Cranes (RTGC) are available for rapid handling of containers. Moreover RTGC service and maintenance facilities have been also created.

2.4.3.2 Traffic at MICT

P&O sources reveal that the North-west India is a high growth region, with the average annual growth in container traffic exceeding 13 percent since 1995. According to them MICT will be India's one of the major container ports. Since its inception few months back, as of now, MICT has handled 43 thousand TEUs.

2.4.3.3 Income and Expenditure Patterns

P&O in the MICT has started investing in 2003, with an investment of INR 10 billion. The expenditure for the first phase inclusive of 630 metres of quay line to facilitate 1.3 million TEUs capacity per annum is estimated at $120 million. Out of this, $50 million was committed in 2003 to provide an initial capacity of 6,00,000 TEUs by the end of 2003.

Table 27: Cargo Handled at Ports in Kutch, 2001-02 in hundred thousand tonnes

Region	Category	Port	Total	% share
Kutch	**Minor & intermediate**	Mandvi	0.07	0.0058
		Mundra (old)	0.57	0.0471
		Mundra (GAPL)	34.7	2.87
		Jhakhau	0	0
	Major	**Kandla**	**377.27**	**31.16**
Subtotal		**Kutch**	**412.61**	**34.08**
Rest of Gujarat	**Minor & intermediate**	Other ports	797.98	65.92
Grand total			**1210.59**	**100**

Source: Gujarat Maritime Board, Gandhinagar

The remaining capital expenditure will be incurred over next few years, subject to growth in demand. The company also intends to further invest INR 2 billion for additional two new berths. Annual income from the port operation is yet not known as the port has not completed its first year of operation.

2.4.4.4 Future Plans

MICT has envisaged the construction of a total 1100 meter long quay line container terminal on a draft of 18.5 meter to handle the future generation post and super panamax vessels of nearly 8000 TEUs, out of which around 400 meter of quay length is yet to be constructed. A back up container yard of 108 acres is also proposed. By the year 2025, the company plans to expand its land area by 5000 acres with additional 4000 meters of berthing length.

2.4.4 Minor Ports

Although, ports at Jakhau, Mandvi and Koteshwar are very small in comparison to Mundra and Kandla, still the availability and small scale operation of these Ports signifies potential to the region to support diverse and large scale operations in future.

2.5 Development Potentials of the Ports in Kutch

Due to advantages of deep natural drafts and locational advantages related to import and export, the ports in Kutch are in fact potential of being large international trading ports and have already attracted substantial foreign and domestic investments. GAPL is being developed and managed by under joint sector initiatives between Government of Gujarat and Adani Group, while the container port at Mundra is recently bought by P&O. On the other hand Kandla being developed and managed by KPT also has planned for capacity augmentation and an additional container terminal development through private participation.

Continuous demand for traffic in the ports of Kutch is envisaged due to:

- Increasing trends of India's total demand
- Congestion in the ports in Maharashtra

2.5.1 Increasing Trends of India's total Demand and its Impact on Ports in Kutch

With increase in international trade, India's port traffic is to grow manifold. While on the other hand, it is also true that capacity for handling sea-borne traffic installed in the country will determine the progress of Indian foreign trade. An expert group set up by the Government of India has forecasted overall port traffic to reach over 565 million MT by 2006/07 and 900 million MT by 2011/12. Another estimate reveals that required capacity by Indian ports shall be 1027 million tones by 2015 and 1625 million tonnes by 2020. Currently approximately 90 percent of the total traffic is being handled by 12 major ports in the country. 10th Five Year Plan (2002-2007) estimates India's port traffic by major ports at 415 million tones by 2007. Capacity is a great constraint in Indian ports, to cope with the aspirations of higher external trade will be completely dependent on augmentation of it.

Implications of this trend will be important for the ports in Kutch. It will be of extreme importance to augment the present capacities as rapidly as possible to cater to the present national demand and to excel to create activities within the region and again to become capable of supporting new traffic generated within the region.

2.5.2 Congestion in Maharashtra Ports and Port Linkages

Additional traffic from Maharashtra ports can be routed through the deep water Kutchi ports. Ports of Kutch has an additional advantage over Mumbai and JNPT port due to increasing congestion at these ports, the congestion at corridors leading to Mumbai. It can observed from the table given below that the Mumbai Port shows a declining trend (37.5 million tonnes to 30.4 million tonnes) as stated in the tenth five year plan (2002-07). Although, the JNPT port shows an increase in cargo handling, however as above stated, the ports of Kutch would be at advantage due to its comparative deep drafts (for handling post panamax vessels) and probably would be able to draw a large share of the additional traffic from these ports.

Table 2.8 Comparative Traffic Scenario

Sr. No.	Port	Traffic Handled (2002-03) in mill tones	Projected Traffic (2007) in mill tones	Percentage Increase (2002-07)
1	All Major Ports	344.4	415	20.5
2	Mumbai	37.5	30.4	-18.9
3	JNPT	29	34.5	19
4	Kandla	40	51	27.5
5	GAPL	3.47 (2001-02)	40.58 (2011 GAPL projection)	1069 (2011)

Source: Government of India, Tenth Five Year Plan (2002-2007), GAPL sources.

2.6 Port-wise Assessment of Demand – Supply Gap

2.6.1 Demand Supply Gap: Kandla Port

In the tenth plan (2002-2007) the traffic at all the major ports in India is estimated to be 415 million tonnes, an increase of 20.5 percent over 2002 (344.5 million tonnes). In the same plan the traffic of Kandla is envisaged to be 51 million tonnes by 2007, an increase of 28 percent over 2003-04.

Table 2.9 Capacity and Projected Traffic at Kandla Port

Sr. No.	Years	Capacity 2004 / Planned by 2007 in mill tones	Traffic Handled 2003-04 / Projected 2007 mill tones	Utilisation Rate %	Required Capacity as par Norms mill tones
	2004	44	41.5	95	69
	2007	--	51	60	85

According to the sources from KPT, the port is running at 90 to 95 percent capacity and is at higher side of capacity utilisation and potential to lead towards saturation. International norm prescribes an acceptable capacity utilisation rate at 60 percent. The port has a master plan to increase number of berths in the port and to develop a new port for handling post and super post panamax vessels with a

draft of 14 meter near Tuna approximately 6 Km south west of Kandla. Also the existing draft of Kandla port is to be deepening to 12.5 meters as per the master plan. These plans are to increase Kandla's capacity by an additional 33.5 million tones per annum to a total of approximately 77.5 million tones and 80 million tones by 2014. According to the KPT sources these plans are to be implemented by 2010. Hence as per norms, Kandla's capacity utilisation will be always at a higher side, capable of increasing inefficiency.

2.6.2 Demand Supply Gap at Mundra Port of Gujarat Adani Port Limited (GAPL)

The traffic handled at GAPL in 2001-02 was 3.47 million tonnes with 2.25 million tonnes of imports and 1.22 million tonnes of exports. The port registered an increase of traffic to 53 percent over the previous year. The traffic at Mundra (GAPL) has grown at a CAGR of 72 percent during 1999 and 2001. GAPL has estimated the demand in the port to be 40.58 million tonnes by 2011, 81.86 million tones by 2015 (CRISIL) and 118.60 million tones by 2027-28. Capacity augmentation and achieving at the target is possible at Mundra as the port is efficient enough in handling the post panamax vessels with a deep draft of 18.5 meters.

Table 2.10: Capacity and Projected Traffic at Mundra Port

Sr. No.	Years	Capacity 2001-02 / Planned mill tones	Traffic Handled 2001-02 / Projected 2011 mill tones	Utilisation Rate 2001-02 %	Required Capacity as par Norms mill tones
	2004	9	3.47	38.5	Adequate
	2011-12	--	40.58	60	68
	2015	--	81.86	60	136
	2027-28	--	118.60	60	198

Overall growth of port traffic and with the setting up of the Mundra Special Economic Zone in the near future traffic at this port is set to increase in a rapid way.

2.6.3 Mundra International Container Terminal (MICT)

P&O in the MICT has started investing in 2003, with an investment of INR 10 billion. The expenditure for the first phase inclusive of 630 metres of quay line to facilitate 1.3 million TEUs capacity per annum is estimated at $120 million. Out of this, $50 million was committed in 2003 to provide an initial capacity of 6, 00,000 TEUs by the end of 2003.

The growing trend of containerisation in the country and across the world, the role of MICT port in terms of containerisation would be of immense importance. Further, MICT as per the projected capacity would be efficient enough in handling the container traffic of the vast la nd locked northern India. P&O sources reveal that MICT has the potential to be the largest container terminal in near the future in the region.

2.7 Major Problems Associated to Ports in Kutch

- Kandla is operating at a very higher side of port capacity
- Lack of dedicated berths for export of local commodities such as salt
- Comparative slow handing of commodities such as salt in Kandla
- Degradation of port infrastructure in Kandla – old handling system, degraded storage areas, office complex, etc.
- Slow implementation of proposed container terminal and additional berth projects in Kandla.
- Degraded living environment in the labourers' colonies in Kandla.
- Lack of township infrastructure at Kandla.
- Kandla SEZ is small and a typical old industrial park and suffers from lack of better infrastructure and living and working environment.
- The access road to Mundra is still in dilapidated condition, some portions of it are narrow and potholed.
- Lack of better road and broad gauge railway line connectivity to ports such as Jakhau.
- Lack of modern systems such as GPS (becoming unsafe due to proximity to Pakistani waters) and modern boats at the fishing harbour at Jakhau; integrated vision for development along with fish processing industries is required to be developed.
- Lack of natural draft within the traditional ports such as Mandvi and Lakhpat acts as impediments for their future development.
- Proximity to Pakistan's border is creating difficult and unsafe conditions for traditional fishermen community at Jakhau; due to lack of modern facilities and boats these are vulnerable.

2.8 Actions, Required for Port Development

2.8.1 Specialisation and Dedicated Berths

- Feasibility for specialised modern port for fishing and salt at Jakhau
- Feasibility for LNG Terminal
- Dedicated salt berths at Kandla and Mundra

Specialised ports and dedicated berths within a port is a viable option. A separate LNG terminal is a feasible option, which can catalyse industrialisation in the region (see detailed potential for LNG Terminal). Dedicated berths for commodities such as salt are extremely important for increase in exports.

2.8.2 Modernisation of Kandla and Development of Kandla – Tuna – Kandla Special Economic Zone Complex

- Rapid execution of the prepared master plan for adding new berths in the original port and in Tuna
- Implementation of privatisation proposals for the proposed container terminal

- Computerisation and IT based traffic handling system at Kandla
- Modernising handling system
- Redevelopment and modernisation of the storage areas
- Development of a modern office complex
- Master plan for the Kandla township, including development strategies for housing for labourers and residential infrastructure development
- Expansion and modernisation of the Kandla Special Economic Zone

Expansion of Kandla SEZ and its linkages to Kandla port and its extension at Tuna will be extremely vital. SEZ and ports are capable of attracting massive investments in Kandla – Gandhidham and Tuna areas. The whole belt can be developed as an integrated complex or there is an option for developing a third large size SEZ in the area. Augmentation of capacity at Kandla port or at any near by areas such as Tuna is extremely important for the purpose.

2.8.3 Feasibility Study for a Third Port by 2015

- Assessing geomorphologic, geotechnical and marine studies for identification of a suitable site for a third modern port and preparation of a feasibility study

Looking at the extremely higher utilisation rate at Kandla port, and traffic projected at India level and increasing inefficiency of the Maharashtra port suggests that a third port is feasible. A detailed feasibility for a private cargo and fishing port is worth exploring. Salt exports can be also boosted through such a measure.

2.8.4 Feasibility Study for Ship Breaking, Repairing and Building

Ship breaking, repairing and building are potential activities within the Mundra SEZ. A detailed feasibility study for breaking, repairing and building yard is a possible action can be taken up by GMB and MSEZ.

2.8.5 Feasibility Study for Mundra – Bhuj and Gandhidham – Bhuj Corridor Roads

The Mundra - Anjar – Gandhidham road has been converted into a national highway. But due to increase in industrialisation within the region and if potential is exploited, Mundra – Bhuj Corridor can become an important port traffic generator. This corridor will also facilitate traffic from the industrial potential Bhuj – Bhachau Corridor. A detailed feasibility study for Bhuj Mundra Four Lane highway can open up new dimensions for regional economic and port development and integration. Private participation can be expected if project becomes economically viable (Refer: roads and spatial actions for corridor development).

Similarly the proposed Gandhidham – Bhuj Expressway shall also promote industrial development and shall assist in port and port related activities' development.

2.8.6 Summary of the actions

- Development of specialised and dedicated berths

- Modernisation of Kandla and development of Kandla – Tuna – Kandla Special Economic Zone Complex
- Feasibility study for a third specialised port
- Feasibility study for ship breaking, repairing and building
- Feasibility study for Mundra – Bhuj , Gandhidham – Bhuj road corridors

3. Roads and Highways

3.1 Network and Density

Length of roads is the longest in Kutch among the districts in Gujarat and it has 8 percent (5605 km) of the state's total road length. Moreover, the region also possesses the longest network of the national highways which is approximately of 11 percent of the state's total. Almost 90 percent of the roads in the district are surfaced, which is just below the state's figure at 96 percent. But due to its vast size and low density scattered population, density of roads in Kutch is lower than the same of Gujarat.

Table 3.1: Road Length and Density, Kutch and Gujarat, 2002

Category of Road	Road Density length (km)/area (100sq.km.)		Road Length
	Gujarat	Kutch	Kutch's Share%
NH	1.2	0.6	11
SH	9.8	4.1	10
MDR	10.7	1.8	4
ODR	5.4	1.6	7
VR	10.5	4.2	9
Total	**37.6**	**12.3**	**8**

Source: Computed from Data source,

R &BD, GoG, Gandhinagar

Recently roads in Kutch have seen rapid growth with substantial increase in road length under various categories. The length of national highways and state highways has shown 59 and 64 percent increase respectively since 1989. Where the total length of roads in state has grown to 15 percent, the same in Kutch was 22 percent. An increase of around 55 percent in the village road category in past five years reveals overall increase of connectivity in the region.

Table 3.2: Development in Road Sector, Kutch and Gujarat, 1989 to 2001 % increase

Category	Kutch	Gujarat
NH	59	68
SH	64	23
MDR	38	-1.7
ODR	0.5	3.1
VR	54	32
Total*	22	15

**includes surfaced and non-surfaced roads.*

Source: R & B D, GoG, Gandhinagar

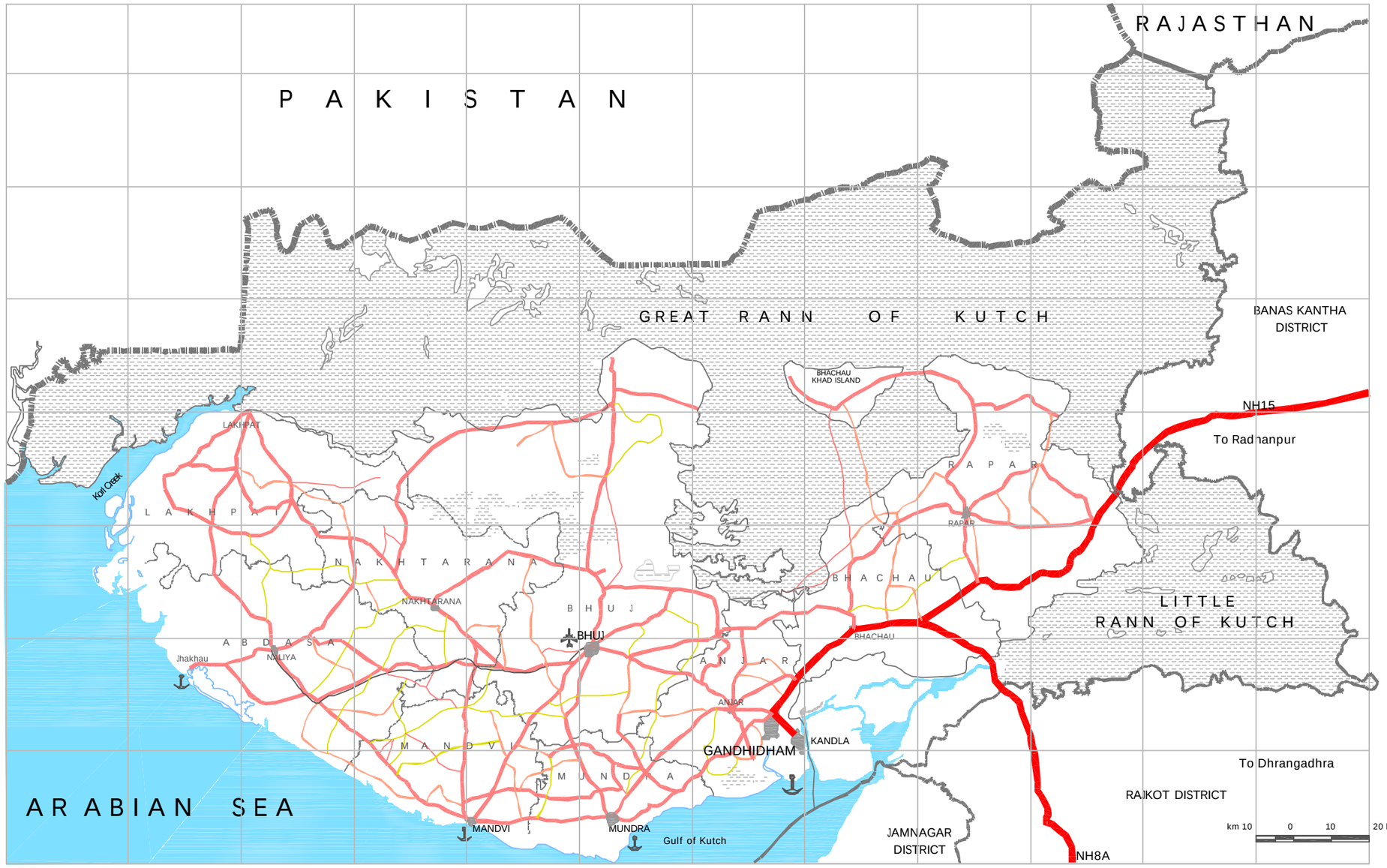
Table 3.3: PCU's in Major Corridors

Name of the road section		CW Width mt	PCUs Trucks '000	PCU '000/day
From	To			
Radhanpur	Samkhaili	7	11	15
Surajbari	Samkhaili	7	16	21
Samkhiali	Kandla	14	14	23
Bhachau	Gandhidham	14	21	27
Gandhidham	Kandla	14	24	33
Anjar	Mandvi	7	8	15
Bhuj	Lakhpat	7	9	18
Bhuj	Khavda	7	4	13
Bhuj*	Anjar	10	8	
Bhuj	Kandla	10	na	12
Bhuj	Mandvi	7	na	6
Bhuj	Mundra	7	na	6
Bhuj*	Bhachau	9.75	10	

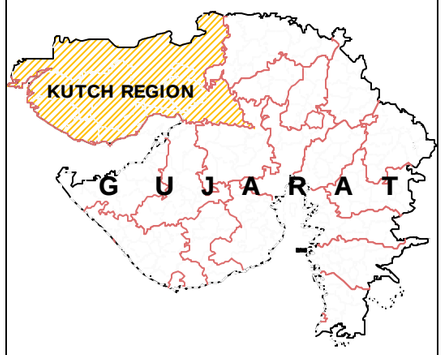
PCU figures include all modes of transport
** PCU above 7000*
Figures are rounded
Figures are average of April & October
Figures are average of different check post on the given route.

3.2 Major Traffic Corridors

Kutch due to its unique form and physical setup is linked with the other parts of the state and India only through two major national highways: NH 15 towards Banaskantha via Radhanpur and NH 8A towards Saurashtra via Surajbari. Interestingly, there are few roads linking various places in Sindh Province in Pakistan, which are not currently in use. Out of the major traffic corridors linking Kutch, NH8A carries 56 percent of the total traffic, while the rest moves through NH15. The consolidate figure of the two national highways predicts that 22,432 PCU of trucks on an average enter and leave from the



KEY MAP



LEGEND

- International Boundary
- State Boundary
- District Boundary
- Taluka Boundary
- Railway Line - Broad Gauge
- Railway Line - Metre gauge
- Water Bodies
- Rann
- Urban Settlements
- National Highway (NH)
- State Highway (SH)
- Major District Road (MDR)
- Other District Road (ODR)
- Village Road (VR)
- Major Port
- Minor Port
- Air Port

N

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Rev.	Date	Drawn	Description	Ch'k'd	App'd
R0	29.10.04	MAS	Issue for ------ Report Submission	VG	AK

Kutch Region

Road Network

Study on
Development Potential of Kutch

Drawing No. 214002/ROAD-NETWORK-MAP/0005

Drawn	MAS
Checked	VG
Approved	AK
Scale	1:1200000
Rev.	R0
Status	APR

district everyday with a total average PCUs of per 30100 per day.

Almost 30 percent of the major routes in the district have PCU's above 20,000 per day. Traffic between Gandhidham and Kandla possesses the highest PCU in the state i.e. 33,000. Other patches such as between Bhachau and Gandhidham, Samakhiyali and Surajbari, Bhuj and Lakhpat are other roads with higher intensity of traffic.

Table 3.4: Traffic at Kandla Port

To & Fro	PCUs Trucks (per day)	% share
Rest of India	22,432	94%
Kutch	1,492	6%
Total	**23,924**	**100%**

Source: Computed on the basis of Traffic Census 2002,

National Highway 8 A – Lifeline of Kutch

Road near Mundra Awaits Modernisation

3.3 Investments and Initiatives

Although Gujarat has built many private toll roads, almost all the state highways, MDRs, ODRs and village roads in Kutch are being developed and maintained by the funds from the state government. The state government increasingly funding these roads by the loans from World Bank and Asian Development Bank and many of the important roads, such as Bhuj-Dudhai-Bhachau Road have seen widening and strengthening during post earthquake reconstruction period. The national highways in the region falls under the Prime Minister's port link part of the corridor project, which is being financed by cess in vehicular oil and other financial institutes and is a nation-wide project.

3.4 Assessment of Corridor-wise Demand-Supply Gaps

Roads are the determinants of primary connectivity within a region. Being more flexible than rail and feasible than air connectivity these can be the best suitable option for intra-regional and inter-regional transportation. Increasing investments and activities within Kutch and due to location of ports, conditions of roads within the region is a crucial area of analysis. Corridor-wise analysis of demand and supply situation of various important road sections is as follows:

3.4.1 Anjar-Mundra Corridor

Mundra Port is expected to grow as par Kandla Port in terms of cargo handling by 2011. Cargo to be handled by Mundra will be 40.58 million tonnes as per GAPL estimates, while the Kandla Port handled 41.5 million tonnes during 2003-04. There is a strong relationship between traffic at the port and PCUs in the port linkages.

Table 3.5: Traffic at Kandla – Gandhidham Route

Name of the Road Section		Count Post	Width of Carriage Way (in mt.)	Traffic Handling Capacity (PCU Range)	Traffic Intensity per day in PCUs 2002		Access Traffic Load in PCUs
					April	October	
Gandhidham	Kandla	FTZ	7*	3000-10000	22945	43100	33100

* the figure is as per Traffic Census 2002, now the section is converted into a 14 mt four lane road.

Table 3.6 Anjar Mundra Section

Name of the Road Section		Count Post	Width of Carriage Way (in mt.)	Traffic Handling Capacity (PCU Range)	Traffic Intensity per day in PCUs 2002		Access Traffic Load in PCUs
					April	October	
Anjar	Mokha	Sinughar	7	3000-10000	9492	18423	8423
Mundra	Mundra Port	Mundra Sch	7	3000-10000	5216	5856	Adequate

At present Gandhidham-Kandla (FTZ) route has passenger car units (PCUs) of 43,100 per day in October (traffic census 2002). The entire traffic at this route is port-borne. Anjar to Mundra Port route presently has a PCUs of 24,099 (traffic census 2002) with a 7 m carriage way. Therefore by 2011, Anjar-Mundra route will have to accommodate an additional 46,000 PCUs if traffic at the Mundra port increases to 40.58 million tonnes. Moreover, with the inception of Mundra Special Economic Zone in the near future, the traffic along this corridor is definitely going to cross the above figures. Therefore, the road section Anjar-Mundra as per standard need to be upgraded to a four lane highway. However, the Government has declared the conversion of Anjar - Mundra corridor as a National Highway.

3.4.2 National Highways

Kutch is connected by two national highways NH 8A and NH 15 to other parts of Gujarat and Country. The NH 15 Radhanpur-Samakhiali caters the whole of the land locked northern India. With increasing pressure at the Mumbai ports it is expected that the ports of Kutch with their deep drafts will draw a large share of Northern Indian traffic. This would thus be reflected in increase in traffic on this corridor.

Presently, the PCUs[2] on Radhanpur-Kandla road section have crossed 43,100; the Government has already converted the 7 meter carriage way to four lane. Similarly, the conversion of Surajbari - Samkhaili road to four lane is also under implementation.

Table 3.7: National Highway

Name of the Road Section		Count post	Width of carriage way (in mt.)	Traffic Handling Capacity (PCUs Range)	Traffic intensity per day in PCUs		Access Traffic Load in PCUs
					April	October	
Radhanpur	Samkhaili	Adesar	7*	3000-10000	11220	12281	2281
Radhanpur	Samkhaili	Lakadia	7*	3000-10000	11475	23482	13482
Surajbari	Samkhaili	Samakhiali	7*	3000-10000	19936	23018	13018

* Partly converted into four lane and rest under implementation.

3.4.3 Anjar-Mandvi Corridor

The Anjar-Mandvi corridor running parallel to the coastline of Kutch is presently 7 meter wide and the PCUs on these route too has exceeded the desired capacity. Traffic on this route up to Mokha is constituted of traffic generated by Mundra and P & O ports, with power driven vehicles plying on the road. Furthermore, this intensity is also carried up to Mandvi (famous as tourist spot). The Kodiai count post on this route reflects the highest traffic density of the order of 31023 PCUs. However, Government has declared the conversion of the road linking from Bhachau-Anjar up till Mundra as National Highway; moreover this needs to be extended till Mandvi and Jakhau (salt pans) because of increasing activity near the coast.

Table 3.8: Anjar Mandvi Section

Name of the Road Section		Count post	Width of carriage way (in mt.)	Traffic Handling Capacity (PCUs Range)	Traffic intensity per day in PCUs		Access Traffic Load in PCUs
					April	October	
Anjar	Mokha	Sinughar	7	3000-10000	9492	18423	8423
Mokha	Paragpar	Gundala	7	3000-10000	7917	18225	8225
Paragpar	Talwana	Bidada	7*	3000-10000	8522	14699	4699
Talwana	Kodiai	Kodiai	7*	3000-10000	9341	31023	21023
Kodiai	Mandvi	Mandvi	7*	3000-10000	12773	18004	8004

*Being strengthened

3.4.4 Bhuj-Bhachau Corridor

Bhuj – Dudhai – Bhachau corridor is a potential corridor for industrial growth. Traffic already is flowing in access capacities.

Table 3.9 Bhuj Bhachau Section

Name of the Road Section	Count post	Width of	Traffic	Traffic intensity	Access Traffic Load in

[2] The PCUs figures in the table presented here are sourced from 'Traffic Census Results' 2002, released by Directorate of Economic and Statistics, Government of Gujarat, Gandhinagar. Also the handling capacity mentioned is sourced from the same.

			carriage way (in mt.)	Handling Capacity (PCUs Range)	per day in PCUs		PCUs
					April	October	
Kukma	Dudhai	Madhapur	7*	3000-10000	17022	17498	7498
Dudhai	Kukma	Kaniabe	7*	3000-10000	10808	9016	808
Bhachau	Bhuj	Bhachau Rly	9.75	3000-10000	21597	22201	12201

*recently strengthened with better solders

3.4.5 Other Corridors from Bhuj

As per the available 2002 traffic census results, Bhuj-Kandla section is congested. Bhuj-Mundra section is set to transcend the designed capacity in the near future due to increasing activities Mundra Port and MSEZ.

Table 3.10: Corridors from Bhuj

Name of the Road Section		Count post	Width of carriage way (in mt.)	Traffic Handling Capacity (PCUs Range)	Traffic intensity per day in PCUs		Access Traffic Load in PCUs
					April	October	
Bhuj	Kandla	PWD Store	10	10000	9557	13598	3598
Bhuj	Mandvi	Sukhpar	7	3000-10000	5763	6025	Adequate
Bhuj	Mundra	BSF Camp	7	3000-10000	2702	2751	Adequate
Bhuj	Mundra	Mulydra	7	3000-10000	6089	6250	Adequate
Mundra	Mundra Port	Mundra Sch	7	3000-10000	5216	5856	Adequate

3.4.6 Bhuj-Khavda-Kunvarbet Corridor

The Bhuj-Khavda-Kunvarbet corridor which as per traffic census 2002 is 7 meter wide has also crossed the designed capacity of 10,000 PCUs per day. The traffic at this corridor has reached to 13,364 PCUs per day. Traffic is high in this section due to setting up of bromine based industries near Khavda and the existing army bases.

Table 3.11: Bhuj-Khavda

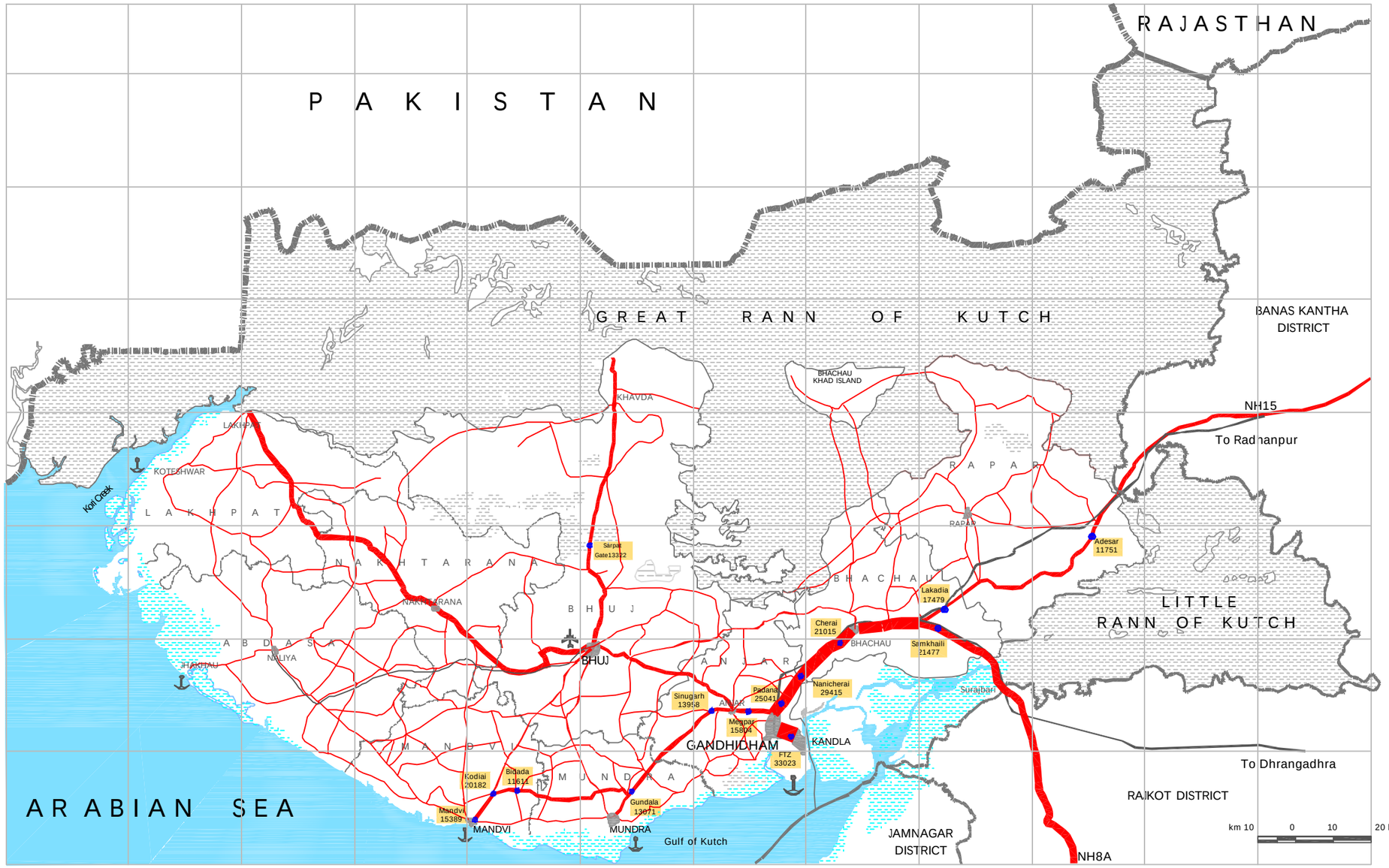
Name of the Road Section		Count post	Width of carriage way (in mt.)	Traffic Handling Capacity (PCUs Range)	Traffic intensity per day in PCUs		Access Traffic Load in PCUs
					April	October	
Khavda	Kunvarbet	Khavda Insp.	7	3000-10000	12876	10125	2876
Bhuj	Khavda	Sarpat gate	7*	3000-10000	13279	13364	3364

* Being strengthened

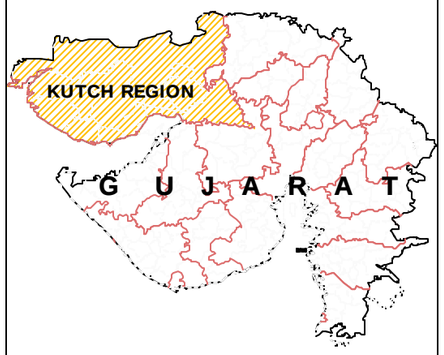
3.4.7 Bhuj-Jakhau Corridor

Similarly, the Bhuj-Jakhau corridor has also crossed its capacity. These roads as per census 2002 are only 3.6 meter wide and the desired capacity (3000 PCUs) has already been crossed to 6000 PCUs per day.

Table 3.12: Bhuj Jakhau



KEY MAP



LEGEND

- International Boundary
- State Boundary
- District Boundary
- Taluka Boundary
- Railway Line - Broad Gauge
- Railway Line - Metre gauge
- Water Bodies
- Rann
- Urban Settlements
- Mud Flats
- Count Post
- Major Port
- Minor Port
- Air Port

Thousand PCU's per day

- 31 and above
- 26 to 30
- 21 to 25
- 16 to 20
- 11 to 15
- 6 to 10
- 0 to 5

From	To	PCU 000's per day
Radhanpur	Samkhaili	15
Surajbari	Samkhaili	21
Samkhiali	Kandla	23
Bhachau	Gandhidham	27
Gandhidham	Kandla	33
Anjar	Mandvi	15

From	To	PCU 000's per day
Bhuj	Lakhpat	18
Bhuj	Khavda	13
Bhuj	Anjar	08
Bhuj	Kandla	12
Bhuj	Mandvi	06
Bhuj	Mundra	06
Bhuj	Bhachau	08

N

Source : Prepared fromTraffic Census 2002; Directorate of Economics and Statistics, Government of Gujarat, Gandhinagar

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R0	29.10.04	MAS	Issue for ------ Report Submission	VG	AK

Kutch Region

Traffic Volume

Study on
Development Potential of Kutch

Drawn	MAS
Checked	VG
Approved	AK
Scale	1:1200000

Drawing No. 214002/TRAFFIC-VOLUME-MAP/0008

Rev.	Status
R0	APR

Name of the Road Section		Count post	Width of carriage way (in mt.)	Traffic Handling Capacity (PCUs Range)	Traffic intensity per day in PCUs		Access Traffic Load in PCUs
					April	October	
Nalia	Thavo	Nalia	3.66	1000-3000	5476	7421	4421
Deralpur	Nalia	Mothala	4	1000-3000	6374	5901	3374
Thavo	Sant Road	Thavo	3.66	1000-3000	5854	5609	2854
Bhuj	Lodia	Nagor	3.66	1000-3000	8230	9587	6587

3.4.8 Bhuj-Nakhatrana-Lakhpat Corridor

In the western part of the region that is the Bhuj-Nakhatrana-Lakhpat (mineral wealth zone) corridor has crossed its capacity of 10,000 PCUs per day at Sukhpar count post (19,363 PCUs per day). Also, Nakhtrana - Devisar road section is handling access PCUs on the existing 3.6 meter wide road.

Table 3.13: Bhuj Lakhpat Section

Name of the Road Section		Count post	Width of carriage way (in mt.)	Traffic Handling Capacity (PCUs Range)	Traffic intensity per day in PCUs		Access Traffic Load in PCUs
					April	October	
Bhuj	Lakhpat	Sukhpar	7	3000-10000	19363	16120	9363
Bhuj	Lakhpat	Kotda	7	3000-10000	5978	5529	Adequate
Kotta	Bitta	Vamoti	3.66	1000-3000	2505	1629	Adequate
Desalpur	Hajipir	Desalpur	3.66	1000-3000	3173	1104	173
Dayapar	Pandhro	Dayapar	7	3000-10000	5389	4171	Adequate
Pandhro	N'Sarovar	Pandhro	7	3000-10000	2433	1994	Adequate
Bhuj	Mirona	Zura	3.66	1000-3000	1058	1449	Adequate
Nakhtrana	Devisar	Devisar	3.66	1000-3000	1079	11606	8606

3.4.9 Mandvi-Gadhshisa-Nakhatrana Corridor

The South western part of the region, the Mandvi-Gadhshisa-Nakhatrana corridor has road width of 3.6 meter and the traffic intensity is already operating surplus (14,398 PCUs) to the designed capacity.

Table 3.14: 6Mdandvi Nakhatrana

Name of the Road Section		Count post	Width of carriage way (in mt.)	Traffic Handling Capacity (PCUs Range)	Traffic intensity per day in PCUs		Access Traffic Load in PCUs
					April	October	
Mangwana	Gadhshisa	Bhadai	3.66	1000-3000	16687	17398	14398
Ghadhshisa	Halapur	Ghadhshisa	3.66	1000-3000	5555	4987	2555

3.4.10 Gadhada-Rapar-Chitrod-Bhachau Corridor

The Gadhada-Rapar-Chitrod-Bhachau corridor, however are still under the desired capacity. This section may not need immediate up gradation.

Table 3.15: Gadhada Bhacuau

Name of the Road Section		Count post	Width of carriage way (in mt.)	Traffic Handling Capacity (PCUs	Traffic intensity per day in PCUs		Access Traffic Load in PCUs
					April	October	

				Range)			
Balasar	Mauwana	Bella	7.5	3000-10000	6805	7000	Adequate
Rapar	Devpur	Trambo	7.5	3000-10000	7113	7499	Adequate
Rapar	Fategadh	Salari	7.5	3000-10000	4868	5162	Adequate
Fategadh	Adesar	Moda	7.5	3000-10000	7650	7917	Adequate
Adesar	Rapar	Bhimasar	7.5	3000-10000	6037	6259	Adequate
Ramvav	Bhachau	Kakarva	7.5	3000-10000	7158	7722	Adequate

3.5 Problems Related to Road Development

- Inadequate capacities in major roads
- Requires better and sophisticated regional roads linking major cities within the region for rapid industrialisation
- Sometimes access road development for newly established industries is a problem due to land issues
- Connectivity in the western mineral rich Kutch is a problem
- Lack of internal roads in the mining areas
- Lack of internal roads in the salt pan areas

3.6 Road Development Strategies and Actions

3.6.1 Strengthening Trade and Agglomeration Support and Industry Linkage Roads

Corridors such as Bhuj – Anjar – Gandhidham, Bhuj – Dudhai – Bhachau, Bhuj – Mundra and the existing national highways are extremely important for facilitating potential businesses and agglomeration economies in Bhuj, Gandhidham, Mundra and Bhachau and also for facilitating industrial growth along these corridors. More than 90 percent of the total industrial projects (commissioned as well as under implementation) are presently located within these corridors.

3.6.2 Strengthening Port Connectivity

Connectivity to the ports is the most important consideration. National highways are the principal linkages for both Mundra and Kandla ports. But regional connectivity through corridors such as Bhuj – Kandla will be extremely important for the region for supporting industrialisation and economic growth within the region.

3.6.3 Salt and Mining Area Roads

Access and internal roads and road access to the mining areas can be developed in partnership of the private or group of private investors and state government. A salt pan infrastructure committee can be formed and co-ordinated effort for some level of road network planning in specific areas will be of extreme importance.

Mining area access roads (if exclusive) can be developed in 50:50 partnership of industry and government. It has been noticed that some industry are willing for 100 percent investments for development of such roads.

3.6.4 Improving General Regional Rural Roads

Due to scarce settlement pattern and low density, road density can not be the criteria for rural road development. It is envisaged that all the existing rural roads (1933 km – R&B Data) to be maintained and out of these 306 km (15.8 %) unsurfaced roads to be converted into surfaced roads.

3.6.5 Speed and Quality; Major Criteria

Usually design speed is not seen as an important aspect while development of road in India. Design speed for particularly the corridor roads and port connections should be fixed. International cases reveal that majority of the business hubs possesses roads with more than 100 km per hour speed and these are catalysing foreign investments to flow into these hubs. For e.g. Shenzhen boosts its 120 km per hour speed highways and similar roads are there in Taiwan, Thailand, Malaysia, etc. Speed not only reduces journey time and provides comfort, but also create very positive impression on development mechanism in a particular region. Roads such as Bhuj – Gandhidham and Bhuj – Mundra can be specifically developed with similar perspective.

3.6.6 Feasibility for Privatisation

Looking at very high PCUs in several corridors such as Bhuj – Bhachau and Bhuj – Gandhidham and potential corridors such as Bhuj – Mundra, there is possibility of private sector participation. Detailed feasibility in these corridors can be taken up.

3.6.7 Integration with Land Development or Corridor Development

If development and maintenance of a road is integrated with land development along the road, private road projects can become more successful and doing so systematic corridor development can be also facilitated. The detailed feasibility of the above mentioned corridors for privatisation may include this option.

3.6.8 Actions, Required

Sr. No.	Corridors	Actions	Approximate Cost INR bill.
1	Anjar – Mundra	45 km, converted into a national highway, requires to be converted into four lane highway.	1.8
2	Bhuj – Kandla	52 km, requires to be converted into four lane highway. Comparative cost is higher as an access controlled expressway is considered.	3.1
3	Bhuj – Bhachau	70 km, requires to be converted into four lane highway.	2.8
4	Bhuj – Jakhau	84 km, requires to be converted into a standard two lane highway from existing 3.6 / 4 m. wide road.	1.2

5	Bhuj – Lakhpat	116 km, requires to be converted into a standard two lane highway from existing 7 m. wide road.	1.7
6	Mandvi – Gadhshisa – Nakhatrana	58 km, requires to be converted into a standard two lane highway from existing 3.6 / 4 m. wide road.	0.87
7	Rural Roads	Surfacing 306 km of rural roads.	0.8
8	Salt Pan Area Road Network	Form salt pan infrastructure committee with government participation. Length to be decided by salt pan area plans prepared in co-ordination.	NA
	Total All Roads		12.27*

* 8 not included.

4. Development of Railways

4.1 Network and Density

Kutch had a poor rail network but recently has started receiving attention for development of a better railway system due to Kandla and Mundra ports and flowing industrial investments. The first railway link was established in the region in 1952, which was meter gauge. By 2001, the total rail length in the region was extended to 372.42 km which was 7 percent of the state's total (5312 km).

But penetration of broad gauge network is very recent in the region and almost whole of western part of the region is yet not linked to such a network. Conversion of metre gauge to broad gauge railway line till Bhuj via Bhachau, Gandhidham and Anjar (Ahmedabad-Kandla-New Bhuj) has been also completed in the late nineties under the Ahmedabad Division of the Indian Railways. Gujarat Adani Port Limited also has completed construction of their 67 km broad gauge port link to Adipur Junction and is operational since mid-2004. On the other hand, recently formed Kutch Railway Company, a joint-sector rail company established by Gujarat Adani Port Ltd., Kandla Port Trust, Government of Gujarat and the Indian Railways is constructing Gandhidham-Palanpur Link to shorten distance from the ports to their northern Indian hinterland.

The region is well connected to other major cities for passenger movements. Gandhidham and New Bhuj are the major stations and have long distance passenger train connectivity to Ahmedabad, Mumbai, Pune, Bangalore, Jaipur and New Delhi.

4.2 Traffic Flow Pattern

The Gandhidham and surrounding stations have a total handling capacity of 28 rakes per day i.e. 65 to 70 thousand metric tonnes of cargo per day. About 21 thousand metric tonnes of capacity is designated for handling petroleum and oil products. During 2002-03, Railways have handled 54 percent of export traffic of Kandla Port, 75 percent of import traffic of Mundra Port and 95 percent of total production of IFFCO. Kandla and Mundra Port together constitutes 36 percent of the total handling capacity.

Table 4.1: Railways, Cargo Traffic in Gandhidham Area

S. No.	Loading/ Unloading Station	Handling Capacity (rakes/day)
1	Gandhidham Goods Shed	3.5
2	IFFCO siding	2.5
3	FCI siding	2.0
4	***Kandla Port***	***5.0***
5	***Mundra Port***	***4.0***
6	NFST siding	2.0
7	LPG siding	1.0
8	Khari Rohar	4.0
9	Chirai	1.0
10	Bhimasar	1.0
11	Samakhiali	1.0
12	New Bhuj	1.0
	Total	**28**

Source: Chamber of Commerce and Industry, Gandhidham

4.3 Investments and Initiatives

In 2004 January, Railway Vikas Nigam a special purpose vehicle has been formed for implementing Gandhidham-Palanpur (313 km) gauge conversion project in participation with the Government of Gujarat, Mundra and Kandla Ports. The project cost including financing charges and contingency is estimated at INR 4530 mill. An equity base of INR 2000 mill has been proposed for the company and the balance cost is to be funded through debt. The equity participation in the project is by the Ministry of Railways (50%), Government of Gujarat (4%), Kandla Port Trust (26%) and Gujarat Adani Port

Ltd. (20%). The project is to be completed by Jan 2006 and will cut short the distances from Kandla and Mundra Ports to North Indian cities. Presently broad gauge line connects Kutch with Ahmedabad via Saurashtra further south.

Gujarat Adani Port Ltd has already built the 67 km Mundra-Adipur (Near Gandhidham) connecting the existing Bhuj-Gandhidham-Ahmedabad broad gauge line of the Indian Railways. The line is in operation since December 2003.

In the recently held Vibrant Gujarat Investor's Summit 2005, the Rail Vikas Nigam ltd has also signed MoU for Bhildi-Samdari Gauge Conversion, 300 Cr., 223 km, which will substantially shorten distances to North India.

The railway budget of 2005-06 also has allocated funds for Bhuj – Naliya Extension to Baranda in the Lakhpat taluka to connect major mining areas in the western Kutch.

4.4 Problems and Potentials

- Due to smaller and scattered settlement pattern and lack of threshold population, passenger transportation in all parts of Kutch will not be viable
- Viability of railways in the region will be dependent only on goods transportation
- But gradual agglomeration of activities and increase in population in Bhuj and Gandhidham shall push passenger rail transportation demand upwardly
- Due to development of Mundra port and Mundra SEZ along with other industries in the region a primarily cargo based sophisticated rail transportation system can be viable and it may later provide opportunity for running some passenger trains as social responsibility.

4.5 Possible Measures

- Extension of BG line to connect, Bhuj - Naliya – Jakhau
- Possibility of double decked goods transportation system for efficient cargo transportation
- Possibility of RVNL's role with more partners

5. Airports and Linkages

5.1 Spatial Distribution

Table 5.1: Passenger statistics at Bhuj and Gujarat Airport

Year	Embarking			Disembarking		
	Bhuj	Gujarat	B%G	Bhuj	Gujarat	B%G
1999-00	27901	542980	5.14	31562	622978	5.07
2000-01	32827	648008	5.07	34690	650721	5.33
2001-02	27728	615538	4.50	31492	615292	5.12

Source: The Indian Airlines Corporation, New Delhi

Air connectivity plays a crucial role in development of trade and commerce and tourism enabling quick mobility of both passenger and cargo. Gujarat has six airports of which the international airport is located in Ahmedabad. Bhuj and Kandla are the two domestic airports in the Kutch. Presently, Kandla airport is not operational.

Table 5.2: Cargo statistics at Bhuj and Gujarat Airport (tonnes)

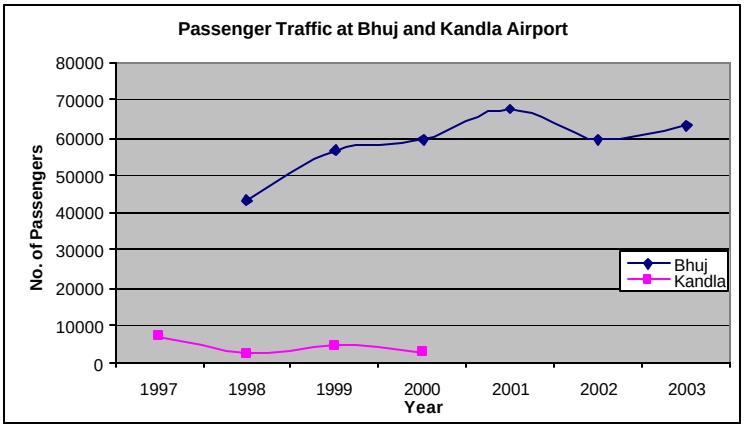
Year	Embarking			Disembarking		
	Bhuj	Gujarat	B%G	Bhuj	Gujarat	B%G
1999-00	10	5551	0.18	44	4061	1.08
2000-01	9	6040	0.15	402	6250	6.43
2001-02	14	6143	0.23	27	3451	0.78

Source: The Indian Airlines Corporation, New Delhi

5.2 Performance

Of the six operational airports in Gujarat, Ahmedabad and Baroda forms the main airbases in the state. In 2001-02, the total passenger traffic at Ahmedabad airport (domestic and international) was 60 percent of the state. Bhuj is the only operational airport in Kutch and handled 60,000 passengers in 2001-02, which is only 5 percent of the state. Bhuj airport handled 44 tonnes of cargo in 2001-02, which is 0.4 percent of the total cargo movement by air from the state.

5.3 Investments and Initiatives



During past few years Kutch has experienced rapid inflow of investments. New initiatives such as the Mundra Special Economic Zone shall create demand for better aviation infrastructure and connectivity in near future. Many investors in the region have demanded renovation and revitalisation of the Kandla Airstrip. With privatisation, and entry of cheap airlines in to the market these airports are potential of generating better demand. Recently, the Government of Gujarat has announced[3] INR 40 million for developing the Mandvi air strip.

[3] Source: CMIE

5.4 Air Traffic and Airports

The passenger traffic at Bhuj airport has been continuously growing from 1998 to present at the rate of 7.9 percent (CAGR). As per the OD survey information mentioned in the Aviation Master Plan of Gujarat by GIDB, around 33-35 percent of the passenger traffic at the Bhuj Airport was originated due to business purposes. Also, around 35-45 percent of above traffic was to Mumbai and 20 percent to Delhi.

Table 5.3: Key Attributes of Air Travel Potential as Identified in the Aviation Master Plan for Gujarat 2004, GIDB:

Sr. No.	Route	Key Attributes	Findings
1	Ahmedabad – Bhuj	2 key urban nodes; existence of traffic driver (Mundra port, Kandla, new units at Kutch owing to Kutch incentive)	Relatively low rail connectivity; reasonable traffic base
2	Surat – Saurashtra & Kutch	Key Urban Nodes; existence of traffic driver (movement of diamond merchants)	Reasonable potential assessed through stakeholder discussion
3	Mandvi – Mumbai	Linkage to Mundra Port	Mundra port likely to create own airstrip
4	Mandvi – Delhi	Linkage to Mundra Port	Mundra port likely to create own airstrip
5	Kandla – Mumbai	Linkage to Kandla Port, industrial area and Gandhidham	Linkage requirement expressed by industrialist
6	Kandla – Delhi	Linkage to Kandla Port, industrial area and Gandhidham	Scarcity of direct existing rail traffic

Estimates of Air Traffic at Bhuj Airport

The estimates given below are based on the model shifts of traffic from road and rail to air.

Table 9.86: Aviation Traffic Forecasts for Bhuj Airport (PAX)

Type	Projection		Probable Growth Rate
	2005	2015	
Passenger	68300	101100	4%
Cargo (tonne/annum)	50	80	

Source: GIDB, Aviation Master Plan for Gujarat State 2004

5.4.1 Review of the Aviation Master Plan Estimates

The aviation master plan has incorporated historical trend analysis and best judgment through stakeholder discussions for forecasting traffic at airports with scheduled flights such as Bhuj and O-D Survey results, model shift potentials and stakeholder discussions for predicting potential air traffic from the new airport sites. It mentions that mathematical correlation of air traffic and GDP could not be established for key airports. In this case, it is certainly saying that it could not establish relationship between the key airport's and state's GDP as there are no accounts for district level income. But it has been seen that there is a strong correlation between state's GDP and total air traffic (total air traffic from 1996 to 2004). The relationship is established at 0.68, which is considerably high. Secondly, air traffic from individual airport is related to sub-state level economy such as city economy or regional

economy. For Bhuj airport traffic, therefore economy and investments in Kutch will be more important determinant than Gujarat's economy.

Economy of Kutch is undergoing substantial changes during past three years. An investment of INR 70 billion in industries is either commissioned or under implementation during past three years and total proposals for INR 190 bullion investments have been made in Kutch. Such a huge amount of investment has significant impact on regional economy including creation of around 70,000 new employments only in secondary sector. The estimates for 2011 envisages a total investment of around INR 320 billion potential of generating additional 1, 50,000 total employment. This will significantly change regional economic dynamism inclusive of demand for air traffic. GDP and per capita income for Kutch have been estimated for 1998-99 and 2001-02 and it shows annual per capita income increase of around 7 percent. A relationship has been established between per capita income of Kutch and aviation traffic of Bhuj (Kutch as Kandla airstrip's share was less and was for only few years) and the basis of it the air traffic is estimated at 1, 37,719 in the year 2011. Therefore, it is envisaged that the investment of INR 150 million for up-gradation of Bhuj Airport proposed by 2015 in the plan may be reconsidered for 2007-08.

5.5 Airport Infrastructure and Air-linkages Development Strategies

5.5.1 Development of Kandla Air-strip and Private Sector Participation

During the interactive sessions, many entrepreneurs along with Mundra SEZ and port and Gandhidham Chamber of Commerce have strongly favoured up-gradation and opening up of the Kandla airstrip. Looking at the pace of industrialisation and tertiary activity agglomeration of Gandhidham – Anjar – Chirai – Kandla and Bhachau belt, it envisaged that Kandla airstrip can be a viable option too. A joint sector participation in the tune of Kutch Rail Vikas Nigam Ltd can be thought of.

5.5.2 Luring Cheaper Airlines

Cheaper airlines are capable of changing traffic demand patterns in the region. Intensive modal shifts and increase in industrial demand can be envisaged. Sources reveal that industries in the region, particularly Mundra and Kandla SEZs are already taking initiatives to attract Deccan Airlines to start a 50 seater flight from Kandla Airstrip and Ahmedabad.

5.5.3 International Airport

With increasing industrial activities and possible agglomeration in Bhuj, Gandhidham and Mundra, an international airport can be a viable option by 2020. Feasibility studies of such projects can be initiated during the middle of the next decade.

6. Power Infrastructure

6.1 Overview

Gujarat is one of the most industrialised states in India. Continued industrialisation and urbanisation are the key factors governing the power demand in the state. With continuous power sector reforms[4] and with the entry of private players in the power production, the scenario of power generation has improved considerably. The state has power plants with various bases from coal, lignite, naphtha, oil to natural gas.

At the central level, the Ministry of Power estimates that to support government targets for 8 percent annual GDP growth, the power supply will have to increase by more than 10 percent per annum. This would require a substantial role of private and foreign investments in power production. The government has focused much attention on coal (due to abundant reserves) as the means to generate half of its future electricity demands. Oil and natural gas have been downplayed somewhat because of uncertainty in global supply and price. Gujarat and Kutch have large reserves of lignite (brown coal) a potential source for power production. It is estimated[5] that by 2009 coal and lignite would form 58 percent of power production in Gujarat.

6.2 Installed Capacity, Generation and Spatial Distribution

Potential of power generation in the region yet not fully exploited. While the total installed capacity of power generation in Gujarat is 8845 MW (as on 2003), a meagre 215 MW of capacity has been installed in Kutch. Even private players have yet not entered in the region. On the other hand, the private sector contribution to the total installed capacity in Gujarat has increased from 11 percent in 1990 to 31 percent in 2003.

Table 61: Installed Capacity of Power in Gujarat, 2003

S. No.	Authority	Installed Capacity (MW)	% Installed Capacity
1	GEB	4540	51
2	IPP's	2743	31
3	NTPC+NPC	1562	18
TOTAL (1+2+3)		8845	100

Source: Gujarat Power Corporation Ltd., Gandhinagar

In Kutch the existing Panandhro thermal power plant under Gujarat Electricity Board (GEB) has an installed capacity of 215 MW, which is a lignite based plant. Expansion of Panandhro plant with an additional capacity of 75 MW is presently under consideration. GMDC is also currently implementing a lignite based power plant in Akrimota with a capacity of 250 MW. Moreover, Adani group, which is developing an SEZ in Mundra, may opt for setting up a power plant and distribution activities.

Due to unique geomorphologic conditions Kutch also enjoys potential of tidal energy production. World energy council has enlisted two sites in India viz., Gulf of Kutch and Gulf of Khambhat for tidal energy production. The studies estimate around 915 MW of potential energy capacity, which can

[4] IIM Ahmedabad Study, 'Impact of Power Sector Reforms', case study Gujarat-2004.
[5] Gujarat infrastructure agenda, Vision 2010.

be developed in Gulf of Kutch, with an annual output of 1.6 twh/yr and an annual peak load factor of 22 percent.

Presently, most of the power plants in Gujarat are located in south and central Gujarat. Kutch has one operating power plant operated by GEB and the other is being established at Akrimota by GMDC. The district presently meets its additional power demand from the rest of the region, which results in high distribution losses (state's and India's transfer and distribution losses are 20 and 30 percent respectively).

6.3 Electricity Consumption

Gujarat is one of the most industrialised states in the country; the per capita consumption of electricity in the state was 688 units in 2001 compared to India's average of 350 units. Per capita consumption of electricity is the highest in the industrial sector and accounts for 28 percent of total electricity consumption and it has grown at a CAGR of 2.5 percent from 1990-00. The present energy deficit in the state as a whole is 9.7 percent which is higher than India's average of 7.8 percent. Existing supply in the region is extremely inadequate. In terms of coverage in Kutch, by the year 1999-2000, along with all the urban areas, almost 93 percent of the total villages in the region have been electrified (Centre for Monitoring of Indian Economy, Ahmedabad). Power cuts are even problems in the larger cities such as Gandhidham.

Table 6.2: Consumption of Electric Power

Electricity consumption	Domestic	Commercial	Industrial	Others	Total
Gujarat per capita (2001)	77.6	25.3	194.1	391.1	**688.1**

Source: Computed from data source of GEB Vadodara

6.4 Investments and Initiatives

Looking at the potential created by the vast lignite resources in the region, the Government of Gujarat has taken initiatives for exploiting lignite reserves for power generation. Two lignite based power plant project with an investment of INR 27.34 billion are coming in the district. Another, INR 22.00 billion is envisaged for wind power production in the district. Out of the total investment flowing in this sector INR 20.55 billion is already under implementation and another INR 28.80 billion is announced.

Table 6.3: Investments in Power Projects in Kutch

Project	Cost INR in bn	Status
Suzlon Energy Ltd. Kutch wind power project	22.00	Announced
Akrimota Power Project	17.50	Under implement.
Panandhro Power Project - II	6.80	Announced
Panandhro Power Project - IV	3.05	Under implement.
Total Investments	**4934.69**	

Source: CMIE

As a whole, under the vision 2010 document of Government of Gujarat, the state envisaged INR 551.67 billion for 22 power projects (47% of total investment in infrastructure projects). In the tenth plan outlay (2002-07) the expenditure on power sector in the state is estimated to be INR 103.50 billion.

6.5 Assessment of Demand – Supply Gap

Demand for power has been estimated through developing two separate scenarios. Firstly samples of industrial consumption patterns have been studied and relationship between industrial investments and power generation requirements is established. It is estimated that at a safe side, for every INR 200 million investments 1 MW power generation capacity should be established. In that case by 2011 for an estimated investment of INR 320 billion additional requirement for generation of power for only industrial purposes will be approximately 1600 MW, which will be increasing to 2100 MW in 2015.

215 MW of power is being generated from the existing Panandhro power plant, which is local lignite based plant. A capacity of 250 MW is being under implementation at GMDC's Akrimota plant. An additional 75 MW in Panandhro and 250 MW in Akrimota are being planned by GEB and GMDC respectively. Sanghi Cement has its own oil based captive plant with a capacity of 55 MW and Mundra SEZ is planning for a 250 MW plant.

Satisfying future industrial demand for power in the region will be extremely important. Due to availability of ports and also due to favourable natural conditions, power generation in Kutch can be based on imported LNG, coal and wind power. The future industrial requirement for the year 2011 can be fulfilled adding new capacities through the following ways:

Sr. No.	Source	Capacity (MW)
1	LNG based power plant (refer LNG terminal)	1000
2	Imported coal based plant	500
3	Wind power	500 (20% will be available)
	Total	1600

The consumption of electricity by residential sector in Gujarat in 2001 was 12 percent, which means rest 82 percent is consumed by commercial, industrial, agriculture, railways and others. Also, 93 percent of the villages in Kutch are electrified, which means the present supply of electricity more or less caters residential demand. However, the rest 82 percent of the consumption shall only cover commercial, agriculture, railways and small scale industries. Large scale industries such as alumina plant, cement plant, etc, which require huge amount of electricity, needed to establish there own captive power plant to ensure consistency and avoid power shedding.

6.6 Wind Energy Potential in Kutch

The region of Kutch so far has not been well served with power / electricity infrastructure. The reason for which can be attributed to the following factors:

- Overall low economic activity levels (especially in manufacturing sector)
- Farming largely rain dependent due to non-availability of perennial water sources
- Vast size of the region with sparse population (many of which are inhabiting in remote areas)

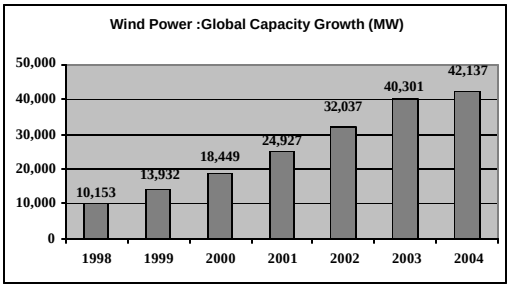
All these factors make extending grid lines extensively in the region (to low demand segments, i.e. Villages) a non-viable proposition taking into account high losses. Hence, very large numbers of rural areas of the regions are devoid of electricity.

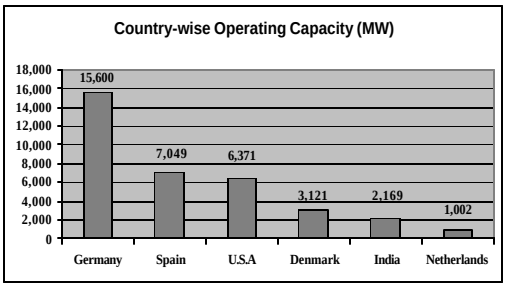
It is well understood that the large projects and projects planned in clusters/ estates / SEZs/ Port vicinity are likely to have captive or shared power infrastructure for power. But the problems of serving rural power needs will not be effectively solved if appropriate means are not devised to address these needs. For the long term sustainable development of the region, it is essential to find effective ways for increasing energy supplies.

In the context of Kutch region, the option of renewable energy sources especially harnessing wind energy for power generation offers good prospects.

6.6.1 Wind Energy: Global Scenario

Wind power is one of the most popular and commercially exploited renewable energy options in the world. Germany, USA and Denmark are the world leaders in wind power energy. Global wind power capacity has touched 42000 mw.





Worldwide, wind power has achieved rapidly increasing levels of technological and economic maturity in the past two decades. Decreasing capital costs, a variety of production, capital and tax subsidies and more robust wind turbines have increased the potential opportunity for wind power to penetrate in both grid-connected and remote generation applications.

6.6.2 Indian Scenario

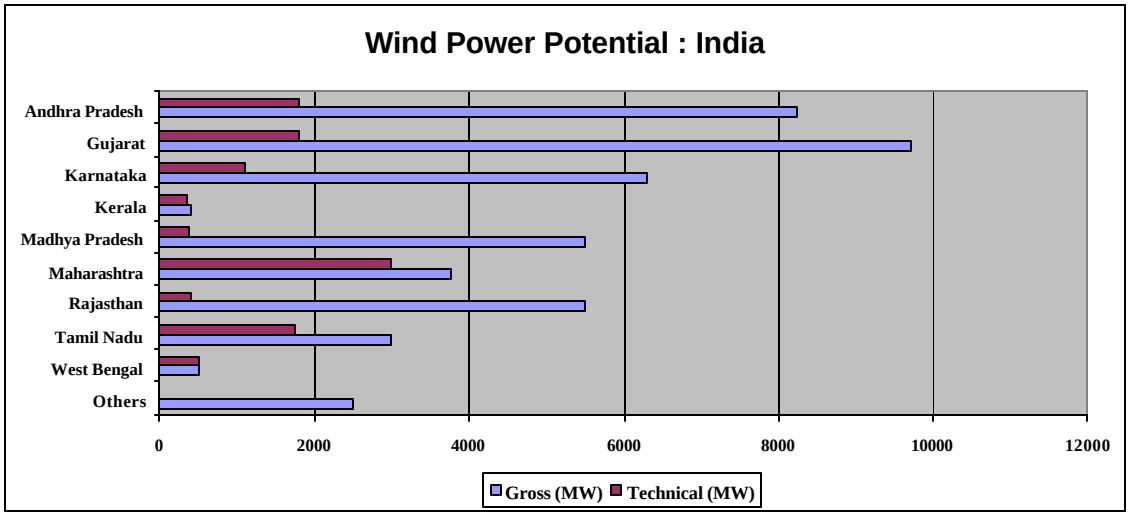
The Wind power programme in India was initiated towards the end of the Sixth Plan, in 1983-84. A market-oriented strategy was adopted from inception, which has led to the successful commercial development of the technology.

The broad based national programme includes wind resource assessment activities research and development support implementation of demonstration projects to create awareness and opening up of new sites involvement of utilities and industry development of infrastructure capability and capacity for manufacture, installation, operation and maintenance of wind electric generators and policy support

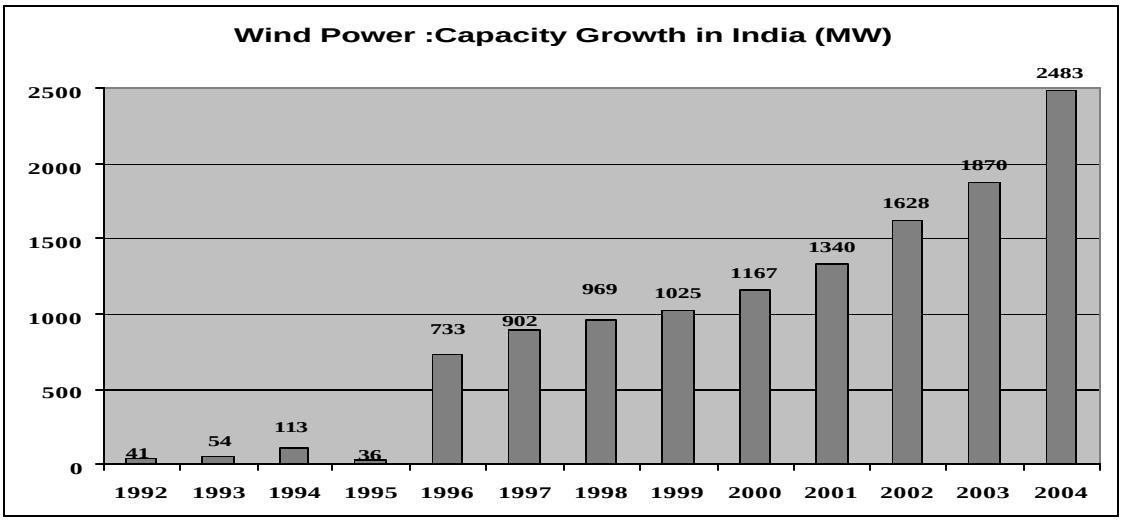
The programme aims at catalyzing commercialization of wind power generation in the country. India is among the top five countries in Wind Power Installations

India has implemented a major wind resource assessment program comprised of wind monitoring, wind mapping and complex terrain projects, which cover 800 stations in 24 states. Wind surveys have

identified specific wind power production locations, and in 2000 demarcated 177 sites in 13 states with the potential for about 45,000 MW of installed capacity (at 50 mt hub height).



As on March 2004, about 2483 MW capacity has been installed, thus leaving huge potential untapped.



Source: MNES

Govt. of India has proposed capacity Installation of 10,000 - 12,000 MW of renewable energy sources over next 10 years. Ministry of Non-conventional Energy Sources, Government of India plans to generate 50% of above from wind energy translating into annual additions of 5000 - 6000 MW

Wind in India are influenced by the strong south-west summer monsoon, which starts in May-June, when cool, humid air moves towards the land and the weaker north-east winter monsoon, which starts in October, when cool, dry sir moves towards the ocean.

During the period march to August, the winds are uniformly strong over the whole Indian Peninsula, except the eastern peninsular coast.

Wind speeds during the period November to March are relatively weak, though higher winds are available during a part of the period on the Tamil Nadu coastline.

A notable feature of the Indian programme has been the interest among private investors/developers in setting up of commercial wind power projects

A good local production base for wind turbines now exists in India, with most of the leading, state-of-the art international models manufactured and installed by local companies. Suzlon Energy Limited is the largest fully-integrated wind power company in India. Wind turbines made in India, are also being exported, as evidenced by the Pune-based, Suzlon Energy's recent exports to China and the U.S. Suzlon is ranked the ninth largest wind energy turbine manufacturer in the world, and plans to export 1500 MW of turbines over a period of a few years.

The local manufacture of wind turbines has helped to reduce both costs and the need for imports. Large-scale wind farms are now planned on an Rs 40 million/MW basis (or approximately $833/kW), which is 10% less than wind farms that use imported machines. Two of the world's leading wind turbine makers, Danish Vestas and NEG Micon, are both expecting strong growth in India, the fifth biggest wind power market in the world. The Vestas India joint venture, expects 6000–7000 MW of wind power to be installed in India over the coming 10 years.

Table 6.4: Major Wind Turbine Producers in India

Company	Foreign collaborator
Asian Wind Turbine	NEG-Micon, Denmark
BHEL	Nordex, Denmark
Das Lagerwey	Lagerwey, Nether lands
Enercon (India) Ltd	Enercon GmbH, Germany
Kirloskar Electric	Wind Energy Group, UK NEPC India
Pioneer Wincon	Wincon, Denmark
Suzlon Energy	Sudwind Energie, Germany
Vestas RRB	Vestas, Denmark

Source: MNES

6.6.3 Gujarat and Kutch Scenario

There are several identified sites (through Wind Energy Survey Program undertaken by the Ministry of Non-conventional Energy Sources) in the Saurashtra and Kutch regions of Gujarat that have adequate winds for wind turbines.

The total wind power potential of the state is on the order of 5000 MW, or approximately 10% of the total potential in India, with Tamil Nadu and Karnataka the two most significant states for wind power. GEDA estimates the potential at 1000 MW for grid-connected wind farms in Gujarat, and has a five-year policy goal of reaching 200–250 MW installed capacity each year.

A rule of thumb for wind developers is to look for sites with at least 18 kmph or 5 meters/second (m/s) annual mean wind speeds and power densities of 140 W/m2 at 20m. The percentage of power during the windiest months, May to September in western India, is also an important criterion, as it directly affects the capacity utilization factor (CUF). Wind farm performance results from the early 1990s in

Gujarat show very low CUF, 10–14%, due to a variety of technical and operational problems, which include:

- Unsuitability of turbine designs to Indian conditions, e.g. lower wind speeds and corrosive environment;
- Incompatibility with the grid;
- Frequent tripping of the generator due to large voltage and frequency fluctuations;
- Failure of lightening arrestors;
- Line faults in power evacuation equipment; and
- Cyclones and extreme weather events (e.g. 27 MW of wind turbines where damaged during the 1998 cyclone season).

The coastal wind farms have performed better than the inland units, with CUFs of 16–17%, compared with 10–11% for the 65 MW of inland capacity.

GEDA attributes the low utilization factor for inland units to poor sitting and a mismatch between the initial mapping of the prime wind resource on the crests of hilly ranges and the eventual sitting of the turbines at lower elevations.

After a lull in investment, the number of large-scale wind projects may be rebounding in Gujarat and demonstrated by the 100 MW of applications GEDA received from September 2002 to January 2003. One factor that should support the long-term growth of wind power in Gujarat is the local capacity to build, operate and maintain wind turbine infrastructure. Several local companies have established themselves in Gujarat to service turbines, including Simms Engineering and Kintech Systems.

In Gujarat, scores of wind test stations have been used to estimate the wind potential in different parts of the state. Following table shows selected results from the field-testing stations operated by the government.

Table 6.5 Selected wind speeds and power at Gujarat monitoring stations, by district

Station	District	Elevation	Mean Annual Wind(m/s)		Mean Annual Wind (W / m2)	
		m.a.s.l.	At Mast	At 30 m	At Mast	At 50 m
Rojmal 2	Bhavnagar	140	5.33	5.61	129	317
Sanador	Bhavnagar	80	5.64	5.97	197.1	373
Kalyanpur	Jamnagar	92	5.49	5.85	207.5	327
Navadra 1	Jamnagar	24	5.57	5.89	182.7	297
Survada	Jamnagar	90	6.14	6.58	166	444
Jamanvada	Junagadh	57	5.56	5.86	149.4	299
Adesar	Kutch	23	5.31	5.58	93.4	307
Bayath	Kutch	-	5.97	6.14	118.2	300
Kukma	Kutch	205	4.86	5.67	149.6	239
Motisindholi	Kutch	5	5.42	5.92	117.9	311
Mundra	Kutch	4	5.78	6.22	167.5	303
Poladiya	Kutch	120	5.56	6.08	177	278
Surajbari	Kutch	9	5.39	5.72	184.2	243
Dhank - II	Rajkot	208	5.66	6.11	327	367

Note - mast height equals 20 m

Source: (CECL, 2003)

The high power densities and wind speeds at 50m means that some areas (i.e. Adesar, Kukma and Surajbari) of Kutch are well suited for wind power.

The state received overwhelming response during the Global Investor's Meet in Gujarat & signed MoUs / IEM for 1100 MW Wind Power Projects.

Table 6.6 MOUs / IEMs Signed for Wind Power Projects

Developer	Capacity	Investment	Land Area (Hectares)		
	(MW)	(Rs.Crores)	Requested	Required	Allotted
Suzlon	500	2200	10079	400	Under Process
Enercon	350	1750	1800	583	29
NEG Micon	250	1000	1640	263	Under Process
Total	1100	4950	13519	1246	29

Expected Generation : 2425 Million Units

This necessitating formulation of Land Policy exclusively for Wind Power Projects. With the initiatives of GEDA & E&PD, Govt. of Gujarat has declared land policy on 11/6/2004 for allotment of land for setting up of wind farm projects in the state. The salient features of the policy are:

- Allotment of Govt. wasteland / Gochar land to developer of Wind farms
- Allotment of 1 Ha. land per Wind Turbine Generator
- Right of Way to wind farm developers on the non-allotted land for laying of transmission lines / sub stations
- Land allotted for Wind Power Projects deemed to be Non-Agriculture
- Land lease for 20 years at prescribed lease rent
- One-time sublease of land to the client of the developer
- Advance possession of land on payment of land cost

The State has always been supportive to Wind Power Projects. The salient features of earlier enacted Wind Power Policy (1993-98) were:

- Energy Buyback @ Rs.1.75 / kWh
- Energy Wheeling @ 2%
- Energy Banking for six months
- Third party sale (later deleted)
- 50% Sales Tax Incentive
- Exemption from Electricity Duty

The capacity installed under 1993 policy was about 150 MW (Wind Turbine Generator Ratings: 90 kW to 350 kW), out of which the present functional capacity is 116 MW.

The policy has been revised in 2002 with following changes:

- Energy Buyback @ Rs.2.60 / kWh with 5 paisa escalation per year for 10 years
- Energy Wheeling @ 4%

- Energy Banking for six months
- Exemption from Electricity Duty

The capacity installed under this policy (as of July 2004) is 42.625 MW (Ratings : 230 kW – 1650 kW). About 766 Hectare Land allotted to 7 developers/ investors. The cumulative generation of all private wind farms has been about 1100 Million units.

Significant initiatives have been taken to develop necessary infrastructure for wind farm power evacuation. The Government has create Wind Farm Sub Stations of 210 MVA at six sites & 66 kV Transmission lines in Jamnagar & Rajkot Districts.

Significant investment in infrastructure has also been done by private developers (see table below):

Table 6.7: Private Developer Investment in Infrastructure

District	Developer	Investment (Rs.Lacs)	Areas of Investment
Bhavnagar	Suzlon Energy	414	Wind farm Substations & 66/132 kV Transmission lines
Kutch	NEG Micon	800	
Jamnagar	Suzlon Energy	869	
	Enercon	490	
Total		2573	

6.6.4 Potential in Kutch

The Kutch region has become one of the important regions on Wind Energy map of India. Few large wind power projects have already been proposed in the region (500 MW Project by Suzlon Energy and 250 MW by NEG Micon). NEG Micon is in fact implementing 50 MW wind farm at Surajbari. Suzlon Structure (Division of Suzlon Energy) is implementing a project to manufacture tubular towers in the region.

From the situation analysis, it can be concluded the he high power densities and wind speeds (at 50m) at following sites are well suited for large wind power generation projects.

- Adesar
- Kukma
- Surajbari

The option of proliferating wind power generation to meet energy needs of rural Kutch is full of promises. A 500 MW Wind power project at 20% CUF have potential to generate about 1000 Million Units, which along with other renewable energy options can meet the energy needs of the rural regions of Kutch to a large extent.

Apart from generating Wind Power, the prospects are also there for the Wind Turbine Manufacturers to set up their manufacturing base (for Turbine and Turbine parts manufacture) in Kutch in view of special incentive package available to projects in Kutch.

6.6.5 Actions and Initiatives Required

The initiatives taken by the state Government so far seems adequate looking at the pace of development happening in this sector in the last decade. Having taken necessary steps on the policy front, the aim now should be to support the long term growth of wind power in Gujarat.

Some of the immediate measures that might be given attention are:

- Speed up allotment of land to developers who are implementing large wind farm.
- Some positive steps like making it mandatory for utilities to purchase 5% of their sold power from renewable sources (solar, wind, hydro, biomass, garbage).

7. Water Infrastructure

7.1 Domestic Water Supply: Coverage and Sources

From the times immemorial Kutch has been a water scarce region. Due to erratic rainfalls and bad ground water conditions Kutch is continuously facing drinking water problems. As per a study done by Gujarat Ecology Commission in 1994, available surface water potential was 390 MCM and the developed was 330 MCM. About 45 percent of the wells serving the area were having saline water (i.e. TDS > 2000 ppm). Total ground water potential was 440 MCM, of which 243 MCM was already developed. Out of 9 talukas, 2 falls under overexploited, 1 under dark category, 4 under grey category and 2 under white category (source: Current Ecological Status of Kutch). Presently water is taken from all the three sources i.e. ground water, surface water reservoirs and Narmada Canal.

Previously most of the villages in Kutch were covered under water supply through pipeline network based on normal wells and bore wells. Later it was realised that this kind of system was not sufficient enough due to increasing demand, diminishing quantity and poorer quality of water from the bore wells. Due to earthquake of 2001, bore wells, pump houses and pumping machineries were severely damaged resulting into huge amount of leakage losses and network disturbances. Temporary arrangements of supply through tankers were started for immediate relief. In 2002, under Asian development Bank's reconstruction project, the state government has initiated a massive water supply project in Kutch with Gujarat Water Supply and Sewerage Board and Gujarat Water Infrastructure Ltd as the nodal public sector agencies.

Table 7.1: Number of Villages Covered under Water Supply Schemes, Kutch

Details	Lakhpat	Rapar	Bhachau	Anjar	Bhuj	Nakhatr-ana	Abdasa	Mandvi	Mundra
Total habited villages	84	97	68	69	146	122	151	89	58
Covered under group water supply scheme	74	81	61	64	110	69	125	42	25
Covered under individual water supply scheme	10	16	7	5	33	46	26	47	33
From pipe line		72	55	64	103	66		42	57
From tanker	17	17	17		7	3			1
From Narmada pipe line		20	49	13	143				2

Source: Gujarat Water Supply and Sewerage Board (GWSSB)

Commencement of Narmada canal played a very important role. Presently there are two main sources of water supply in Kutch, i.e. ground water and pipelines from Narmada canal. For the first time in June 2003 Narmada canal based water supply system started functioning in Bhuj city, Anjar town and in some portions of Bhuj taluka such as in the Banni villages. By April 2003 it has been further extended to Mandvi town and parts of Mandvi taluka. The first phase of the project is being implemented rapidly in other parts of the eastern and central Kutch. At present almost 40 percent of

the Bhachau taluka and 85 percent of Rapar taluka are covered with Narmada canal based water supply pipelines. In the second phase of the project, the bulk transmission main from Kukma to Netra is expected to complete by March 2006 under Sujlam-Suphlam project. After completion of this Lakhpat, Abdasa, Nakhatrana and remaining parts of the Bhuj taluka will be able to receive piped water supply.

Till date, approximately 25 percent of the villages are covered under individual connections through water supply schemes, while 73 percent are covered under community water supply schemes. Almost 51 percent villages are being provided with piped water supply, while 9 percent of total villages are getting water through tankers. Presently 29 percent of total villages are getting water through Narmada canal based pipe lines.

75 villages of Abdasa and Lakhpat talukas are getting water from a joint effort of Sanghi industries and GWSSB. Sanghi industries Ltd. from its desalination plant located in Abdasa is providing 2 MLD water to GWSSB for domestic supply to nearby villages.

7.2 Water Demand Assessment

7.2.1 Assessment of Domestic Water Demand and Supply Gap

Due to scare supply from surface and ground water sources, in future it is anticipated that the Narmada water will be the major potential source of water in the region. The design flow of Narmada pipe line is 236 MLD (year 2021), which is sufficient to fulfil the projected domestic demand.

Table 7.2: Assessment of Demand Supply Gap of Domestic Water in Kutch

Year	Demand (MLD)			Supply Status	Remarks
	Urban	Rural	Total		
Present (2004)	71.8	75.5	147.3	Adequate	Ground water, surface sources and Narmada water is used
2011	93.8	80.5	174.3	Adequate	Narmada water based project will be completed by 2006 to cater to the whole district
2021	122.1	86.7	208.8	Adequate	Narmada pipe's design flow for year 2011 is 236 MLD

Source: DMM estimates, GWSSB, gidb.org

Note1: Estimates for 2011 are based on GWSSB population projections.2 Source for 2021.estimates is gidb.org

As per estimates carried out by GWSSB for the year 2011, total water requirement for Kutch will be approximately 200 MLD. Out of which 155 MLD will be for domestic and 45 MLD for industrial uses.

7.2.2 Assessment of Industrial Water Demand and Supply Gap

As per data on October 2004, a total 60 connections, fulfilling a water demand of approximately 60 MLD has been approved by GWSSB and GWIL for different industries located in Bhuj, Gandhidham, Anjar, Bhachau, Mundra and Mandvi talukas. Main corridors along which industrial connections are being commissioned are Malia- Samakhiali- Bhachau- Gandhidham, Bhachau- Sikra- Amardi, Varsana- Bhimasar- Varsamedi- Anjar- Kukma and Loria- Bhirendiara- Khavda. Except this Narmada water is also supplied to some other industrial establishments like Kandla Special Economic Zone, Kandla Port Trust and IFFCO, Gandhidham etc. Many of the industries have their own bore wells and some of the large industries like Sanghi have their own desalination plants.

Table 7.3: Assessment of Demand Supply Gap of Industrial Water in Kutch

Year	Demand (MLD)	Supply Status	Remarks
Present (2004)	94✦	Inadequate	Demand has been estimated for projects commissioned and under implementation from 2001 to 2004
2011	380	Inadequate	Reservation for Industrial water in Narmada supply is 45 MLD for year 2021

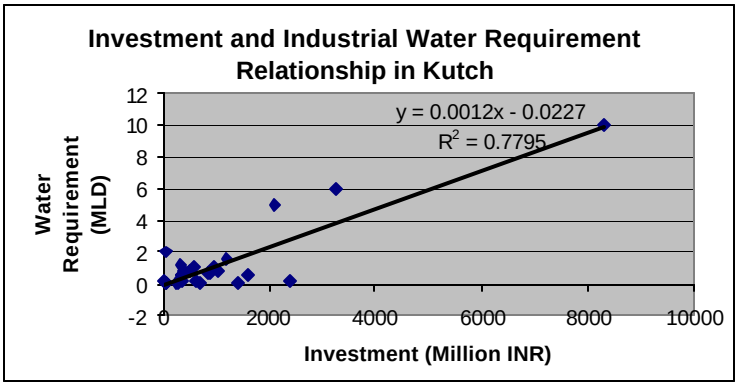
Source: DMM estimates, GWSSB, INDEXT-b

✦*Industrial demand has been estimated on the basis of water requirement pattern of existing industries*

The reservation of industrial water from Narmada has been kept at 45 MLD till the year 2021. Keeping depleted ground water and scarce surface water sources, it is noticed that the most likely dependency for industrial water supply will be on Narmada water. The industries coming into the region have already applied for a large-scale demand for Narmada water. Till November 2004, GWSSB and GWIL has already approved for 62 MLD of Narmada water for industrial purposes. Looking at the lesser domestic consumption than what is targeted by 2021, Narmada water can be strategically supplied to attract industries for next 5 to 6 years, but this has to be carried out through complying certainty of domestic provisions by 2021.

7.2.3 Estimation of Future Industrial Water Demand

A linear regression model has been developed on the basis of industrial investment and demand of water looking at present trend. As per iNDEXTb data from August 2001 to June 2004, projects worth of investment of INR 78943.2 million has been either commissioned or under implementation in Kutch. Substituting this value in the following equation, derived from the linear model (see. scatter diagram) below the water demand generated by the new industrial projects (commissioned and under implementation) in Kutch is estimated to be 94 MLD till June 2004. As per this relationship, for the estimated investment of approximately INR 320 billion in year 2011, the water demand is likely to be approximately 380 MLD. On the other hand, studies of various industrial estates and stand alone units in Gujarat suggest 1 MLD of water demand is usually generated by an investment of around INR 1000 to 1500 Million of investment. Assuming that water intensive industries will not be attracted to the Kutch due to comparative higher cost of water, therefore, additional water demand can estimated at 300 MLD of against an estimated investment of INR 320 billion by 2011.



Y = 0.0012 x -0. 0227, Value of R2 =0.7795

7.3 Strategic Options for Fulfilling Industrial Water Demand Supply Gap

- Increase reservation of industrial water from total supply of Narmada pipe line. This can be a short term temporary solution and may result into shortfall of domestic supply by 2021.

- Increase reservation of Narmada water for Kutch as a whole. Although it has a limit of 236 MLD for year 2021, a substantial may fulfil the requirement.
- Set up desalination plants, at least with a capacity of 150 MLD. For long run solution of the industrial water desalination plants are the most viable option. Estimated cost for a 150 MLD plant is approximately INR 6 billion.

7.4 Issues and Action

- Supply to stand alone industries is a problem, with duplication and un-necessary extension of supply lines. Industrial area plans or zoning is an urgent necessity. The corridor development plans proposed in the spatial development strategies can help in mitigating the problem.
- Setting up of desalination plants is a viable option. Initiative of setting up of desalination plants may be promoted in public private partnership. Large stand alone units can develop their own requirements or group of large and medium or even small units may participate in development of a large-scale plant. A good amount of water can be also spared to domestic demand for industrial workers and near by villages. Sanghi industries ltd has already set up an example (refer next chapter).
- Prepare water supply and use policy for industries. Industrial approval in Kutch should be based on water use policy for industries. To ensure a sustainable industrial development it is necessary to keep a check on the water intensive industries in the region. The industrial proposals should be reviewed for their water demand and probable sources of water to be used by the industry. Exploration of ground water by industries should be restricted, especially in already overexploited areas. But provision of industrial water is essential for attracting industries.
- Generate degraded water resources. Region, which is known for overexploited ground water resources, needs immediate attention for ground water recharge. Rainwater harvesting by industrial units and residences may contribute to fulfilment of micro level demand of water till some extent.

8. Water Infrastructure: Case of Desalination

Many Indian states are drought prone including Gujarat, Rajasthan and Andhra Pradesh. In fact, there is severe shortage of water almost every year in these States. In Gujarat, the coastal belt especially Saurashtra - Kutch region is always facing acute shortage of drinking water. The industrial development also faces a setback due to non-availability of water. The fact that the State Government had to run "Water Special Trains" from Gandhinagar to Rajkot / Saurashtra region before few years reflects the severity of water shortage in the region.

One of the solutions to perennial water shortage in Saurashtra and Kutch regions is setting up of Desalination Plants in the coastal areas. Desalination of seawater would be a possible solution to overcome shortage of both potable as well as industrial water in the State, if proper technologies are used.

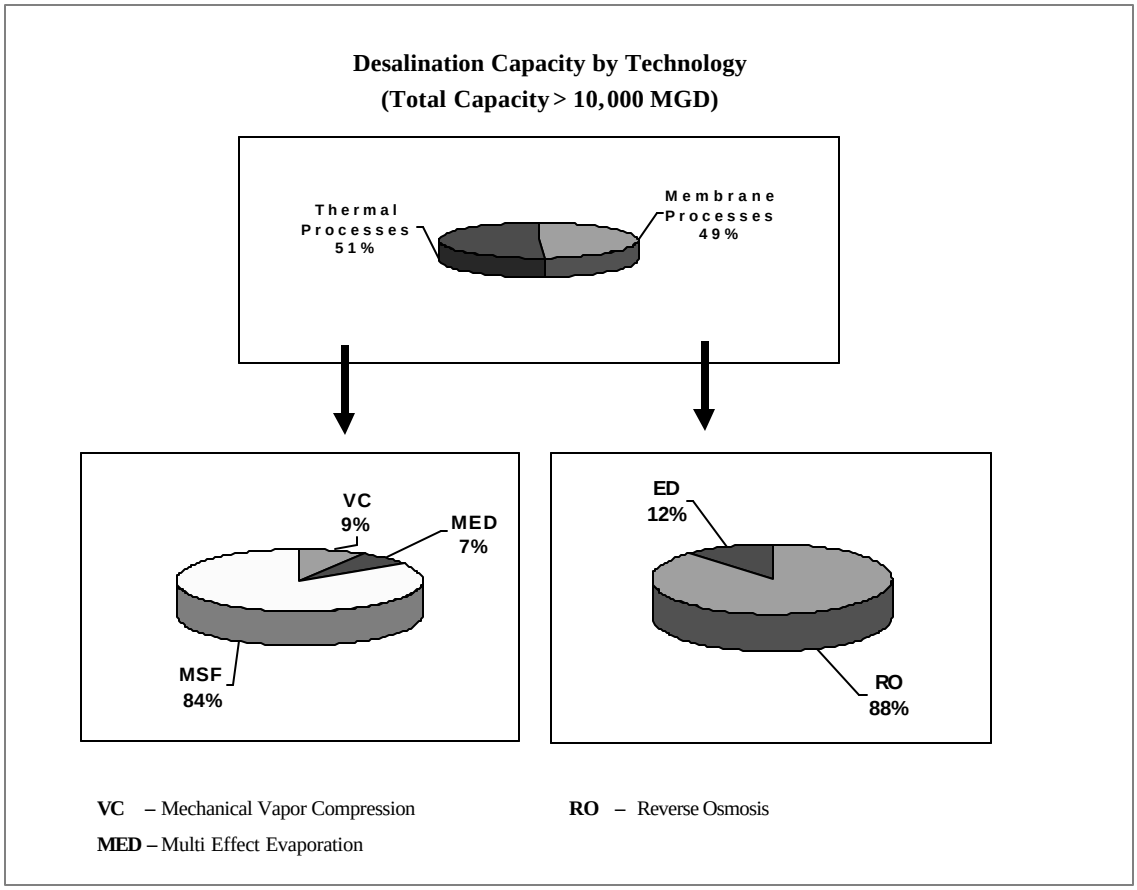
It is pertinent to note that there are already few industrial units, which have set up their own desalination plants to meet the water requirements, e.g. Reliance Petroleum at Jamnagar and Sanghi Cement in Kutch. These plants are also feeding water to villages situated around the plant.

8.1 Desalination: Global Scenario

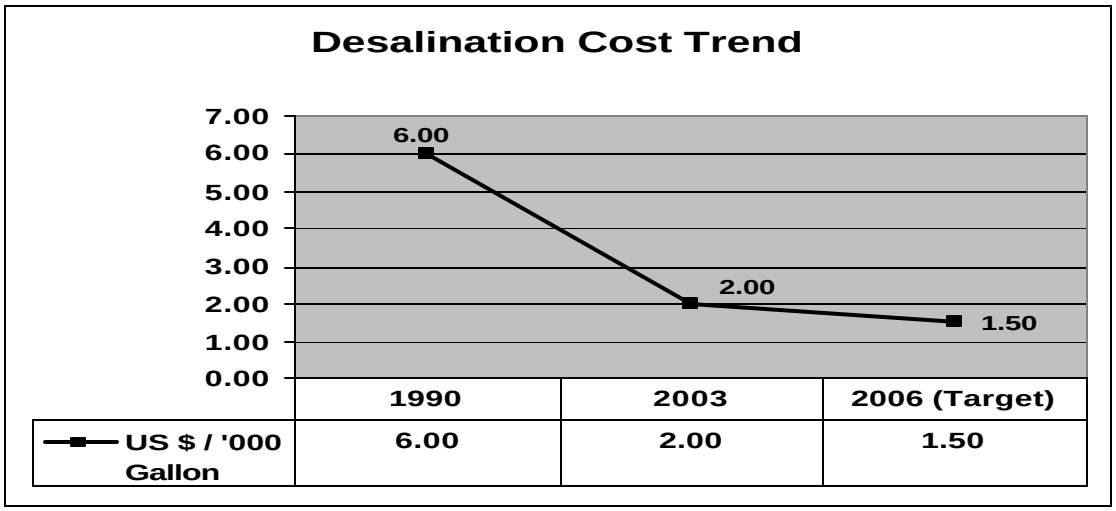
Currently over 12,500 industrial scale desalination units are operating worldwide. Continuous progress in desalination technology makes it a prime, if not the only, candidate for alleviating severe water shortages across the globe. Moreover, desalination costs are competitive with the operation and maintenance costs of long-distance water transport systems.

The current installed capacity of desalination plant has been estimated at about 10,000 MGD globally. Different technologies have been in operation depending on effectiveness and economics in local conditions, i.e. Membrane Processes (Reverse Osmosis and Electro-Dialysis) and Thermal Processes (Multistage Flash Evaporation, Vapour Compression and Multi effect evaporation).

Both Membrane and Thermal processes appears to be equally popular. However, the extent of popularity differs among various technology variants under these basic processes, i.e. Among Thermal processes, Multi-stage flash evaporation technology is most popular, while among Membrane processes, Reverse Osmosis is the most preferred technology.



Desalination costs have been continuously decreasing over the years as a result of advances in system design and operating experience, and the associated reductions in specific unit size and specific power consumption.



Once considered an expensive luxury, desalination is now a technology of choice especially in the Gulf & Middle East States. A dramatic decline in cost has led to it being a viable and economic solution to ensure future water supplies in these countries.

Middle East countries are the biggest users of desalination technology, with over 50% of the world's capacity. Gulf States such as Saudi Arabia, the UAE and Kuwait use dual-purpose power and desalination plants on a major scale. With the continued deterioration of existing groundwater resources, the technology is finding new outlets in parts of the region where it had never previously been considered as a viable long term resource.

North African countries vary in their demand for desalination from supplying water to sea resorts such as Tunis, providing alternatives to major water transport schemes or simply supplying water to meet growing needs.

While Syria and Lebanon may not see the need for desalination, the former, with as many as 16,000 illegally drilled wells abstracting water from its aquifers, will have to consider it as an option in the future. Iraq is likely to undergo severe water shortages and will need to develop desalination in its southern territories.

Table 8.1 Desalination units in GCC+MENA Region

Location	Number of Units	Capacity (MGD)
GCC		
UAE	382	1446
Bahrain	156	305
Saudi Arabia	2074	3084
Oman	102	224
Qatar	94	324
Kuwait	178	828
Sub Total (GCC states)		6209
Middle East and North Africa (MENA)		
Libya	431	429
Iraq	207	111
Egypt	230	63
Algeria	174	80
Tunisia	64	39
Yemen	66	35
Israel	n/a	40
Sub Total (MENA states)		796
Total (GCC + MENA)		7005

Source: Arab Gulf Co-operation Council.

Desalination requirements in the Gulf - Middle East region are slated for substantial growth.

The successful introduction of desalination technology for meeting combined needs of power and water would further lead to the market development. Several such projects are under implementation, e.g. IWPP at Ras Laffan-Qatar having generating capacity of 750MW and a water output of 40MGD, IWPP at Shuweihat in Abu Dhabi (1500MW and 100MGD) and Barka in Oman (400-440MW and 20MGD).

The types of desalination technology used in integrated power and water schemes in the region have been multistage flash (MSF), multi effect distillation (MED) and reverse osmosis (RO).

MSF was developed in the Gulf States as early as the 1970s and has been used successfully on the Arabian Peninsula in large scale applications. The capital costs of MSF vary from $4.00 to $12.00/gpd equivalent to $1050 to $3150/m3 per day of installed capacity.

MED is older than MSF and is more energy efficient. However, the technique has suffered some operational problems and its maximum unit capacity is limited compared with MSF.

MSF has been the mainstay for large scale water production in the Middle East but its position is now being challenged by the latest developments in MED. This type of competition among processes offers significant potential for water cost reduction.

Table 8.2 Specific investment costs for main desalination processes

Process	MSF	MED	RO
Specific investment cost (US $/m^3/day)	1100-1600	900-1250	700-1000

Generally, specific investment costs for an MED plant are 10-20% lower than for an MSF plant.

Two recently contracted desalination plants, with comparable local conditions and identical capacities, the Jebel Ali K project in Dubai, an MSF plant with two 5 MGD units, and the Layyah project in Sharjah, an MED plant with two similar size units, have investment costs shown below.

Table 8.3 Investment cost of two recent desalination plants in the UAE.

Plant type	MSF Jebel Ali K	MED Sharjah Layyah
Specific investment cost (US $/m3/day)	1100	980

The MED plant investment cost is 11% lower than the MSF plant investment cost.

The future of desalination technology will depend largely on reducing energy costs by optimising power and water generation. It will also rely on further improvements in the unit size of RO and distillation processes.

In the short term, new solutions are required to address the trend of water demand growing at a greater rate than electricity and the dramatic seasonal variation of power. Some analysts claim that the seasonal surplus of unused idle power could be used by electrically driven technologies such as RO and vapour compression distillation in combination with aquifer storage and recovery.

These areas demand continuous research and development to achieve the goal of low cost desalination to produce water at less than $0.50/m3 and power at $0.02/kWh.

8.2 Desalination Processes

The most widely used desalination processes are membrane separation via reverse osmosis (RO), and three types of thermal separation — multistage flash desalination (MSF), multiple-effect evaporation, with thermal vapour compression (MEE-TVC) and without (MEE), and mechanical vapour compression (MVC). The MSF and RO processes dominate the market for both brackish water and seawater desalination, with a total share of more than 90%.

8.2.1 Thermal Processes

All three types of thermal desalination systems are equipped with condenser tube bundles. In MSF (Figure 1), these are used to preheat the brine recycle stream. The tube bundles in MEE and MVC

(Figures 2 and 3) function as condensers/evaporators, where the heating steam condenses inside the tubes and vapour is formed outside the tubes. The MEE and MVC systems are divided into evaporating effects, while MSF systems are divided into flashing stages.

Figure 1: Multistage Flash Distillation (MSF) Desalination Process

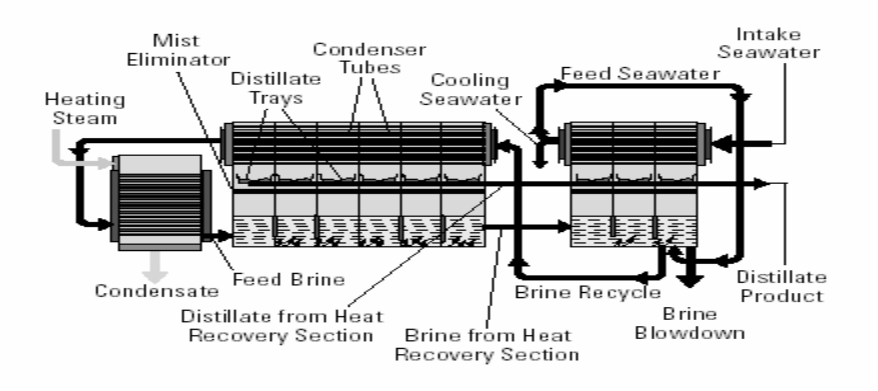


Figure 2: Multiple-effect Evaporation (MEE) Desalination

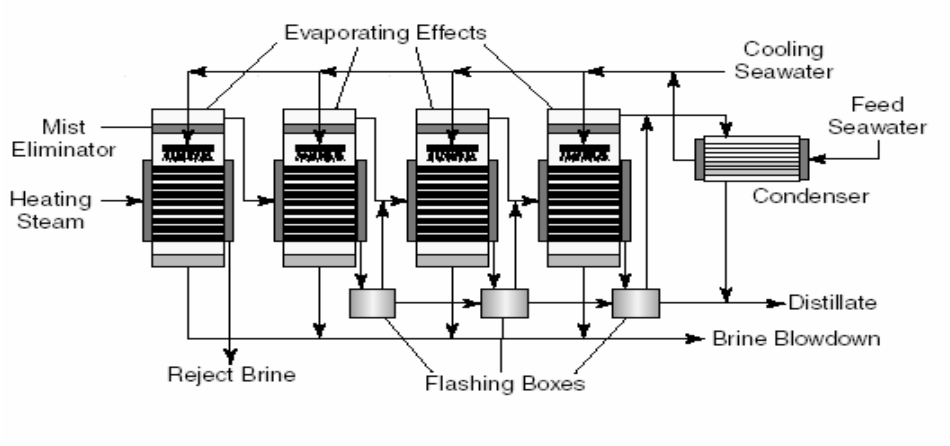
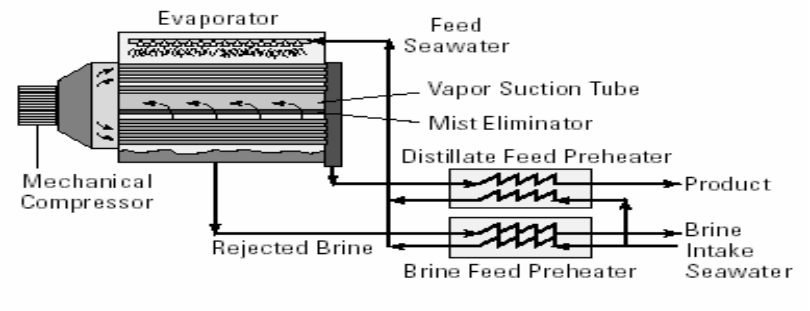


Figure 3: Multiple-Effect Evaporation (MEE) Desalination



All of the systems employ a number of large pumping units, including pumps for seawater intake, distillate product, brine blow-down and chemical dosing. The MSF and MEE systems have additional pumps for the cooling seawater. In addition, MSF has pumps for brine recycle.

In MSF and MEE, steam extracted from low- and medium-pressure turbine lines provides the heat necessary for flashing or evaporation. In MSF, the heating steam is routed to the brine heater; in MEE, the heating steam is routed to the first evaporating effect. The MSF process operates with a top brine temperature in the range of 90–110°C. The MEE and MVC processes are operated with lower top brine temperatures in the range of 64–70°C.

MVC is distinguished from the other processes by the presence of a mechanical vapour compressor, which compresses the vapour formed within the evaporator to the desired pressure and temperature. The system also includes plate heat exchangers for preheating the feed using heat recovered from the brine blow-down stream and the distillate product.

All thermal processes produce a high-purity distillate product, with a salinity of less than 10 ppm. This is achieved by a wire-mesh mist eliminator, which removes entrained brine droplets formed in the distillate stream.

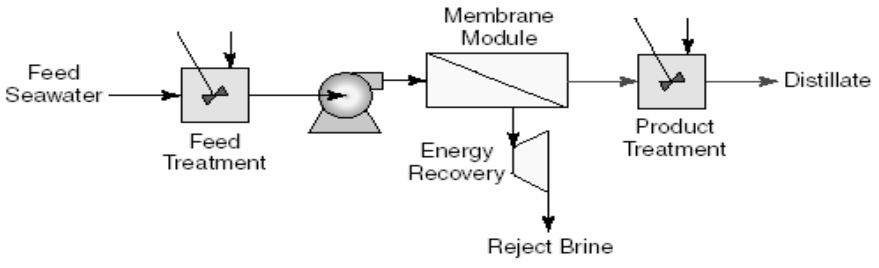
The capacity of the thermal desalination processes varies over a wide range, from 500 KLD to 55,000 KLD. The average conventional sizes are 3,000 KLD for MVC, 33,000 KLD for MSF, and 12,000 KLD for MEE.

Energy requirements for the MSF and MEE processes are higher than those for MVC (and RO). MSF and MEE consume heating steam to drive the flashing and evaporation processes. They also use a considerable amount of electrical power to drive the pumps (an average specific power consumption of 4 kWh/ m3). The specific power consumption of the MVC and RO processes varies over a range of 6–10 kWh/m3.

8.2.2 Membrane Desalination

The RO process (Figure 4), which employs membranes, has a simple layout, and is compact and modular. Existing units can be expanded to handle larger capacities. However, RO membranes are more sensitive to the conditions of the feed seawater, scaling, fouling and pH than thermal processes. Furthermore, unlike thermal processes, RO membranes do not provide high-purity water. On average, the permeate salinity varies over a range of 30–150 ppm. The actual value depends on the process recovery, which is defined as the amount of product per unit mass of feed water. Depending on the intended use of the water, a second RO pass may be needed to reduce the salinity to an acceptable level.

Figure 4: Reverse Osmosis - Membrane Desalination Process



Energy consumption is reduced through the use of energy recovery systems. Two configurations are available, one based on shaft work (known as the Pelton wheel) and the other a direct work exchanger, which eliminates losses generated by shaft work.

8.3 Factors Affecting Desalination Water Cost

Unit product cost is affected by several design and operational variables:

- Salinity and quality of feed water: Lower feed salinity allows for higher conversion rates. As a result, the plant can operate with lower specific power consumption and dosing of anti-scalant chemicals. Also, downtime related to chemical scaling is considerably reduced.
- Plant capacity: Larger plant capacity reduces the cost per unit product, despite a higher initial capital investment (due to economies of scale).
- Site conditions: Installation of new units as an expansion of existing sites eliminates the costs associated with facilities for feed water intake, brine disposal and feed water pre-treatment.
- Qualified labour: The availability of qualified operators, engineers and management personnel results in higher plant availability and production capacity, and shorter downtimes.
- Energy cost: The availability of inexpensive sources for low-cost electric power and heating steam has a strong impact on unit product cost.
- Plant life and amortization: Increases in the life of a plant reduce product capital costs.

8.4 Cost Economics of Desalination Technologies

Following table gives clear idea about the impact of various design and operational variables on unit of cost desalination water. The table compares unit cost of water for two widely used technologies, i.e. RO and MSF and for different capacities in local Indian conditions.

Table 8.4 Cost Economics: Desalination Technologies

	Particulars	RO			MSF		
	Capacity	1.21	3.78	18.9	1.21	3.78	18.90
	Investment Rs. Crores	9	16.6	81	15.70	31.50	81.00
	Investment / KL	204	120	117	356	228	117
A	Operating Cost (Rs/KL)						
1	Chemicals	1.35	1.35	1.35	0.45	0.45	0.45
2	Power	34.44	34.44	34.44	8.84	8.84	8.84
3	Steam	0	0	0	23.40	23.40	23.40

4	Maintenance	5.04	2.53	2.44	10.67	5.06	3.52
5	Membrane Replacement Cost	7.2	7.2	7.2	0	0	0
6	Labour	0.3	0.2	0.15	0.3	0.2	0.15
7	Administrative Charges	0.3	0.2	0.15	0.3	0.2	0.15
	Sub-Total (A)	48.63	45.92	45.73	43.96	38.15	36.51
B	Fixed Cost (Rs/KL)						
1	Finance Charges	20.18	11.91	11.62	35.20	16.68	11.62
	Total Cost (Rs/KL)	68.81	57.83	57.36	79.16	54.83	48.14
	Basic Assumptions:						
		RO			MSF		
	Power Consumption (KWH / m^3)	8.61 KWH/KL			2.21 KWH/KL		
	Steam Consumption (MT/m^3)	0.00 MT/KL			0.117 MT/KL		
	Power Cost (Rs/KWH)	Rs. 4.0 / KWH					
	Steam Cost (Rs/Ton)	Rs. 200 / Ton					
	Membrane Cost (Rs/m^3)	Rs. 36 / M^2					
	Maintenance	@3% of Capital Cost					
	Membrane Replacement Cost	20% of Membrane Cost					

8.5 Desalination Plant in Kutch: Sanghi Cement Experience - Case Study

M/s. Sanghi Cement Limited is operating 5.5 MLD desalination plant. Out of the total capacity of 5.5 MLD, approximately 3.3 MLD is for meeting captive needs and 2.2 MLD for supply to nearby villages to meet their drinking water requirements.

The ballpark estimate of unit cost of desalination water (worked out on the basis of basic details provided by M/s. Sanghi Cement) from Sanghi Plant has been as estimated in the following table.

Table 8.5 Unit Cost of Desalination Water (Sanghi Cement)

Capacity	5.5 MLD
Investment	20.00 Crores
A. Operating Cost	Rs/KL
- Chemicals	1.89
- Power	6.53
- Steam	25.16
- Maintenance @4% of Capital Cost	3.99
- Labour	0.5
- Administrative Charges	0.2
Sub-Total (A)	38.26
B. Fixed Cost	
- Finance Charges	9.86
Sub-Total (B)	9.86
Total Cost (Rs/ KL)	48.12
Basic Data/ Assumptions:	
- Power Consumption	2.21 KWH/KL
- Steam Consumption	0.117 MT/KL

- Power Cost	Rs.2.90 /KWH
- Steam Cost	Rs.215 / MT
- Maintenance Cost	4% of Capital Cost
- Finance Cost	15% Interest on 2/3 Investment

The option of desalination is no longer considered as an expensive luxury. With the advent of different technology options to suit different local conditions, desalination has become a viable and economic solution for ensuring water supplies in different regions. Desalination costs have been continuously decreasing over the years as a result of advances in system design and operating experience, and the associated reductions in specific unit size and specific power consumption.

So far, the experience of desalination plants operating in Gujarat (i.e. M/s. Reliance and Sanghi) has been very encouraging. These plants, apart from meeting their captive requirements, are supplying drinking water to number of villages in the vicinity. Thus, such projects in Kutch are also desirable from social angle.

The successful integration of power generation with desalination has a potential to reduce the cost of desalination water further. Looking at several large and mega projects being planned in Kutch, the option of Integrated Power and Water Plant (IPWP) appears to be quite feasible option.

9. Communication Infrastructure

9.1 Network and Density

Telecom reforms across the world are energising businesses and people. Long considered a natural monopoly, recent technological developments have facilitated competition in this sector leading to increased access to telecom services and gains in efficiency and quality. High bandwidth transmission and teledensity are increasingly seen as one important barometer for global integration and economic progress. India's teledensity as on March 2004 was 7 percent which is quite lower than the developed countries that have crossed the mark of 100 percent. The rapidly progressing neighbouring China has a teledensity of 42 percent.

Table 9.1: Comparative Scenario of Telecommunication, Kutch and Gujarat

Region	No. of Exchs.	No. of Stns.	Equppd. Capacity	Working Conn.	Obs Pending	Waiting List	Demand	STD STA	% Utilization
Kutch	227	157	131540	103696	3995	3995	107691	157	78.83
Gujarat	3236	2168	3496664	2833880	22370	52725	2856250	2136	81.05

Source: Gujarat Telecom Circle, 2002

Teledensity6 in Gujarat has increased from 1 to 5.48 in 2002. Comparatively the teledensity of Kutch was 6.4 in 2002 (Ahmedabad and Surat are 10 and 6.5 respectively for the same year). However, Kutch constitute only 3.5 percent of state's telephone connections, The number of telephone connections in the district in 2002 were 103 thousand, which is lower than the average number of connections in all the districts at 113 thousand. Presently the demand has been estimated to around a hundred thousand connections. This would subsequently require an increase in the equipped capacity. At the same time the number of pending connections in Kutch was 17.8 percent of the state's total pending connection, which reveals comparative regional inefficiency.

The entry of private players in communication infrastructure has added to these capacities. The details of cellular connections in the region by different operators are not exactly known. But with entry of players such as reliance, hutch, airtel, etc and expansion of BSNL services, it is estimated that number of connections have increased manifold during past couple of years. Yet most of the private operators have not covered the complete region.

9.2 Investors, Players and Initiatives

As per the tenth plan outlay of Government of Gujarat, expenditure on state's communication infrastructure is planned to be INR 400 million against the previous plan of INR 250 million (actual expenditure INR 470 million).

Investment by BSNL and private players for expansion of cellular services in Kutch is not exactly known.

[6]Teledensity is number of telephone connections (excluding cellular connections) per 100 persons.

9.3 Problems

- Land line connectivity to the potential industrial areas is not available completely.
- Many of the stand alone industries even in a taluka such as Bhachau are not yet provided telephone connections.
- Single unit and lack of residential density does not make land line connections viable in majority of the areas.
- Inadequate coverage of mobile telephony network.

9.4 Possibilities

- The corridor development plans shall create sufficient agglomeration of industrial units and residential population, which will create conditions for commercial viability of providing land line telephones and broad band internet.
- Attract mobile telephony players through demonstration of industrial growth and its potentials.

10. Social Infrastructure: Health

Kutch has 37 primary health centres (PHCs) constituting only 3.83 percent of the total of such centres in Gujarat. But the region has 2.4 PHCs per hundred thousand persons, against the same for Gujarat at 1.94 (CMIE, 2004), which is a better figure. Among the districts in Gujarat it is placed at 9th position in availability of PHCs per hundred thousand persons. The figure for Panchmahals at the top is 4.8, followed by Valsad (4.61) and Kheda (4.60). There are also 8 community health centres and 217 sub centres in the district as on March 2002 (District Statistical Outline, Kutch 2001-2002). As per 2001-02 data, there were 20 Ayurvedic and 12 Homoeopathic institutions in the district. There were also 254 family welfare centres or clinics. The total number of hospital beds available in the region is 1305, a 3.2 percent of the total hospital beds in Gujarat. Hospital beds to population ratio in the region is 0.82 per thousand population, slightly higher than state's at 0.79.

Table 10.1: Health facilities in Kutch and Gujarat 2001-02

Sr. No.	Details	Kutch in nos.	Gujarat in nos.
1	Primary Health Centres	37	967
2	Community Health Centres	8	206
3	Sub Centres	217	7274
4	Beds Available	1305	40491
5	Ayurvedic Institutions	20	821
6	Homoeopathic Institutions	12	216
7	Patients Treated in Govt. Medical Institutes	2222000	39095000
8	Family Welfare Centres/ Clinics	254	7380

Source: Statistical Abstract of Gujarat State 2002; District Statistical Outline, Kutch District, Year 2001-2002

But the recent annexure of hospital infrastructure during the earthquake reconstruction period has the potential to lead the region towards a sophisticated and modern health care age. The district hospital which was completely destroyed during the earthquake has been built as a modern health-care centre with sophisticated machineries and equipments. The hospital will be not only important for the region in future but also for adjoining North Gujarat districts. Similarly many private hospitals under various trusts have been also built in Bhuj with better facilities. Moreover, modern hospitals from various funds have been established at smaller towns such as Bhachau, Mandvi etc.

Community Health Centre at Bhachau

But yet many health care facilities have come up with improved and upgraded infrastructure after reconstruction. In Bhuj a 300+200 bedded hospital with two nursing schools, 50 seated medical college and a tertiary care unit has been recently completed. In Gandhidham a 100 bedded hospital has been reconstructed at a cost of INR 40 million by Indian Medical Association, Delhi. 3 community health centres, one each in Bhachau, Rapar and Lakadia have been constructed with a cost of INR 30 million each. Mental hospital in Mundra has been reconstructed by JICA at a cost of INR 4 million. As per an estimate INR 4.2 million has been channelised through GSDFMA towards revival of health facilities in the district, while a total of INR 264 million have been received by NGOs for the same.(Source: Coming together, 2003)

The Newly Built State-of-the-Art District Hospital in Bhuj

10.1 Assessment of Health Infrastructure

Health infrastructures in Kutch have improved after the earthquake. Funds from various sources along with from many international agencies have been utilised to create many new state of the art facilities. Construction of new 300 + 200 bedded hospital with two nursing schools, a medical college with 50 seats in Bhuj, a 100 bed hospital in Gandhidham by Indian Medical Association. Community Health Centres (infrastructure is no less than a hospital) each in Anjar, Bhachau and Rapar through various funds are important additions. Moreover, many private hospitals have been also built in Bhuj and Bhachau. In Mandvi a maternity hospital has been built and a CHC has been retrofitted by the Government.

Assessments of health infrastructure show that maximum facilities are available in Bhuj, Gandhidham, Anjar and Bhachau taluka. Abdasa, Nakhatrana and Lakhpat talukas are backward in term of health infrastructure. But there is deficit of health infrastructure in the region, if UDPFI norms are considered. There will be demand for 11 general hospitals and 21 intermediate hospitals in Kutch by 2011.

Table 10.2 Health Infrastructure Requirement Based on UDPFI Norms

	Population per unit
Dispensary	15000
Intermediate Hospital	100000
General Hospital	2,50,000

Table 10.3 Health Infrastructure Demand in Kutch 2011

	Requirement of units
Dispensary	140
Intermediate Hospital	21
General Hospital	8

10.2 Actions Required for Health Infrastructure

- Industrialisation in Kutch will influx population in Gandhidham, Bhuj and other urban areas it will necessary to provide access to quality of medical facilities. Initiative can be taken by encouraging renowned hospital chains to set up state of art hospitals in strategic locations through providing incentives in the form of making land available at concession rates. If using the available infrastructure, a world class hospital specialised in few aspects can be created and foreign patients can be attracted such hospitals can be made feasible.
- Facilities, amenities and sophistication created in the Bhuj Hospital are normally not present in the very good hospitals in larger cities. It is even better equipped than many of the famous hospitals in cities such as Mumbai. Partnership with doctors and medical institutions in these cities can be created through providing space for operations and treatments of higher order.
- A health infrastructure management plan can be a good option for running available non-functional infrastructure and in maintaining these. Industries in the region and those willing to enter into the region can participate in such an initiative, as these will bring demand for health facilities for their workers.
- Mundra SEZ and other future large scale/ Mega industrial initiatives would promote better health care facilities. This added advantage to society if such large plants are attracted to the region

11. Social Infrastructure: Education

11.1 Existing Status of Primary and Secondary Education

In 2001-2002, there were 1388 primary schools in Kutch, which is just 3.5 percent of the total primary schools in Gujarat. There are 92 primary schools per hundred thousand persons in the region which is the 9th highest amongst the districts in Gujarat and is much higher than the state's figure at 79 (CMIE, 2004). The teacher to primary student ratio in the region is 40, which is slightly lower than that of state's figure at 42.3. There are 5 villages in the region, with a combined population of 812, which do not have a primary school (District Statistical Outline, Kutch, 2001-2002)

Table 11.1: Taluka-wise Educational Institutions in Kutch 2001 - 2002

Sr. No.	Talukas	Primary	Secondary	Higher Secondary	Higher	Others
1	Lakhpat	92	6	2	0	0
2	Rapar	224	16	2	0	0
3	Bhachau	129	10	3	1	0
4	Anjar	84	8	3	0	0
5	Bhuj	258	25	13	4	1
6	Nakhatrana	154	9	4	1	0
7	Abdasa	161	11	2	0	0
8	Mandvi	159	16	7	1	0
9	Mundra	92	9	1	0	2
10	Gandhidham	35	15	12	2	1
	Kutch	**1388**	**125**	**49**	**9**	**4**

Source: District Statistical Outline, Kutch District, Year 2001 -2002

Intra-regional distribution reveals that number of primary schools per hundred thousand persons is the highest in Lakhpat Taluka (183) and the lowest in Gandhidham (17).

In 2001-2002, numbers of secondary and higher secondary schools were 174, which is again only a 2.58 percent of the total such schools in the state. The secondary/higher secondary teacher to student ratio is 37, which is almost the same as of Gujarat. The figure is the highest in Abdasa taluka (44.1) and the lowest in Rapar (25.2).

11.2 Existing Status: Higher and Technical Education

Kutch has limited higher educational institutes. In terms of technical education there is only one engineering college (degree level) in Bhuj with an intake of 113 students per year. There is also one Government Polytechnic in Bhuj (intake 30), a grant-in-aid institute under Tolani Foundation: Tolani Institute of Pharmacy (intake 60) and a diploma engineering college (intake 220) at Adipur near Gandhidham. Tolani Institute of Management again under Tolani Foundation, Adipur has 100 self-sponsored seats for business management diploma. Moreover, there are 5 industrial training institutes located in Gandhidham, Lakhpat, Mandvi, Bhuj and Rapar, with a total intake of 672 students per year. A very recent initiative - a new university, named as Kutch University is coming up in Bhuj.

Table 11.2: Technical and Higher Educational Institutes in Kutch, Year 2003

Sr. No.	Name of Institute	Level	Taluka	Intake per Annum
1	Government Engineering College, Bhuj	Degree	Bhuj	113
2	Government Polytechnic, Bhuj	Diploma (12^{th} based)	do	30
3	Tolani Institute of Pharmacy, Adipur	do	Gandhidham	60
4	Gandhidham Polytechnic, Tolani Foundation Adipur	Diploma (10^{th} based)	Gandhidham	220
5	Government Polytechnic, Bhuj	do	Bhuj	230
6	Tolani Institute of Management, Adipur	PG Diploma	Gandhidham	100
7	Industrial Training Institute, Gandhidham	Diploma (10^{th} based)	do	360
8	Industrial Training Institute, Lakhpat	do	Lakhpat	64
9	Industrial Training Institute, Mandvi	do	Mandvi	48
10	Industrial Training Institute, Bhuj	do	Bhuj	184
11	Industrial Training Institute, Rapar	do	Rapar	16
	Total Number of Available Seats per Annum			1425

Source: Industries Commissionerate, Gandhinagar 2004

11.3 Changes after the Earthquake

A lot of changes have taken place in terms of educational infrastructure during the process of reconstruction. Inflow of funds through non government organizations specially dedicated to education has made significant contribution to improvement of infrastructure of existing schools as well as for opening of new schools. Reconstruction of 3603 schools has been already completed by different non government organizations (as of January 2003). Expenditure of INR 638.9 million has been injected including INR 551.6 million by the state government (up to 31 December 2003) through GSDMA for reconstruction and strengthening of educational infrastructure in Kutch. A total of INR 59.7 million has been raised by different non government organizations for education sector, out of which 56 percent has been utilised (Source: Coming together, 2003). In spite of these interventions, there are evidences of irregularities at micro level like vacant posts of school teachers and non-functioning of schools having permanent structures. As per a primary survey conducted by FICCI-CARE 22 percent of the posts of teachers in Anjar, 40 percent in Bhachau and 30 percent in Rapar are vacant. Another survey conducted by the Setus, approximately 10 percent of schools having permanent building and 17 percent of the schools having interim structures are not functional.

A recent initiative has been taken by Government of Gujarat by establishing a separate University in Kutch.

11.4 Assessment of Educational Infrastructure in Kutch

Assessment of primary and secondary schools at the taluka level indicates that there is a serious deficit in the number of secondary schools in Bhuj and Rapar taluka (13 against 46 required in Bhuj and 2 against 26 required in Rapar). According to UDFPI guidelines, for every 7500 population 1 secondary school is needed with strength of 1000 students. According to the norm, Kutch requires 211 secondary schools as against a present total of 49 present in the district.

Table 11.3 UDPFI Guidelines

	Population Per Unit

Primary School	2,500
Senior Secondary School	7,500
College	125,000
Engineering/ Medical College	1,000,000

Table 11.4: Taluka-wise Assessment of Availability of Primary and Secondary Schools

Taluka	Population (2001)	Primary School			Secondary School		
		Required	Present	Surplus/ (-) deficit	Required	Present	Surplus/ (-) deficit
Lakhpat	50120	20	92	72	7	2	-5
Rapar	198000	79	224	145	26	2	-24
Bhachau	147891	59	129	70	20	3	-17
Anjar	160292	64	84	20	21	3	-18
Bhuj	345013	138	258	120	46	13	-33
Nakhatrana	129249	52	154	102	17	4	-13
Abdasa	97508	39	161	122	13	2	-11
Mandvi	170573	68	159	91	23	7	-16
Mundra	83010	33	92	59	11	1	-10
Gandhidham	201569	81	35	-46	27	12	-15

Source: District Statistical Handbook Kutch, 2001-2002 and DMM Analysis

On the other hand, the problem area in education in Kutch is according to a survey carried out by the FICCI-CARE is vacant teacher's posts and non-functional schools. 33 percent of the total teachers post in primary schools is vacant. Situation is the worst in Bhachau, where 40 percent post are vacant.

11.5 Actions, Required

- Extension of primary education in the hamlets and stress on higher secondary education should be the basic focus area for the region. Approximately 150 new higher secondary schools are required in the region.
- Education infrastructure has been improved after the earthquake. Many funding agencies and non government organization are engaged in repair and construction of new school buildings in urban and rural areas.
- A permanent structure for grass-root level initiatives (by various NGOs, CII, etc) for education extension is required to continue these initiatives for long run.
- Building up of linkages between the existing technical institutes and industries within the region is an important aspect to be considered.
- Quality schools such as Delhi Public Schools and Amity Schools should be encouraged to establish their branches in strategic locations. Industrialisation will lead to influx of skilled workers from out side, which will increase the demand for new quality schools. Industries can also participate in this attempt if an integrated policy is derived and an effective platform is created. Mundra SEZ and other future large scale/ Mega industrial initiatives would promote schools. This added advantage to society if such large plants are attracted to the region
- A long term strategic plan for tertiary education with the perspective of industrialisation should be prepared, before designing courses and curriculum of Kutch University. Specialised courses of national level demand under Kutch University through participation of industry and business (e.g. furniture design, marine engineering, industrial design,

engineering, etc) can be introduced and brilliant students from all over the country and other South Asian countries can be attracted for improving quality and increasing income. Research and industrial linkages is extremely important.

- A marine and geologic research institute of higher excellence can be a viable option for satisfying tertiary education needs in the region.

12. Sports and Entertainment

12.1 Assessment of Sports and Entertainment Infrastructure

The region suffers from sports and entertainment infrastructure. In 2000-2001 there were only 13 cinema halls in Kutch, with 5300 total seat arrangements. Out of these, four are located in Gandhidham, three in Bhuj, two in Anjar and one each in Bhachau, Mandvi and Mundra. These halls are old and insufficient in terms of infrastructure and better environment. Recently a modern multiplex with three screens has started functioning in Gandhidham. There were 66 libraries in the region with facilities of reading and borrowing books. The highest numbers of libraries are in Mandvi (33) followed by Anjar talukas (20). As a whole, the region also suffers from lack of sport infrastructure. Only Gandhidham has an indoor stadium and a good playground in Kandla Port Trust colony. The museum in Bhuj was one of the best in Gujarat, with many valuable displays, but the earthquake has severely destroyed its building. Development of Special Economic Zone in Mundra can play an important role in development of sports and entertainment infrastructure in the region. The Mundra Special Economic Zone Limited (Adani's) has already declared their intentions to promote such facilities.

12.2 Actions Required

- A Kutch International Desert Car Rally is good option for taking up as an annual mega-event, which will not only develop sport enthusiasm, but also assist in tourism development and creation of regional impression.
- Water sport facilities are a viable option if Mundra and Kandla SEZs or any private group participates. Places like Mundra, Mandvi and Jakhau may be good options for these. In development of such sport, there is a great potential for integrating with tourism development.
- Moreover, initially an indoor stadium each in Gandhidham and Bhuj will be able to cater to needs for sports. A participatory framework with private partners can be derived to develop such facilities.
- All higher secondary schools to be built with a medium sized playground (minimum) and sport utilities.
- New course on physical education is a good option to introduce in Kutch University, which will increase interest of youths in sports.

13. Proposed Infrastructure Development Actions, Timescale and Implementation Procedure

The proposed infrastructure development initiatives are arranged in a timescale for project integration and effective implementation. These follows logical need based sequencing. Refer the Annexure I for the detailed infrastructure development actions, timeline and implementation procedure.

Vol. II, Part II

International Cases and Adaptability

2.2

Mott MacDonald

Dalal Mott MacDonald

1. International Models and their Adaptability

1.1 Defining a Trade / Business Hub

A tertiary activity predominant region with highly agglomerated economies developed due to fiscal policies, successful international trade (with large volumes of exports and re-exports), large investments, a strong manufacturing activities (hi-tech manufacturing and research within and general in surrounding region) and usually a city of international order with state of the art infrastructure, conglomeration of educational and cultural activities and a major destination of tourists.

1.2 Trade Hubs in Asia and their State of Development

Trade / business hubs in Asia are the wonders of the later decades of 20th and 21st century and their growth is unprecedented in the economic history of the world. The trade hubs in Asia can be divided into two groups, firstly the well established ones in Japan, South Korea, Taiwan along with Singapore, Hong Kong and Dubai and secondly the emerging hubs in the countries such as China, Malaysia, Indonesia and Thailand.

Table 1.1: The Trade Hubs in Asia

Sr. No.	Regions / City Regions / Cities / Smaller Countries	Basic Character
	Established Global Trade Hubs in Asia	
1.	Tokyo-Osaka	▪ Traditional urban area, the capital of Japan emerged as one of the largest city in world in the second half of the 20th century; earlier a manufacturing hub, now a global city with intense tertiary activities. Along with near by cities and intensive activity regions has developed as massive 'city region'. Massive in-migration (9 million people) from rural and smaller towns from other provinces during 1955 to 1970. Now manufacturing industries, microelectronics (semi-conductors, computers, and communication equipment) automobile industry and consumer durable goods, became the major sources of employment, technological innovation, and the macroeconomic multiplier affecting the overall economy. In the tertiary sector, finance (banking, securities, and insurance), distribution (wholesale and retail), and services (especially producer services) began to equip themselves with and fully utilize the new information technology. Due to rise of yen, economy was affected during early 80s. But focus on high tech industries, R & D, automation, investment in other countries and growth of service industries and strong international linkages have placed Tokyo as a Global City region and a hub for international trade. The Capital Tokyo Metropolitan Area is not only the hub of the hyper-production system but also, perhaps, the largest consumer market in the world today. More than 30 million daily commuters and residents with an average disposable income per household of more than US$30,000 per year (1990s) with highly diversified tastes and lifestyles, inevitably make the region the most attractive market in Japan. Tokyo Stock Exchange is one of the largest in the world in terms of stock volumes and stock values. Infrastructure is

Sr. No.	Regions / City Regions / Cities / Smaller Countries	Basic Character
		superior and planning efforts are massive. ▪ Kansai region with 9 prefectures, occupies 11% of Japan's land area and 19.2% of the population in Japan is the second most important region in Japan. Osaka and Kyoto are major cities and business hubs. Osaka's GDP is even larger in volume than many western industrialised nations and contributes 8 % of Japan's (2002). Work force participation rate is 41% with 68% workers in tertiary and 31% in secondary sectors. Tertiary sector contributes 81% of Osaka's GDP. Only Osaka contributes 12.5% in import and 10% in export of Japan (2002). Kansai International Airport is one of the large st. Economic focus is to establish internationally competitive R & D hub in biotechnology, nanotechnology, etc. Business Support: by providing one-stop information and services for foreign companies and provides incentives through incubation offices for foreign companies, reduction in corporate business tax and real estate acquisition tax, subsidies and loans. Enhancement of quality of life by urban infrastructure improvement and redevelopment of older urban areas, enhancing international activities and partnership with foreign regions and cities are the initiatives.
2.	Seoul; the Capital Region of South Korea	▪ Seoul is the centre of South Korea's economic success since 1960s, capital of the country, a manufacturing hub, emerged as a large city region with multiple economic activities. Being the capital city for over 500 years, Seoul has been the nation's centre of politics and culture. The city also has 24 per cent of nation's population, abundant economic opportunities, and quality education. About 41% of nation's population, 47% of manufacturing employees, and 44% of the tangible capital assets of the nation are centred in the Capital region. About 61% of managerial personnel in business and 96% of the top 50 corporations' headquarters are located in Seoul. Seoul has been taking a commanding role in the nation's planning and in managing and controlling business activities and is also the centre of academic and industrial research. The concentration of high-tech industries in Seoul and the Capital region is paralleled by a concentration of higher education institutions and research institutes operated by manufacturing industries. About 64% of research scientists in South Korea are associated with private and public research institutions in Seoul. Most of the in dustries in the region are export based and the Kimpo Airport plays important role in international trade. Since the late 1980s, the positions of the government and planners gave in to development pressure arising from the housing shortage. Following the development of the Green Zone in Kaepo, Koduk, Mokdong, and Madeul plain on the outskirts of Seoul, five large-scale new town development projects are planned for the vicinity of Seoul. The total population of the five new towns is expected to reach 1.2 million, with a total area of 294 km2. These new towns will all be within 20 km and one hour's commuting distance from the central business district of Seoul. Accessibility to Seoul from the new satellite cities will be improved by the construction of an intraregional transportation network.
3.	Taiwan: Taipei	▪ Consists of a core city (Taipei Municipality) and 24 towns and hsiang, with an area of 1,896 sq km. Taipei Municipality occupies an area of 272 sq km, 14.4 % of the metropolitan area. Centre of the island's Northern region, Taipei Municipality (5 million) serves as the island's political, economic, and cultural centre. Railway electrification and completion of the Sun Yatsen

Sr. No.	Regions / City Regions / Cities / Smaller Countries	Basic Character
		Freeway in the mid-1970s, travel time between the Northern and Southern regions has been reduced to 4 hours, it transformed the hierarchical relationship between urban systems. The sphere of influence of the Taipei Metropolitan Area has gradually spread throughout the Northern region and Taiwan. A number of industrial estates are spreading into the periphery: Tu-Chen, the Shu-Lin, the Northern Special Area, and the Kuang-In and Taoyuan industrial estates. There are also some traditional textile and food-processing factories in Panchiao, Hsinchuang, and Sanchung. These plants, most of which are labour intensive and export oriented, created many job opportunities in earlier years and attracted many people to this area, contributing importantly to the rapid growth of medium-sized cities. ▪ During the 1970s, the government implemented the Ten Major Construction Projects, including the North-South Freeway, Suao Harbour, Taichung Harbour, railway electrification, the Taoyuan International Airport, and the North-Link Railway. These projects affected the distribution of population. Taoyuan International Airport and Keeling Harbour (both of which can be reached within half an hour). Following the completion of the Ten Major Construction Projects, the government launched the Twelve Major Construction Projects and the Fourteen Major Construction Projects. ▪ Secondary industry's share of total employment showed the most rapid rate of increase, growing from 28.6% in 1971 to 38.1% in 1989. Tertiary industry's share was stable at 59.6 %. The share of primary industry declined dramatically, from 11.8% in 1971 to 2.9% in 1989. ▪ Regional plans designate industrial sites to encourage the establishment of plants. More than 70 industrial areas have been developed in this way, promoting the balanced development of residential communities and industries. There are also programmes for the improvement of social overhead capital for developing cultural centres, new colleges and universities and health care. 'Living Perimeters' are being created to distribute social facilities effectively.
4.	Singapore	▪ Singapore is Singapore is blessed with a highly developed and successful free-market economy, a remarkably open and corruption-free business environment, stable prices, and the fifth highest per capita GDP in the world. Exports, particularly in electronics and chemicals, and services are the main drivers of the economy. The government promotes high levels of savings and investment through a mandatory savings scheme and spends heavily in education and technology. It also owns government-linked companies (GLCs) - particularly in manufacturing - that operate as commercial entities and account for 60 percent of GDP. As Singapore looks to a future increasingly marked by globalization, the country is positioning itself as the region's financial and high-tech hub. ▪ Key statistics: Population 41,85,000 (2003), GDP US$ 159135 million, labour force participation rate 64.2, industrial output US$ 155642 million, trade US$ 473906 million, exports US$ 251095 million, imports US$ 222811 million
5.	Hong Kong	▪ Hong Kong has a free market economy highly dependent on international trade. Natural resources are limited, and food and raw materials must be imported. Imports and exports, including re-exports, each exceed GDP in

Sr. No.	Regions / City Regions / Cities / Smaller Countries	Basic Character
		dollar value. Population of Hong Kong was 6.8 million in 2003. It's GDP was US$ 158.3 billion in 2003 and per capita forecast GDP in 2004 is US$ 23, 700. Labour force by occupation manufacturing 8.2%, construction 2.9%, wholesale and retail trade, restaurants, and hotels 43.5%, financing, insurance, and real estate 19.5%, transport and communications 7.8%, community and social services 17.8% (Note: above data exclude public sector) (2002 est.). Major industries textiles, clothing, tourism, banking, shipping, electronics, plastics, toys, watches, clocks. Major Export electrical machinery and appliances, textiles, apparel, footwear, watches and clocks, toys, plastics, precious stones. Major Import electrical machinery and appliances, textiles, foodstuffs, transport equipment, raw materials, semi manufactures, petroleum, plastics; a large share is re-exported. Hong Kong was the world's 10th largest trading entity in 2002, although it ranked only 95th (as in mid-2002) in terms of population. During the past 10 years, the value of Hong Kong's total merchandise trade with East Asia expanded by 85%. The value of Hong Kong's total merchandis e trade with the United States and the European Union also rose over the same period, by 50% and 36% respectively. Natural resources: Outstanding deepwater harbours, feldspar, land uses arable land 5.05%, permanent crops 1.01% and other 93.94%, natural Hazards: occasional typhoons.
6.	Dubai	▪ Dubai market provides unrivalled trade advantages for potential investors, residents and businessmen. Various attractions that have made Dubai an emerging hub for global world trade are: Location and access to global markets. Strategically located between East and West, Dubai has access to a market of over 1.5 billion consumers. It is rapidly developing its role as a key supplier to such emerging markets such as India, the CIS, Central Asia and South Africa, direct access to Jebel Ali seaport (the largest man-made port in the world), the planned second International Dubai airport (proposed for development after year 2010), and major UAE freeways, transport infrastructure unrivalled in the region in terms of size, facilities and efficiency, political and social stability characterized by laws that are both pragmatic and liberal, low labour costs. Various parks and free trade zones are the driving forces of Dubai's economy today. ▪ Dubai Investment Park (DIP) is a modern, environmental friendly mixed-use industrial, business, residential and recreational development located in Dubai. The DIP is 3,200 hectares in size and is located approximately nine kilometres inland from the Arabian Gulf. It is 3.5 kilometres wide and 9.7 kilometres in long. Extensive park landscaping that enhances the overall living environment in the Park. Jebel Ali Free Zone, alongside the eponymous port, was founded in 1985 and is under the management of the Jebel Ali Free Zone Authority (JAFZA) which cooperates closely with the Dubai Ports Authority. Built around the world's largest man-made port, Jebel Ali Free Zone includes manufacturing, trading and services companies as well as distribution companies covering the Middle East, the Asian sub-continent, Africa, the former Soviet Union, Eastern Europe and many other locations in the world. By the end of 1999, the Jebel Ali Free Zone had 1600 companies registered originating from 90 countries. In terms of activities, 70 percent of the companies are involved in trading and 25 percent in industry. The remaining 5 percent are service providers. A company can be incorporated in Jebel Ali as totally independent Free Zone Establishment (FZE). A Zone Establishment has a distinct legal

Sr. No.	Regions / City Regions / Cities / Smaller Countries	Basic Character
		identity and, contrary to other establishments, can be incorporated with a limited liability limited to the extent of the paid-in cap ital which is Dhs one million. ▪ The advantages and benefits of a Jebel Ali base include: 100% foreign ownership: Jebel Ali Free Zone companies do not need a local partner, No recruitment/sponsorship problems: the Free Zone Authority also acts as the nominal sponsor of the staff the companies wish to hire. There are no regulations regarding the employment of UAE nationals, 100 percent repatriation of capital and profits: no corporate taxes are imposed and repatriation of both profits and capital is allowed; No currency restriction; Dubai's trading tradition, is based on the free flow of capital and profits and the absence of exchange control. The Free Zone follows the same policy; No corporate taxes for 15 years: companies operating in the Jebel Ali Free Zone are exempt from corporate taxes for a minimum of 15 years, renewable for a further 15-years period; No personal income taxes; Abundant energy: the Jebel Ali Power Station serves both the water and power needs of the Free Zone; Dubai ports and the Free Zone contributed to making of Dubai the success story of today and a world-class trading centre. At the beginning of the year 2000, the Free Zone had well in excess of 1600 companies registered.
	Emerging Regions	
7.	Shanghai Region	▪ Shanghai is the largest city in China and is one of the most rapidly growing in the world. Pudong New Town is a massive special economic zone with a state of the art CBD and architectural marvels. Shanghai's total population is 13.12 million which is only 1% of total china and it area is only 0.06% of china total area. Shanghai contributes 8.3% in China's total industrial output and 16.6% in China's port cargo handling volume. Shanghai contributes 25% in China's export. Shanghai invested a total of more than 310 billion Yuan, with an annual increase of 33%, in its urban construction projects. 59 out of 100 largest industrial multinational corporations in the world have invested in Shanghai. Harbour of Shanghai and newly built Pudong International Airport are major infrastructures in the Shanghai City Region.
8.	Shenzhen and Pearl River Delta	▪ Shenzhen city and Shenzhen Special Economic Zone are the present day wonders in the world. The city has grown from 20,000 populations to more than 10 million within past 20 years. Basically a manufacturing hub, but during past ten years Shenzhen city has grown rapidly to become one of the largest trade hubs in Southern China. Shenzhen is a production base, R&D base and transaction base of high-tech products including computer and parts, communication equipment, audio visual products, optical and electromechanical products, biological engineering products, etc. Shenzhen has over 1500 factories producing supporting parts of computer, which produce almost all computer parts except chips. Their annual supporting ability is over 30 million sets. There are over 30 million lines for communication and exchange. Shenzhen has become an electronic supporting centre in mainland China. China International High-tech Result Fair is held in Shenzhen once every year. Shenzhen owns Luohu Port, the largest land passenger port in China and Huanggang Port, the largest land freight port. At the same time, Guangshen, Shenshan, Jingjiu and Guangshen expressways link Hong Kong, Shenzhen and inland cities. In 2002, its GDP reached 223.941 billion. Its total import

Sr. No.	Regions / City Regions / Cities / Smaller Countries	Basic Character
		and export amount was USD 87.1 billion, including an export value of USD 46.52 billion. Its total industrial output value was RMB 422.1 billion. The output value of high-tech industry accounted for 46% of the total industrial output value. By the end of 2002, the accumulated amount of foreign capital actually utilized reached USD 31.519 billion. Futian, Shatoujiao and Yantian Port Free Trade Zones are three bonded areas in Shenzhen. Geographical conditions of the bonded areas are superior. Futian Bonded area has a special passage to Honk Kong. Yantian Port Bonded area is close to Yantian Container Terminal. Futian Bonded Area covers 1.35 square kilometres and focuses on developing high-tech industries and logistics. Shatoujiao Bonded Area covers 0.27 square kilometres and focuses on the development of export processing of computers, toys, jewellery and gold. Yantian Port Bonded Area covers 0.85 square kilometres and focuses on logistics industry. Shenzhen port ranks sixth among world container ports.
9.	Kuala Lumpur, Putrajaya and Cyberjaya	▪ Kuala Lumpur is the capital of Malaysia and is a large city, houses the World's tallest Petronus Towers and modern airports such as the Kuala Lumpur International Airport. With ambitious projects such as development of a IT Corridor known as Multimedia Super Corridor (MSL) and two new cities Putrajaya (the proposed future capital of Malaysia) and Cyberjaya spread between KL and KLIA, the city will be a massive urban region with hi-tech economic activities and is a major trade hub in ASEAN. Global merchant banking, advertising businesses and tourism are the focus areas.
10.	Jabotabek	▪ The Special Capital Region of Jakarta (in Indonesian known as Daerah Khusus Ibukota (DKI) Jakarta) is Indonesia's largest and most important city. It has a status equal to a province. The city has been established for over 460 years, and in the past 20 years has grown at an explosive rate. After more than four centuries of limited population and spatial growth, Jakarta has expanded rapidly over the past two decades. The growth of Jakarta in this period has resulted in a significant shortfall of infrastructure in terms of public services and has highlighted the urgent need to consider means of coordinating the management of the city's development and growth with the surrounding regions, namely, the Kabupatens of Bogor, Tangerang, and Bekasi. This metropolitan region comprises DKI Jakarta and the Kabupatens of Bogor, Tangerang, and Bekasi. A joint development cooperation board was established with the responsibility of coordinating development activities in this region. Presently the whole region is called as Jabotabek, a massive metropolitan and industrial activity area. Foreign investments in the region are the largest in Indonesia. Jabotabek region has extremely focused on development of highways and urban infrastructure. Soekarno-Hatta Airport is one of the largest among the ASEAN countries.

In the contemporary history, these regions have exhibited unprecedented trends continuously maintaining higher economic growth for decades and experiencing rapid economic transformation to achieve higher income levels and higher quality of life in comparatively short period of time. Growth started in Japan gradually followed by other East Asian countries during 60s and 70s, Dubai in United Arab Emirates in the 70s and 80s and lately the coastal regions of China during past two decades. The hubs in the ASEAN countries have grown since the late 80s.

Table 1.2: Development Time Scale

Sr. No.	Regions	1950	1960	1970	1980	1990	2000
1.	Tokyo-Osaka						
2.	Seoul Capital Region						
3.	Taiwan: Taipei						
4.	Singapore						
5.	Hong Kong						
6.	Dubai						
7.	Shenzhen / PRD						
8.	Shanghai Region						
9.	Beijing City Region						
10.	Bangkok						
11.	Kuala Lumpur						
12.	Manila						
13.	Jabotabek						

Majority of these trade hubs are located in the East Asian Tigers as referred to the economies of Taiwan, Hong Kong, South Korea, and Singapore. These nations were noted for maintaining high growth rates since the early 1960s till 1990s. These nations were relatively poor during the 1960s, but today are rapidly transforming towards developed status with sharp increase in per capita income and double digit growth rates sustained for decades. The East Asian Tigers were able to move from third world status to first world status in a few decades and were able to progress past other developing areas, particularly Latin America and Sub-Saharan Africa. The tigers have exemplified a model for Third World Economic Development. But most interestingly, until the mid-1970s it was not clear that the East Asian Tigers were a peculiar region of fast growth and that the tiger development model was producing superior results to either neo-liberal (the USA-backed policies), Soviet, or import substitution development models. Because of the success of the initial Tigers, nations in the South East Asia such as Thailand, Malaysia, Indonesia and Philippines also have followed similar development models.

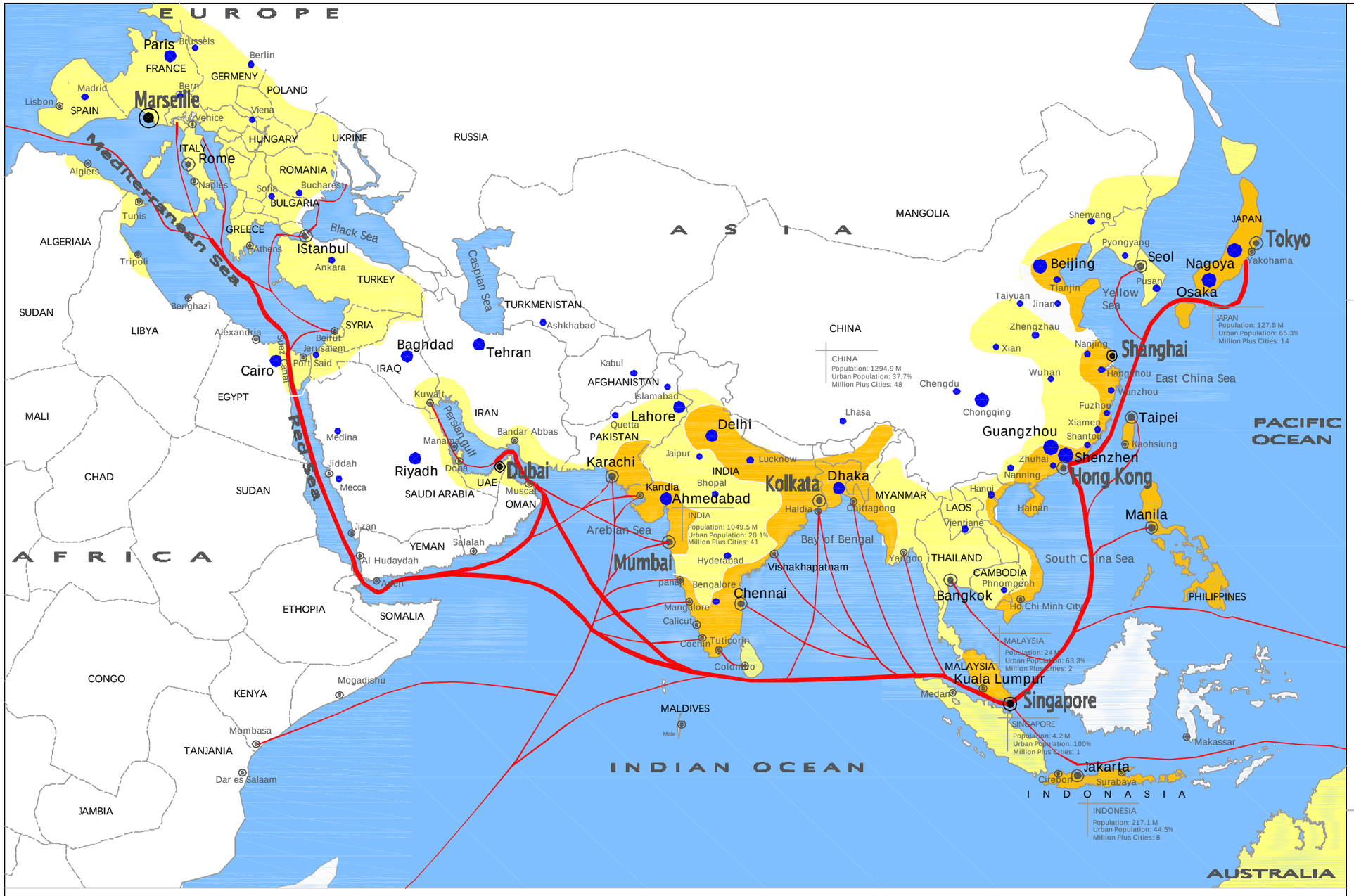
The common characteristics of the East Asian Tigers were: focus on exports to rich industrialized nations, sustained rate of double-digit growth for decades, non-democratic and relatively authoritarian political systems during the early years, high tariffs on imports, undervalued currencies, trade surplus, high level of U.S. Bond holdings and higher savings rate.

Dubai in UAE is on the other hand a city-emirate with extensive free trade policies. The free trade zone developed along with its port (one of the largest in the world) and airport and massive construction projects have transformed the city as one of the most modern urban areas in Asia and an important trade hub. Re-exports and retail trade are extremely important for Dubai.

1.3 Analysis of the Key Driving Forces

The key driving forces for development of a business hub are identified through a general analysis of the Asian trade hubs and through a detailed case study of three of these.

The general analysis includes the conditions from internal resource base (agriculture and minerals) and industrial and service growth conditions to the conditions of infrastructure availability. Availability of



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each of these conditions is checked through literature reviews and important aspects under each are highlighted as comments.

Table 1.3: General Analysis of the Key Driving Forces

Sr. No.	Key Driving Forces	Tokyo-	Seoul	Taiwan-Taipei	Singapore	Hong Kong	Dubai	Shanghai	Shenzhen /PRD	Kuala	Jabotabek	Comments
14.	Agricultural Resource Base	×		v	×	×	×	v	v	v	v	▪ PRD/Shenzhen was a rich agricultural region with abundant water resources ▪ Beijing is rich agricultural region with abundant water resources
15.	Mineral Resource Base	×	×	×	×	×	×	×	×	×	×	▪ Majority of these zones are poor in mineral resource base.
16.	In or in Proximity of a Large Urban Centre / Mega-cities	v	v	v	v	v	v	v	v	v	v	▪ All the hubs fulfil this criterion.
17.	Strong Manufacturing Base	v	v	v	v	v	×	v	v	v	v	▪ Exception is only Dubai. But recently Dubai is attempting to develop hi-tech industries.
18.	High-tech Industrial Base	v	v	v	v	v	×	v	v	v	×	▪ Focus of even emerging hubs in China and Malaysia is hi-tech industries inclusive of nano-technology, biotech, IT, research, etc.
19.	Large Domestic Market	v	v	v	×	×	×	v	v	v	v	▪ Hong Kong is dependent on mainland Chinese market. ▪ Markets in Japan and South Korea are rich due to higher purchasing power of people.
20.	Strong International Trade	v	v	v	v	v	v	v	v	v	v	▪ All the hubs fulfil this criterion.
21.	Re-exports	×	×	×	v	v	v	×	×	×	×	▪ Dubai, Singapore and Hong Kong are extremely successful re-export hubs.
22.	Cheap Labourers 30/40 years back	×	v	v	v	v	v	v	v	v	v	▪ South Korea and Taiwan had advantages of cheaper labourers three to four decades back and attracted large investments.

Sr. No.	Key Driving Forces	Tokyo-	Seoul	Taiwan- Tainei	Singapore	Hong Kong	Dubai	Shanghai	Shenzhen /PRD	Kuala	Jabotabek	Comments
23.	Cheap Labourers Now	×	×	×	×	×	v	v	v	v	v	▪ China, Malaysia and Indonesia possess strong base for cheaper labourers.
24.	Migrated Cheaper Labourers	×	×	×	×	×	v	×	×	×	×	▪ Dubai is blessed with cheaper labourers from India and Pakistan.
25.	Globalisation and Opening Up / WTO / FTAs	v	v	v	v	v	v	v	v	v	v	▪ Every hub is taking advantages as much as possible.
26.	Special Incentives	v	v	v	v	v	v	v	v	v	v	▪ Common for all.
27.	Planned Special Economic Zones /FTZs/ Technology / Industrial Parks	v	v	v	v	v	v	v	v	v	v	▪ China has SEZs, South Korea, Taiwan, Singapore, Malaysia have industrial parks and technology parks; Dubai has successful free zones.
28.	Political System Supporting Open Market Policies	v	v	v	v	v	v	v	v	v	v	▪ All the political systems support open market policies vigorously.
29.	Location of Deep Water Ports	v	v	v	v	v	v	v	v	×	×	▪ Almost all the hubs have the advantages of deep water ports.
30.	Location of Large Modern Airport	v	v	v	v	v	v	v	v	v	v	▪ Large international airports are common factor in every hub.
31.	Availability of Highways	v	v	v	v	v	v	v	v	v	v	▪ Expressways with more than 100/120 km per hr speed are also common in all.
32.	Availability of Water and Power	v	v	v	v	v	v	v	v	v	v	▪ Adequate water and power in all.
33.	Tourism Potential	v	v	v	v	v	v	v	v	v	v	▪ Tourism potential is being vigorously explored in all the hubs.

It has been seen that availability of a good agricultural base or a mineral resource base is not a significant criteria for growth of these hubs. Even few of these hubs does not have sufficient domestic market and are heavily dependent on exports and re-exports. But each of these hubs have stressed on fiscal incentives, open market policies, systematic industrialisation, urban development, infrastructure development and on tourism.

1.4 Assessment of the Key Driving Forces through Selected Cases

To internalise the key driving forces in depth, detailed case studies are undertaken for three of the above mentioned regions. The cases of Singapore and Taiwan will provide detail characteristics of well-established hubs, while the case of the Pearl River Delta shall detail out the conditions of growth and functions of an emerging region.

1.5 Case Study: Taiwan

1.5.1 Growth of Taiwan

Taiwan is an island in Eastern Asia, bordering the East China Sea, Philippine Sea, South China Sea, and Taiwan Strait, north of the Philippines, off the south-eastern coast of China. Following the Communist victory on the mainland in 1949, 2 million Nationalists fled to Taiwan and established a government using the 1946 constitution drawn up for all of China. Over the next five decades, the ruling authorities gradually democratized and incorporated the native population within the governing structure. In 2000, Taiwan underwent its first peaceful transfer of power from the Nationalist to the Democratic Progressive Party. Throughout this period, the island prospered and became one of East Asia's economic "Tigers." The dominant political issues continue to be the relationship between Taiwan and China - specifically the question of eventual unification - as well as domestic political and economic reform.

1.5.2 Taiwanese Economic Boom

Through nearly five decades long hard commitment and sound economic management, Taiwan has transformed itself from an underdeveloped, agricultural island to an economic power that is today a leading producer of high-technology goods. It has a dynamic capitalist economy with gradual deregulation and disinvestments by the government. GDP in real terms has grown in average 8 percent per annum during the past three decades. Exports have grown even at a faster rate and have provided the primary impetus for industrialisation. Inflation and unemployment are low; the trade surplus is substantial; and foreign reserves are the world's one of the largest. Agriculture contributes only a 3 percent to GDP, which was 35 percent in 1952. Traditional labour-intensive industries are steadily being moved off-shore and replaced with more capital and technology-intensive industries. Taiwan has transformed itself from a recipient of the U.S. aid in the 1950s and early 1960s to an aid donor and major foreign investor, especially in Asia. Taiwan is now a creditor economy, holding one of the world's largest foreign exchange reserves of more than $100 billion (100 G$) in 1999.

Taiwan has become a major investor in mainland China, Thailand, Indonesia, the Philippines, Malaysia, and in Vietnam. Private investments from Taiwan in the mainland China are estimated to more than $30 billion, and Taiwan also has invested a comparable amount in Southeast Asia.

On the other hand, due to its conservative financial approach and entrepreneurial strengths, Taiwan suffered little from the Asian financial crisis in 1998-1999 comparing many other East Asian economies. Despite the crisis, the economy continued to expand at about 5 percent per annum, with virtually full employment and low inflation levels. Backed by expansion in domestic consumption, exports, and private investment, growth in 2000 is picking up a bit from late nineties. The population also enjoys an annual average income equal to U.S. $13,152 (1999).

1.5.3 Foreign Investments

The basic driving forces of the Taiwanese economy are influx of foreign investments and growth of foreign trade. In the 1960s, foreign investments in Taiwan helped in introducing modern, labour-intensive technology to the island, and Taiwan became a major exporter of labour-intensive products. In the 1980s, focus shifted toward increasingly sophisticated, capital-intensive and technology-intensive products for export and toward developing the service sector. On the other hand, due to appreciation of the New Taiwan dollar (NT$), rising labour costs, and increasing environmental consciousness in Taiwan many labour-intensive industries, such as shoe manufacturing have moved to the mainland China and Southeast Asia.

1.5.4 Foreign Trade and Exports

Foreign trade has been the engine of Taiwan's rapid economic growth during the past 40 years. The total value of trade has increased more than five-fold in the 1960s, nearly 10-fold in the 1970s, and doubled again in the 1980s. The 1990s saw a more modest, slightly less than two-fold, growth. Export composition changed from predominantly agricultural commodities to sophisticated industrial products (now 98%). Electronics is the Taiwan's most important export industry and is the largest recipient of the U.S. investments. Taiwan is the world's largest supplier of computer monitors and is a leading PC manufacturer. Textile production, though of declining importance as Taiwan loses its competitive advantage in labour-intensive markets, is another major industrial export sector. Imports are dominated by raw materials and capital goods, which account for more than 90 percent of the total.

The United States is Taiwan's second largest trading partner, taking 20 percent of Taiwan's exports and supplying 16 percent of its imports. Taiwan is the United States' eighth-largest trading partner; Taiwan's two-way trade with the United States amounted to about $45 billion in 2002. Imports from the United States consist mostly of agricultural and industrial raw materials. Exports to the United States are mainly electronics and consumer goods. The United States, Hong Kong (including indirect trade with mainland China), and Japan account for nearly 56 percent of Taiwan's exports, and the United States and Japan provide over 40 percent of Taiwan's imports. As Taiwan's per capita income level has risen, demand for imported, high-quality consumer goods has increased. Taiwan's 2002 trade surplus with the United States was $8.7 billion. Taiwan became a member of the World Trade Organization (WTO) as a special customs territory in January 2002.

The lack of formal diplomatic relations with all but 26 of its trading partners appears not to have seriously hindered Taiwan's rapidly expanding business and commerce. Taiwan maintains trade offices in more than 60 countries where it does not have diplomatic relations. In addition to the WTO, Taiwan is a member of the Asian Development Bank as "Taipei, China" and the Asia-Pacific Economic Cooperation (APEC) forum as 'Chinese Taipei". These developments reflect Taiwan's economic importance and its desire to become further integrated into the global economy.

1.5.5 Small, but Dynamic Agriculture Base of Taiwan

Although only about a-quarter of Taiwan's land area is arable, virtually all farmland is intensely cultivated, with some areas suitable for two and even three crops a year. However, increases in agricultural production have been much sluggish than industrial growth. Agriculture only comprises about 2.69 percent of Taiwan's GDP. Taiwan's main crops are rice, sugar cane, fruit, and vegetables. Although self-sufficient in rice production, Taiwan imports large amounts of wheat, mostly from the United States. Meat production and consumption are rising sharply, reflecting a rising standard of living. Taiwan has exported large amounts of frozen pork, although this was affected by an outbreak of hoof and mouth disease in 1997. Other agricultural exports include fish, aquaculture and sea products, canned and frozen vegetables, and grain products. Imports of agriculture products are expected to increase due to the WTO accession, which is opening previously protected agricultural markets.

1.5.6 Contemporary Issues

Taiwan now faces many of the same economic issues as other developed economies. With the prospect of continued relocation of labour-intensive industries to countries with cheaper work forces, Taiwan's future growth will be dependent on further transformation to a high technology and service-oriented economy. In recent years, Taiwan has successfully diversified its trade markets, cutting its share of exports to the United States from 49 percent in 1984 to 20 percent in 2002. Taiwan's dependence on the U.S. market will continue to decrease as its exports to Southeast Asia and mainland China are gradually growing and also due to its efforts to develop European markets. Taiwan's accession to the WTO and its desire to become an Asia-Pacific "regional operations centre" are spurring further economic liberalization.

1.5.7 Science Based Industrial Parks: the Basic Driving Force of Taiwan’s Economy

The basic driving forces of Taiwan’s economy are the science based industrial parks, which are transforming Taiwan into a hi-tech global manufacturing centre. Taiwan's transformation to a dynamic capitalist economy has been studied and marvelled by experts all over the world because of its overwhelming success. Formerly relying on industrial manufacturing and a wide assortment of agricultural goods, Taiwan's government and business leaders took a bold step more than twenty years ago by deciding to follow the lead of Silicon Valley and establishing a land development specialising in the manufacturing and research and development of hi-tech industries. Thus, came forth Taiwan's first science-based industrial park, the Hsinchu Science-based Industrial Park (HSIP).

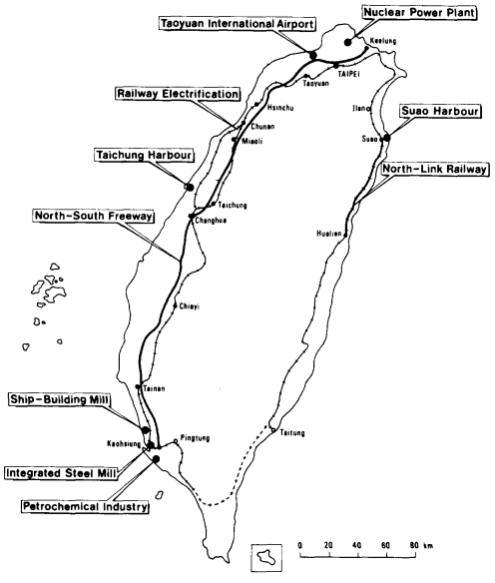
1.5.7.1 Hsinchu Science-based Industrial Park (HSIP)

The park is a 632 hectare facility sprawled across the northern county and city of Hsinchu, which now accommodates more than 300 companies seeking the latest technological breakthroughs in hi-tech areas such as integrated circuits, computers and peripherals, telecommunications, optoelectronics, precision machinery and biotechnology. The spectacular success of the Hsinchu Science-based Industrial Park not only fuelled Taiwan's rise as one of the new Asian economic "tigers" in the late 1980s, but soon thereafter other types of technological industrial parks were being planned and developed all over the island, and it became apparent that a number of Taiwan's longstanding industries would have to make room for a new family of hi-technology and information age industries.

The Hsinchu Science-based Industrial Park was first established in 1980, and under its varying stages of development, has gradually expanded its facilities throughout Hsinchu and its nearby base site areas. With an extensive infrastructure providing its own water and power supply, telecommunications, convenient access to national freeways, the CKS International Airport and future high speed rail, as well as close proximity to national universities and research institutes, the HSIP provides the most ideal conditions and comfortable environment for its dwellers with a complete combination of office and living facilities, communities, activity centres, recreational parks and basic services. Planning, design and efficient land development ensured all of the public facilities, including road systems, water supply systems, drainage systems, sewage and wastewater collection and treatment systems and landscaping.

1.5.8 New Initiatives

Regional Infrastructure in Taiwan



Similar to the HSIP in the northern part of Taiwan, a second of such type is being developed in Tainan in the southern part and in the face of an economic downturn and layoffs that have hit even the high-tech industrial park of Hsinchu, the Taiwanese government plans to build a third science-based industrial park in central Taiwan. Infrastructure investment for the park is estimated at NT$10 billion facility. Two sites have recently been picked for the new park, including a 300-ha plot that straddles Taichung city and county and another 36-ha plot in Yunlin county.

The Yunlin site, which is close to a proposed high-speed rail station, has been slated mainly for biotechnology and pharmaceutical use. Unlike the present science parks, the proposed facility will be modelled on European science parks which are closely connected to universities in the same areas. Thus, the Yunlin site was chosen because it is where the National Taiwan University already has plans to set up branches of its medical and electrical engineering colleges, as well as a hospital. Meanwhile, the Taichung site was chosen because it

already has a flourishing precision machinery industry with about 20,000 firms making products such as lathes and precision machine parts as well as good infrastructure such as established transport networks, residential areas, and universities. Its focus will be the production of high-tech precision machinery. As most of the equipment for the IC and TFT-LCD industries is imported from the US or Japan presently, the government envisages that these will be produced locally at this park. Other industries slated for the area include aerospace as there is already an aerospace research facility in Taichung with optoelectronics and telecommunications.

The new science-based industrial park will complement Hsinchu, which focuses on the IC industry, and Tainan which concentrates on optoelectronics, although some overlap is expected. Detailed planning for the new park has already begun. The whole project duration will take 10 years, but companies would be able to start their production within three years of the parks establishment.

Basic Facts
Hsinchu Science-based Industrial Park
Location: 632 hectares over both Hsinchu City and Hsinchu County in northern Taiwan. Also, the newly developed 138 hectare Chunan Base in Miaoli County, south of Hsinchu.
Facilities: Standard plants and factories, clinic, post office, bank, warehouses, truck depots, residential area with housing complexes, sports and recreation facilities, restaurants, bookstore, artificial lake, mini shopping centre and experimental schools.
Industrial Development: Over 335 companies (282 local and 53 foreign) involved with integrated circuits, computers and peripherals, telecommunications, optoelectronics, precision machinery and biotechnology.
Tainan Science-based Industrial Park
Location: 638 hectares over Tainan County in southern Taiwan.
Infrastructures: Site grading, road system, flood control, drainage system, water supply system (with a 3,000 tons elevated storage tank), wastewater recycling, sewage treatment plant (Design capacity Q = 90,000 CMD), waste disposal, bridges, lift station and flood control pump station, etc.

1.5.9 Supportive Role Played by the Freeways and other Infrastructures

The planning, design and construction of Taiwan's first freeway, the Sun Yat-sen National Freeway, began in 1970 with the task of bringing the rural areas of western Taiwan closer to the cities and encouraging local development along its route stretching from Taipei's northern port of Keeling to the southern port city of Kaohsiung (Taiwan's second largest city). The highway was opened to traffic in 1978 with a speed limit of the 100 km/hr. But, with the ensuing rapid economic development of Taiwan, the demands and burden for this one major arterial became too much for the freeway to handle.

By the time plans for the Second National Freeway were under way since 1986. The first segment of the northern section of the Second National Freeway was opened to the public in 1993, and other sections and extensions of the freeway were opened to traffic upon their completion in subsequent years. Besides offering an alternative route heading north or south in Taiwan's western corridor, the new freeway offers six traffic lanes throughout its length with a speed limit of 110 km/hr as opposed to. Taipei’s urban rapid transit system and the high speed railways, currently under construction are two other mega infrastructure projects having major impact in development of Taiwan.

1.6 Case Study: Singapore

1.6.1 Rise of Singapore; the Island of Tactics

Singapore was founded as a British trading colony in 1819. It joined the Malaysian Federation in 1963 but separated two years later and became independent. It subsequently became one of the world's most prosperous countries with strong international trading links (its port is the world's busiest in terms of tonnage handled) and with per capita GDP equal to that of the leading nations of Western Europe.

Population (Mid Year Estimates) & Area 2004	
Total Population[1] ('000)	4,240.3
Annual Growth (%)	1.3
Singapore Residents[1] ('000)	3,486.9
Annual Growth (%)	1.4
Sex Ratio[2] (Males per 1,000 Females)	988
Population Density (Per Sq Km)	6,066
Land Area (Sq km)	699.0

Source: http://www.singstat.gov.sg/

Singapore's achievements and unique characters:

- Singapore is blessed with a highly developed and successful free-market economy, a remarkably open and
- corruption-free business environment, stable prices, and the fifth highest per capita GDP in the world.
- Exports, particularly in electronics and chemicals, and services are the main drivers of the economy.
- The government promotes high levels of savings and investment through a mandatory savings scheme and spends heavily in education and technology.
- It also owns government-linked companies (GLCs) - particularly in manufacturing - that operate as commercial entities and account for 60 percent of GDP.
- As Singapore looks to a future increasingly marked by globalization, the country is positioning itself as the region's financial and high-tech hub.

1.6.2 A Unique Mix of Physical / Locational Advantages and Tactical Policy Decisions

Singapore's strategic location on major sea lanes and industrious population has given the country an economic importance in Southeast Asia disproportionate to its small size. Upon independence in 1965, Singapore was faced with a lack of physical resources and a small domestic market. In response, the Singapore Government adopted a pro-business, pro-foreign investment, export-oriented economic policy framework, combined with state-directed investments in strategic government-owned corporations.

Box 1.1: Singapore's Strategic Moves

- Investments in port, airport, information infrastructure, education, training, and facilitating business.
- Higher value added foreign investment by facilitating the establishment of corporate headquarters and R&D centre to enhance its intellectual base.
- Knowledge service hub for East Asia
  - Finance and other business services
  - Education and health
  - Research and development

1.6.3 Economic Growth and Contemporary Focus

1.6.3.1 Economic Dynamism

- Continuous hyper dynamic economic growth from 1060 to 1999.
- Suffers from East Asian Crisis 1998 – 99
- Recovers with robust growth in 2000

Singapore's economic strategy proved a success, producing real growth that averaged 8 percent from 1960 to 1999. The economy picked up in 1999 after the regional financial crisis, with a growth rate of 5.4 percent, followed by 9.9 percent in 2000. However, the economic slowdown in the United States, Japan and the European Union, as well as the worldwide electronics slump, has put the estimated economic growth in 2001 to 2.0 percent.

Gross Domestic Product (GDP) 2004	
At Current Market Prices ($m)	180,554.4
Per Capita GDP ($)	42,581.0
At 1995 Market Prices ($m)	180,496.0
Annual Growth (%)	8.4
Productivity and Inflation	
Annual Growth in Labour Productivity (%)	6.7
Annual Inflation Rate (%)	1.7

Source: http://www.singstat.gov.sg/

1.6.3.2 Multinational Corporations

- 3000 MNCs
- MNC's accounts for more than two thirds of manufacturing output and direct export sales.

Singapore's largely corruption-free government, skilled work force, and advanced and efficient infrastructure have attracted investments from more than 3,000 multinational corporations (MNCs)

from the United States, Japan, and Europe. Foreign firms are found in almost all sectors of the economy. MNCs account for more than two-thirds of manufacturing output and direct export sales, although certain services sectors remain dominated by government-linked corporations.

1.6.3.3 Manufacturing

- Singapore is manufacturing and financial / business services hub.
- Electronics is the leading manufacturing industry; chemical and biotechnology are the two present focus areas.

Manufacturing and financial/business servic es are the twin engines of the Singapore economy and accounted for 24 26 and 25 22 percent, respectively, of Singapore's gross domestic product in 2000 The electronics industry leads Singapore's manufacturing sector, accounting for 48 percent of Singapore's total industrial output, but the government also is prioritizing development of the chemicals and biotechnology industries.

To maintain its competitive position despite rising wages, the government seeks to promote higher value-added activities in the manufacturing and services sectors. It also has opened, or is in the process of opening the financial services, telecommunications, and power generation and retailing sectors to Foreign Service providers for greater competition. The government has also pursued cost-cutting measures, including wage and rent reductions, to lower the cost of doing business in Singapore.

Manufacturing 2004 Singapore $	
Total Output [6] ($m)	189,789
Net Investment Commitments at end of yr ($m)	8,258.1
(gross commitments less projects withdrawn or uncertain)	
Foreign Investments ($m)	6,001.8

Source: http://www.singstat.gov.sg/

1.6.4 Investment Scenario

- Attracts investments, despite having relatively higher cost of operation
- Massive American investments in electronics, oil ref ining, chemical and more than 1500 American firms.
- Government encourages local firms to invest outside Singapore.

1.6.4.1 Inwardly Flowing Investments

Singapore continues to attract investment funds on a large-scale despite its relatively high-cost operating environment. The U.S. leads in foreign investment, accounting for 40 percent of new commitments to the manufacturing sector in 2000. As of 1999, cumulative investment for manufacturing and services by American companies in Singapore reached approximately $20 billion (total assets). The bulk of U.S. investment is in electronics manufacturing, oil refining and storage, and the chemical industry. More than 1,500 U.S. firms operate in Singapore.

1.6.4.2 Strategy for Investing Outside

The government also has encouraged firms to invest outside Singapore, with the country's total direct investments abroad reaching $39 billion by the end of 1998. The People's Republic of China was the top destination, accounting for 14 percent of total overseas investments, followed by Malaysia (10 %), Hong Kong (8.0%), Indonesia (8.0%) and U.S. (4.0%). The rapidly growing economy of India, especially the high technology sector, is becoming an expanding source of foreign investment for Singapore. The United States provides no bilateral aid to Singapore.

1.6.5 Trade in Singapore

1.6.5.1 Advantages of Strategic Location

- Singapore considers 2.8 billion populations in the surrounding regions as its market within seven hours of flight time.
- More than 10,000 trading companies use Singapore as their distribution point in the Asia-Pacific market.

The strategic location of the country forms a major focal point for South East Asian countries in terms of both sea and air routes and therefore becomes the major business destination for the rest of the world both in terms of transhipment and other trade relations. This strategic location enables a market catchment size of 2.8 billion within just seven hours flight time. As Singapore is recognised as one of the most competitive economies in the world, more than 10,000 trading companies use Singapore as their distribution point for markets in the Asia-Pacific.

1.6.5.2 Trade, Achievements

Singapore's total trade in 2000 amounted to $273 billion, an increase of 21 percent from 1999. Despite its small size, Singapore is the tenth-largest trading partner of the United States. In 2000, Singapore's imports totalled at $135 billion, and exports at $138 billion. Malaysia was Singapore's main import source, as well as its largest export market, absorbing 18 percent of Singapore's exports, with the United States close behind. Singapore's principal exports are petroleum products, food and beverages, chemicals, textile and garments, electronic components, telecommunication apparatus, transport equipment. Singapore's main imports are aircraft, crude oil and petroleum products, electronic components, radio and television receivers and parts, motor vehicles, chemicals, food and beverages, iron and steel, textile yarns and fabrics.

External Trade At Current Prices 2004 $ = Singapore Dollar	
Total Trade ($m)	580,370.2
Exports ($m)	303,476.3
Domestic Exports ($m)	166,502.5
Imports ($m)	276,893.9

Source: http://www.singstat.gov.sg/

1.6.5.3 Re-exports from Singapore

Interestingly, re-exports accounted for 43 percent of Singapore's total sales to other countries in 2000. In addition, more than 5000 foreign companies (including many of the Global 500) also use Singapore as their Asia Pacific Base. Singapore's total trade in 2000 amounted to $273 billion, an increase of 21 percent from 1999.

Commerce and Tourism 2004	
Annual Growth in Retail Sales At Constant Prices (%)	13.4
Visitor Arrivals ('000) (excluding Malaysian arrivals by land)	8,328.1
Hotel Occupancy Rate (%)	80.6

Source: http://www.singstat.gov.sg/

1.6.6 Labour Force and Employment

- Workforce 2.18 million in 2004
- Unemployment rate is 4.3 percent in 2004
- Labour force participation rate 64.2 percent

In 2004, Singapore had a work force of about 2.18 million. The National Trades Union Congress (NTUC), the sole trade union federation, comprises almost 99 percent of total organized labour. Extensive legislation covers general labour and trade union matters. The Industrial Arbitration Court handles labour-management disputes that cannot be resolved informally through the Ministry of Labour. The Singapore Government has stressed the importance of cooperation between unions, management and government ("tripartism"), as well as the early resolution of disputes. There has been only one strike in the past 15 years.

Singapore has enjoyed virtually full employment for long periods of time. Amid an economic slump, the unemployment rate was expected to rise to 4.0 percent by the end of 2001, from 2.4 percent early in the year. The Singapore Government and the NTUC have tried a range of programs to increase lagging productivity and boost the labour force participation rates of women and older workers. But labour shortages persist in the service sector and in many low-skilled positions in the construction and electronics industries. Foreign workers help make up this shortfall. In 2000, there were about 600,000 foreign workers in Singapore, constituting 27 percent of the total work force.

1.6.7 Industrial Parks in Singapore

1.6.7.1 Jurong Island Industrial Park

Singapore's industrial development began in the '60s with the building of Jurong Industrial Estate. Jurong then was largely swamplands with the scarcely populated islands of Pulau Ayer Chawan, Pulau Ayer Merbau, Pulau Seraya and Pulau Merlimau, the villagers continued to live a simple and sun-kissed lifestyle. As late as the 1960s, they lived in Malay-style wooden stilt houses on their palm-fringed islands. In the late 1960s and early 1970s, three oil companies decided to house their facilities on the islands; Esso in Pulau Ayer Chawan, Singapore Refinery Company in Pulau Merlimau and Mobil Oil in Pulau Pesek. With these pioneers of Singapore's petroleum industry in place, it became

logical that when the chemical industries was identified in 1980 as an industry cluster capable of contributing significantly to the economic growth of Singapore, amalgamation of the islands in forming Jurong Island, become the natural choice for the development of a petrochemical hub.

Today, Jurong Island is home to leading petrochemical companies, Industry luminaries like BASF, BP, Celanese, ExxonMobil, Dupont, Mitsui Chemicals, Chevron Oronite, Shell and Sumitomo Chemical, have taken their poised to reap the benefits of comprehensive infrastructure and production synergies from this unique cluster development for oil, petrochemical and specialty chemicals. In addition, third party service providers of utilities, tankages and terminalling facilities, warehouses , maintenance and repair centres, such as SUT, Vopak, Oiltanking, Odfjell, Rotary IMC and Poh Tiong Choon have also found it advantageous to be located there.

1.6.7.2 Institutional Support

In 1991, the JTC Corporation was appointed the agent of the Jurong Island project. Based on the needs and feedback from the industrialists, it planned and coordinated with the various government agencies in delivering the necessary infrastructure and services to the island, namely land through large-scale reclamation, roads, drains, utilities and others.

1.6.7.3 Infrastructure in Jurong

Jurong Island is served by efficient road network and public transport system via the dual four-lane carriageway, Jurong Island Highway. The Jurong Island Highway is the key to the operational requirement in the zone. The Highway begins with a 2.6 km causeway linking mainland Singapore and the island. It merely takes one less than 10 minutes to travel from mainland Singapore to the furthest part of Jurong Island. There are also public bus services plying the entire island.

1.6.7.4 Other Business Parks

Changi Business Park, International Business Park, iPark, etc are other spatial enclaves being developed for systematic development and attracting investments. Businesses in these parks have a wide choice of space for their operations. All manner of office space can be found from three-storey walk-up former shop houses in the conserved parts of town to towering office blocks with high-speed lifts and far-reaching views. Factory spaces are available in ranges from vacant plots of land to ready-built low-rise and high-rise units, workshops and warehouses.

1.6.8 Quality of Life

Singapore has achieved very high quality of life through continuous wealth accumulation and infrastructure investments. Few of the indicators are in the following table:

SOCIAL INDICATORS	Year 2003
Home Ownership (%) (among resident households)	92.8
Resident Households Living in HDB 4-Room or Larger Flats or Private Housing (%)	71.7
Doctors Per 10,000 Population	15

Private Cars Per 1,000 Population[2]	111
Mobile Phone Subscribers Per 1,000 Population	831
Casualties of Road Accidents Per 100,000 Population	196
Crime Rate (Per 100,000 Population)	802
Crude Birth Rate[2] (Per 1,000 Population)	10.3
Crude Death Rate[2] (Per 1,000 Population)	4.4
Total Fertility Rate[2] (Per Resident Female)	1.25
Infant Mortality Rate[2] (Per 1,000 Live-births)	2.5
Life Expectancy at Birth[2] (Yrs)	78.9
Males	76.9
Females	80.9
Literacy Rate(%) (among residents aged 15 yrs & over)	94.2
% with Secondary or Higher Qualifications (among resident non-students aged 15 yrs & over)	56.7
Mean Years of Schooling (Yrs) (among resident non-students aged 25 yrs & over)	8.6

1.7 Case Study: Pearl River Delta

1.7.1 The Pearl River Delta, China

Pearl River Delta occupies the low-lying areas alongside the Pearl River estuary where the river flows into the South China Sea. The region covers an area of 11,000 sq. km. and is a part of Guangdong Province and is positioned at the same latitude where Gujarat is lying. The PRD is one of mainland China's leading economic regions and a massive manufacturing centre. The region includes eight municipalities, namely Guangzhou, Shenzhen, Zhuhai, Dongguan, Zhongshan, Foshan, Huizhou and Jiangmen. According to the 2000 national Census in China, the region had a population of 40.8 million. The eastern side of the PRD (Shenzhen, Dongguan, Guangzhou) is the most developed economically. The western areas are open for development. New transport links between Hong Kong, Macau and Zhuhai in the PRD are expected to open up new areas for development and facilitate trade within the region. A major transportation development within the region, the Pearl River Bridge Project, is targeted for completion in 2006. The 29-kilometre Y-shaped bridge will be among the longest in the world.

Until around 1985, the PRD had been mainly dominated by farms and small rural villages, but after the economy was reformed and opened up, a flood of investment turned it into China's economic powerhouse. The PRD's startling growth was fuelled by foreign investment coming largely from manufacturers from Hong Kong that moved their operations into the PRD. In 2003, companies in Hong Kong employed 11 million workers in their PRD operations.

1.7.2 Booming Economy

The Pearl River Delta Economic Zone has been the most economically dynamic region of the Mainland China since the launch of China's reform programme in 1979. In 1991, almost 50 percent of foreign investment in China was in Guangdong Province as a whole, and 40 percent alone in the PRD. The region's Gross Domestic Product (GDP) grew from just over US$8 billion in 1980 to more than US$89 billion in the year 2000. During that period, the average real rate of GDP growth in the Pearl River Delta Economic Zone exceeded 16 percent, well above the People's Republic of China's national figure of under 10 percent. By 2001 its GDP rose to just over US$100 billion. The abundance of employment opportunities created a pool of wealthy, middle-income, professional consumers with an annual per capita income that puts them among China's wealthiest.

Per capita income has been growing substantially in recent years, as have consumer expenditures. Although the Pearl River Delta Economic Zone encompasses only 0.4 percent of the land area and only 3.2 percent of the 2000 Census population of the Mainland China, it accounted for 8.7 percent of GDP, 32.8 percent of total trade, and 29.2 percent of utilised foreign capital in the Mainland China in 2001. These figures show the remarkable level of economic development that the Pearl River Delta Economic Zone has achieved and the international orientation of the region's economy. This orientation has attracted numerous investors from all over the world who use the Greater Pearl River Delta region as a platform for serving global and Chinese markets.

1.7.3 Growth of Manufacturing Sector

The Pearl River Delta Economic Zone has become the workshop of the world and is a major manufacturing base for electronic products (such as watches and clocks), toys, garments and textiles, plastic products, and a range of other goods. Much of this output is invested by foreign entities and is geared for the export market. The Pearl River Delta Economic Zone accounts for approximately one third of Mainland China's trade value.

Private-owned enterprises have developed quickly in the Pearl River Delta Economic Zone and are playing an ever-growing role in the regions economy, particularuly after the year 2000 when the development environment for private-owned enterprises has been greatly relaxed. Nearly five percent of the world's goods were produced in the Greater Pearl River Delta in 2001, with a total export value of US$ 289 billion. Over 50,000 Hong Kong companies have plants there, according to a 2002 survey.

1.7.4 Role of Hong Kong

The Pearl River Delta Economic Zone has benefitted from proximity to Hong Kong. Hong Kong has been the source of over 70 percent of the cumulative foreign direct investment in the region since 1979, or roughly eight times the investment of North America, Japan, and Europe combined. One reason Hong Kong has played such an important role is because it links the region with the rest of the world, handling 70 to 80 percent of its seaborne exports and an even greater percentage of its airborne exports.

Hong Kong serves a distinct role as a place for firms to access the strength of the Greater Pearl River Delta region. Many western firms also use Hong Kong as a base for their Greater Pearl River Delta region activities, with senior managers often residing in Hong Kong. Hong Kong also serves as a principal location for the buying offices for companies doing business with the Greater Pearl River Delta region. Increasingly, savvy companies are developing Hong Kong and Greater Pearl River Delta strategies with their management, finance, communication, and coordination activities based in Hong Kong and their manufacturing activities in one or more of the jurisdictions of the Pearl River Delta Economic Zone. While the PRD offers a competitive market for companies to source or manufacture goods, Hong Kong provides logistical, financial, legal, design and marketing services that allow companies to export their products to rest of the world.

1.7.5 Special Economic Zones: Case of Shenzhen

The driving force of the economy and development of the Pearl River Delta Region is the special economic zones. Three of the five Special Economic Zones (Shenzhen, Zhuhai and Shantou) are located in the PRD. With large scale infrastructure investments and integrated planning, the economic zones such as Shenzhen has rewritten the economic history of Asia.

1.7.5.1 Shenzhen, the Economic Engine of the Pearl River Delta

Shenzhen was a small town only of 38 sq km and a building of five floors was the highest building in the city after 570 years of development from 1410 to August 1980 till the Shenzhen Economic Special Zone was officially established. Since then urban area expanded continuously and more than 2,000 high-rise buildings emerged in urban area. Yantian Urban District was established in 1998. By the end of 1997, the population within the special zone had reached 1.7 million and that of the whole city had reached 3.79 million while the total area of the whole city today covers a massive 2020 sq km of area. Today Shenzhen is the sixth largest city in China with skyscrapers, broad avenues and with sophisticated lifestyle. Skyscrapers including International Trade Building, Development Centre Building, Shenfang Building, Diwang Building enjoyed high reputation, among which International Trade Building created the "Shenzhen Speed" by building 3 floors each day. Diwang Building ranked 5th in the world and 2nd in Asia among the highest skyscrapers that have been built.

1.7.5.2 Investments and Income

Within a short period of time the city attracted numerous businesses and investments. Only within first ten years, by the end of 1990, the city had entered into 7,686 various contracts and agreements with

foreign investors with agreed amount of investment of USD 6.18 billion and with an actual amount of utilised investment of USD 3.25 billion. Over 4,000 association enterprises were established with actual investment of more than RMB 3 billion. The total amount of export through these agencies amounted to over USD 1 billion. Till date, Shenzhen has fetched 15,700 projects of investment from 150 counties with agreed foreign investment of USD 17.816 billion and with an actual foreign utilised investment of USD 7.71 billion. According to statistics, the GNP of the whole city in 1990 increased by 49 times over 1980 when the special zone was first established, reaching RMB 13.5 billion. Income increased by 41.5 times and reached RMB 9.4 billion with an annual increase of 45.5 percent. GNP per capita increased from RMB 6,084 to RMB 26,047. The income of foreign exchange increased from USD $ 4,505 to USD $ 2.17 billion. The overall labour productivity increased by 8.9 times, from RMB 7,217 to RMB 71,506. While national economy developed continuously and rapidly, the output value, net output value and financial income increased simultaneously.

In 1997, the GNP of the whole city was amounted to RMB 113 billion with an increase of 16 percent over the previous year. The proportion of primary, secondary and tertiary sectors were 1.4:49.3:49.3. The industrial structure gradually resembled to that of the developed countries. The comprehensive index of industrial economic results was 178.4. The total value of import and export increased by 19.2 percent and amounted to USD 45 billion (in 1998, India's trade was USD 50 billion), with exports at USD 25.5 billion. The investment in fixed assets of the total population in Shenzhen amounted to RMB 39.1 billion. The local budgetary financial income reached at RMB 14.48 billion. The total retail sales of social consumables reached at RMB 32.5 billion. The average annual wages increased by 11.4 percent. The living standard and quality was further enhanced.

1.7.5.3 Creation of Massive Infrastructure in Shenzhen, a Focal Point

Infrastructure is the catalyst for economic growth experienced in Shenzhen. Prior to establishment of the special economic zone Shenzhen's infrastructure was extremely backward, the transportation by land was mainly depended on Guangzhou-Kowloon railway and on sandy soil highways of low grade. Air traffic was almost non existent. For telecommunication, there were only 500 analogue exchanges. Since the SEZ was declared, the municipal government and relevant departments provided great importance for infrastructure development. In 1997 the investments in infrastructure increased by 33.6 percent to reach at RMB 11.215 billion.

1.7.5.4 Power and Water

Large power plants including Shajiao B Power Plant, Ma Wan Power Plant, Nanshan Gas Turbine Power Plant, and Moon Bay Power Plant with total capacity of 700 MW were built one after another. Shenzhen cooperated with Guangdong Provincial Government in building Daya Bay Nuclear Power Plant. The total capacity of the power plants in the whole city reached 2275 MW with annual electricity supply of 8.8 billion kWh.

The third phase of East River-Shenzhen water supply works, Maozhou diversion works, Eastern Area water supply works, the expansion works of Dachong Water Supply Station, Meilin Water Supply Station were built.

1.7.5.5 Transport Infrastructure

Shenzhen Airport and Nantou Helicopter Airport were built for transportation by air. Transportation pivot facilities including Huanggang Port and a new railway station were constructed. Guangzhou-Shenzhen quasi-high-speed railway with the designed speed per hour reaching 160 km, Pingyan Railway, Pingan Railway, Guangshen Expressway, Shenhui and Shenshan Highways of first grade were opened to traffic. Shennan Road, Beihuan Road, Shungang Road, Shensha Road and Luosha Road are the other urban avenues built. The scale of traffic and transportation has been increasingly enlarged. The construction of the first phase of Shenzhen subway project has begun recently. Shenzhen airport has become one of the largest airports in the whole country with annual passenger capacity of 4.346 million.

For transportation by sea, there are 14 flights of hovercrafts shuttling between Shekou and Hong Kong as well as between Xiaomeisha and Hong Kong. There are also regular flights to cities including Guangzhou, Zhuhai, Zhongshan, etc. and vehicle ferry to Zhuhai. The handling capacity of Shenzhen port has exceeded 30 million tons with 8 ports including Yantian, Man Wan, Chiwan, Shekou, etc.

1.7.5.6 Communication Infrastructure

Shenzhen also has established new and high communication technology and quickened the modernization of communication network. It introduced ATT 5E-200 exchange with powerful functions, undertook experiments of intellectualization and developed asynchronous transfer mode (ATM) technology. Light synchronous output network, the most advanced in the world, has been put into operation. In the field of mobile communication, digital mobile phone network (GSM) has been put into operation and the communication technical equipment has attained the advanced level in the world.

Moreover, a large number of commercial, cultural and sports facilities including dozens of modern commercial buildings, libraries, museums, science centres, gymnasiums, broadcast and television building, grand theatre, activity centre for teenagers, etc. have been built.

Table 1.4: A Comparative Scenario: Kutch, Taiwan and Singapore

Attributes	Taiwan	Singapore	Kutch
Location:	23 30 N, 121 00 E	1 22 N, 103 48 E	24 41 N, 71 54 E
Area:	total: 35,980 sq km land: 32,260 sq km water: 3,720 sq km	total: 692.7 sq km land: 682.7 sq km water: 10 sq km	total: 45, 000 sq. km land: 26,870 sq. km Rann 23,310 sq. km
Coastline:	1,566.3 km	193 km	332 km
Natural Resources	small deposits of coal, natural gas, limestone, marble, and asbestos	fish, deepwater drafts useful for ports	lignite, bauxite, limestone, kaolin, bentonite, silica sand, salt, deepwater draft for ports
Land Use	arable land: 24%	arable land: 1.64%	arable land: 52%
Population	22,749,838 (July 2004 est.)	4,353,893 (July 2004 est.)	1,583,220 (2002)

Literacy	definition: age 15 and over can read and write total population: 96.1% (2003)	definition: age 15 and over can read and write total population: 92.5%	definition: age 6 and over can read and write total population: 59.1%
GDP	purchasing power parity - $528.6 billion (2003 est.)	purchasing power parity - $109.4 billion (2003 est.)	INR 39.93 billion (2002 est.)
GDP Growth Rate	3.2% (2003 est.)	1.1% (2003 est.)	NA
GDP Per Capita	purchasing power parity - $23,400 (2003 est.)	purchasing power parity - $23,700 (2003 est.)	INR 25,226 (2002 est.)
GDP Composition	agriculture: 1.8% industry: 30.3% services: 67.9% (2003)	agriculture: negligible industry: 32.2% services: 67.8% (2003 est.)	primary: 35.6 secondary: 18.6% tertiary: 45.7% (2002 est.)
Foreign Exchange Reserves	$207.1 billion (2003)	$95.75 billion (2003)	NA
Exports	$143 billion f.o.b. (2003 est.)	$142.4 billion f.o.b. (2003 est.)	NA
Imports	$119.6 billion f.o.b. (2003 est.)	$121.6 billion (2003 est.)	NA
Labour Force	10.08 million (2003)	2.2 million (2003)	0.60 million (2002)
Telephone Users Mainline	13.355 million (2003)	1,896,100 (2004)	103,696 (2002)
Mobile Phone Users	25,089,600 (2003)	3,521,800 (2004)	NA
Internet Users	8.83 million (2003)	2.31 million (2002)	NA
Electricity Consumption	140.5 billion kWh (2001)	28.35 billion kWh (2001)	NA
Electricity Production	151.1 billion kWh (2001)	30.48 billion kWh (2001)	0.25 million kWh (2004)
Railways	total: 2,544 km narrow gauge: 1,108 km 1.067-m gauge (519 km electrified) note: 1,400 km .762-m gauge (belonging to the Taiwan Sugar Corporation and to the Taiwan Forestry Bureau used to haul products and limited numbers of passengers (2003), High speed rail under construction.	not available	total: 372.42 km
Highways	total: 35,931 km paved: 31,583 km (including 608 km of expressways) unpaved: 4,348 km (2000)	total: 3,066 km paved: 3,066 km (including 150 km of expressways) unpaved: 0 km (1999)	total: 5605 km paved: 5224 km (including 263 km NH) unpaved: 560.5 km (2001)
Ports	Chi-lung (Keelung), Hua-lien, Kao-hsiung, Su-ao, T'ai-chung	Singapore	Kandla, Mundra
Airports	total: 37 over 3,047 m: 8	total: 9 over 3,047 m: 2	total: 3 over 3,047 m: NA

	2,438 to 3,047 m: 8 1,524 to 2,437 m: 12 914 to 1,523 m:8 under 914 m: 1 (2003 est.)	2,438 to 3,047 m: 1 1,524 to 2,437 m: 4 914 to 1,523 m:1 under 914 m: 1 (2003 est.)	2,438 to 3,047 m: NA 1,524 to 2,437 m: NA 914 to 1,523 m: NA under 914 m: NA (2003 est.)

Sources: CIA Factbook and Various Sources in the Status Study on Kutch

1.8 Key Observations, Strategies and Their Concept Details

The key observations from the detailed cases and also from literature review of other trade hubs in Asia lead to identification of nine key strategic areas or conditions required for development of these regions. These are:

- Availability of mega-cities and urban focus for development
- Adoption of international trade and export driven growth model
- Support from national level economic policies
- All the regions and transformed or transforming towards tertiarisation from initial manufacturing base
- Availability of fiscal incentives, systematic industrialisation and business agglomeration
    - Strategies for developing FTZs and free ports
    - Strategies for developing Special Economic Zones
    - Strategies for developing technology parks and knowledge parks
- Heavy investments in infrastructure
- Availability of international standard urban quality of life
- Stress on institutional planning and development
- Adoption of place marketing and branding strategies

1.8.1 Availability of Mega-cities and Urban Focus

Almost every trade hub which is well established or is emerging in Asia is a mega-city or is located proximity to a mega-city. Majority of these regions are capital cities of developed or industrially growing economies such as Tokyo for Japan, Seoul for South Korea, Taipei for Taiwan, Kuala Lumpur for Malaysia, etc. Japan, South Korea and Malaysia are almost comparable to size of Gujarat and Taiwan is a small country even smaller than Kutch.

There are unique city nations such as Singapore. Hong Kong is a special administered region of China since 1997. Dubai is the largest city of UAE and is an Emirate. Most of these cities are considered to mega-cities. Urban development and agglomerated economy is a key driving force in development of a trade hub of similar scale.

1.8.2 International Trade and Export Driven Growth Model

International trade is another focus. The city- nations and the smaller nations are extremely successful in international trade. Most of these nations are export oriented manufacturers and Dubai and Singapore has converted them as re-export hubs due to their strategic locations and economic policies.

The East Asian Tigers particularly religiously followed an export-driven model of economic growth and concentrated on developing goods for export to highly-industrialised nations. Initially domestic consumption was discouraged through government policies such as high tariffs. On the other and, these nations had abundance of cheap labour and coupled with educational reforms, they were able to leverage this combination into a cheap, but productive workforce.

Chinese SEZs and Economic Regions

1.8.3 National Economic Policy Support

Singapore and Hong Kong are one of the freest economies in the world. ASEAN umbrella also have provided a strong platform for economic co-operation between the Southeast Asian nations. All the nations with the trade hubs have liberated their economies since past two or more decades. China, a communist country has liberalised its economy since early 80s and have opened up coastal provinces, regions and cities. With the advantages of international division of labourers, these nations and particularly these specific regions have grown as the major manufacturing, export and re-export hubs in the world. The free trade agreements under consideration among these countries are capable of pushing trade to a new height.

1.8.4 Manufacturing Base Transformed in to Tertiary Hubs

Majority of these trade hubs, except Dubai have grown initially as manufacturing hubs. Due to agglomeration of economies and related advantages of economy of scale urban development took place in an unprecedented way. Growth of tertiary sector and knowledge based industries has followed the trend. Dubai has taken advantages of re-exports by facilitating free trade zones and developed a tertiary economic base at the initial phase.

1.8.5 Incentives, Systematic Industrialisation and Business Agglomeration

Many of these trade hubs have integrated the processes of fiscal incentives and systematic and planned industrialisation to facilitate large agglomeration of economic activities. Various strategies are adopted. Few of these are:

- Free trade zones and free ports
- Special economic zones and regions
- Science and technology parks

1.8.5.1 Free-trade Zones and Free Ports

Free-trade Zone is a customs-defined area in which goods or services may be processed or transacted without attracting taxes or duties or being subjected to certain government regulations. A special case is the free port, into which goods are imported free of customs tariffs or taxes. Free-trade zones have been approved at fifty-six locations in the United States. In these, customs duties are not paid until, and if, the goods are sold in the United States outside the zone. In the United States, A plan was approved by the Federal Reserve Bank in 1980 for setting-up of free-trade zones for banks dealing in international finance. This enables the banks to service the accounts of multinational firms without attracting city and state taxes and also to be free from the normal banking regulations such as the FED's reserve requirements and rate of interest ceilings. Dubai has few of the most successful free trade zones in the world. The Russian Republic planned in 1990 to set up in Vyborg the first free-trade zone in the USSR.

Freeport is a seaport or airport which is able to accept cargo without the imposition of any import tariff or some specified taxes. In addition, free ports may be granted special dispensation regarding legislation affecting businesses in the domestic market outside the port, such as employment conditions, health and safety regulations and development planning. There are several hundred such ports throughout the world, such as Hamburg, Rotterdam, Hong Kong and Singapore.

1.8.5.2 Special Economic Zones and Special Economic Regions

Special Economic Zone (SEZ) is a specifically delineated duty free enclave and shall be deemed to be foreign territory for the purposes of trade operations and duties and tariffs. Goods and services going into the SEZ area from DTA are treated as exports and goods and services coming from the SEZ area into DTA are treated as if these are being imported. SEZs may include processing areas for setting up of units for production of goods and rendering of services and also non-processing areas (urban areas, protected areas, etc), if any. Usually the goal for establishing a special economic zone is to increase foreign investment. Special Economic Zones have been established in several countries, including the People's Republic of China, India, Iran, Philippines, Vietnam, Jordan and Kazakhstan. Recently, North Korea also has attempted this strategy. The basic characteristics of the SEZs are:

- These are urban-industrial spatial enclaves.
- Special tax incentives for foreign investments in the SEZs.

- Single window clearance system.
- Greater independence on international trade activities.
- Organised planning and constructions primarily relies on attracting and utilizing foreign capitals and massive investments in infrastructure.
- In China, primary economic forms are sino-foreign joint ventures and partnerships as well as wholly foreign-owned enterprises.
- Products are primarily export-oriented.
- Economic activities are primarily driven by market
- In China, SEZs are listed separately in the national planning (including financial planning) and have province-level authority on economic administration. SEZs local congress and government have legislation authority.
- In India even private organisations can establish SEZs.

Yet China has transformed its economy up to a great extent through development of SEZs. There are five major SEZs in China today. China's major SEZ's are: Shenzhen, Zhuhai and Shantou in Guangdong Province, Xiamen in Fujian Province, Pudong New Area in Shanghai and the whole province of Hainan. Following China other countries in South East Asia also have started developing SEZs in their countries. The Philippines have started an ambitious SEZ in Clark Airbase and surrounding areas, Vietnam has initiated one in its border area with China in Lancan, etc. In the year 2000 the Government of India also has initiated its SEZ Policy and converted 20 small existing Export Processing Zones into Special Economic Zones. Few of the state governments also have declared new special economic zones recently along with two private organisations planning two large SEZs in Navi Mumbai and in Mundra in Kutch. Iran also have developed around 21 SEZs inclusive of few specialised petro based SEZs. The SEZs have become the strongest tool for attracting investments leading to economic growth of regions.

1.8.5.3 Technology Parks or Knowledge Parks

The term ‘technology park’ is used to describe a variety of efforts to stimulate the development of "entrepreneurial, knowledge-based small and medium-sized enterprises" (or SMEs) within a country. The term has at least 16 synonyms, with the most common being ‘science park,’ ‘research park,’ and ‘technopole’. New terms are constantly arising as technology parks attempt to distinguish themselves from the considerable competition of at least 295 technology parks worldwide.

Technology parks or knowledge parks are basically specific growth models capable of energising regional development. On the other hand, urban knowledge parks are a new mechanism for the transformation of places into knowledge cities, in which the leit motif is knowledge and information. These cities offer one of the desirable paradigms for the sustainable cities of the future.

Basic characteristics of technology parks are:

- They are manufacturing and research hubs.

- Linked with educational and research institutes and facilitates R&D and product development.
- Provide infrastructure and support services for businesses, particularly real estate and office space
- Perform a technology transfer function
- Perform an economic development function

A knowledge park, whether located in a city or not, offers both direct and indirect advantages. The principal direct ones include strengthening of industry, creation of industrial jobs and of new higher value-added businesses, and retention of existing businesses. Indirect advantages include creation of service jobs to serve the park and its population, upgrading of the quality of business in the areas adjacent to the park, enhancement of real estate values, improvement and expansion of the infrastructure, enhancement of tax revenues, and encouragement and attraction of new activities. In addition, a major reason for a park may be the creation of a new focal point for community planning and development. Although direct advantages are easy to assess, it is not so with the indirect ones.

Technology parks have been in existence in the United States since at least the early 1950's and have since spread around the world, with new technology parks continually arising. The UK, France, Germany are other western countries, which have successfully established technology parks. In Asia Japan and Taiwan are the foremost countries to follow this model. Tsukuba in Japan and Hsinchu in Taiwan are extremely successful parks.

1.8.6 Infrastructure Investments

Massive infrastructure investments are the common strategies adopted in all these trade hubs. Well established trade hubs such as Tokyo-Osaka, Singapore and Hong Kong enjoyed superior infrastructure since their development after the World War II. These regions have some of world's largest and busiest ports, airports and super speed railways such as bullet trains and express highways. While South Korea, Taiwan followed the trend during 70s and 80s. China has been religiously concentrating in development of highways, express railways, urban infrastructure, etc for past two decades. Standards of infrastructure in cities such as Shenzhen and Shanghai have surprised the world. Among the Southeast Asian nations, Malaysia, Indonesia and Thailand emerged as fore-runners during late 80s and 90s. Malaysia has successfully developed Kuala Lumpur as a World City with mega infrastructure projects such as Kuala Lumpur International Airport, Petronus Tower, Light Transit Rail, Multi-media Super Corridor, etc.

1.8.7 International Standard Urban Quality of Life

Due to massive infrastructure investments and urban development initiatives, the business hubs in Asia today are beautiful cities. Quality of life of these cities is equivalent to those in the USA or Europe. Skyline in Hong Kong, Singapore and Shanghai even are unique and most of the world's tallest structures are being built or proposed in these cities. Along with economic boom, these cities also have become major tourist destinations in the world and hub for retail trade and cultural industry.

1.8.8 Institutionalising Planning and Development

Strategic planning is an essential requirement and it will be more comprehensive and complicated for newer areas aspirant for developing trade hubs. Without having a systematic approach and a support institutional framework, such attempts will not be successful. Every trade hub in Asia is well led by one or two institutions in a well-co-ordinated framework. Singapore is a nation, while Hong Kong has a Special Territory Administration, Kuala Lumpur and Dubai have municipalities, when Dubai is also an emirate. Chinese region Pearl River Delta is administered by Guangdong Provincial Government, while Shenzhen has its own municipality.

1.8.9 Place Marketing and Branding

Many of the Asian business hubs have initiated the new approaches such as place-marketing and branding for selling their unique attributes and attracting investments in the areas ranging from manufacturing and service sectors to tourism. Kuala Lumpur demands itself to be a 'Vision City'; similarly Hong Kong also advertises itself in print and visual media.

1.8.10 Others

Moreover, these nations also followed egalitarianism in the form of land reforms, promoting property rights and ensuring that agricultural workers would not become disgruntled. The policies of agricultural subsidies and tariffs on agricultural products were implemented as well. Most importantly, they singled out education as the means of improving productivity and focused on improving the education system at all levels. Serious emphasis was given on ensuring that all children attended elementary and compulsory high school education. Massive amount of investments were carried out for development of educational infrastructure and the college and university systems as a whole.

But in a varying degree almost all of these nations were strongly affected by the Asian Economic Crisis. While on one hand, Taiwan was not as strongly affected, South Korea was badly battered by the crisis. Due to the extreme focus on export-driven growth, many of these nations became caught up in a game of currency devaluation. The current criticism of the East Asian Tigers is that these economies are highly focused on export-demand, at the cost of import-demand and therefore are heavily reliant on the economic health of their targeted export nations. In addition to it, these nations are gradually facing severe competition from countries such as China and India. The initial competitive edge, cheap productive labour, no longer exists, due to the emergence of China and India with abundant cheaper skilled labour.

1.9 Identification of Key Strategic Areas for Kutch

Table 1.5: Analysis of the Key Strategic Areas in Kutch

Sr. No.	Basic Characteristics	Specific Observations	State and Potential of Kutch
1.	Capital of countries, provinces, located in or in	All existing Asian business hubs fall under this category.	× Kutch only has Bhuj as the district administration centre,

Sr. No.	Basic Characteristics	Specific Observations		State and Potential of Kutch
	proximity to large urban agglomerations / mega cities.			can not be compared to a state / provincial or a national capital. Kutch also does not have a large urban agglomeration. Gandhidham and Bhuj are small cities with less than 0.2 million population.
2.	Massive international trade with exports, imports, value added exports and re-exports (for some)	Dubai and Singapore are more dependent on re-exports.	v	Kutch is off-course through both the ways, directly or indirectly related to international trade being carried out through its ports. But a regional trade account is yet not available in India.
3.	Falls under country-wide national liberal economic policies or are delineated special economic zones / free zones	Singapore, UAE, Hong Kong, Taiwan are open economies; while Japan, South Korea, Malaysia, Indonesia are also heavily liberated economies; China has adopted the concepts of special economic zones.	v	India is gradually liberating its economy, and due to many recent national initiatives, is a capable country to attract investments in different fields. Kutch as a region with good ports definitely has the advantages. The special incentives declared in the region already have shown a positive trend of investment attraction and declared Mundra SEZ further creates potential.
4.	Mostly are large manufacturing hub at the initial stages, converted into hi-tech manufacturing and true business hubs at the later stages due to constant effects of agglomeration and policy changes	Except Dubai and Hong Kong, all the hubs followed these trend; but lately Dubai also trying to develop its own base for IT industry.	v	The region possesses great potential to become a manufacturing hub, which is already exhibited through number of industries established and proposed during past few years. The industrial location also follows a clear cut trend of agglomeration, which is potential to lead to more systematic and sophisticated industrialisation leading to growth in the tertiary

Sr. No.	Basic Characteristics	Specific Observations	State and Potential of Kutch	
				services and trade.
5.	Systematic industrialisation / business agglomeration	Industrial parks and technology parks are the driving forces of economic growth in Japan, South Korea, Singapore and Taiwan. Industrial parks and financial and trading zones within the special economic zones in China have transformed Chinese regions. Dubai has free trade zones, internet city, etc.	×	Except the Kandla SEZ (converted EPZ) and GIDC estates, such efforts are not present in Kutch. Mundra SEZ is planning few manufacturing zones within it. Looking at the large availability of barren land such initiatives can be successful in Kutch and infrastructure can be provided and managed effectively.
6.	Massive investment in infrastructure with availability of deep water ports, large international airports, expressways, express-railways, abundant power and water supply	Almost all the trade hubs in Asia are well-equipped with these infrastructure and emerging regions are concentrating in a massive way to develop these.	√ / ×	Kandla, Mundra and MICT and their ambitious expansion plans provides a very good port infrastructure potential for the region. The recently developed four lane highway and one or two good roads will play important role in attracting investments and agglomeration. But region lacks airport infrastructure and an international airport will be a distant dream till agglomeration is matured and planned systematically. Lack of water and power are great hindrances.
7.	Availability of urban quality of life of international standards	All existing Asian business hubs fall under this category. Emerging regions such as the Pearl River Delta, Kuala Lumpur and Jabotabek are trying hard and have seen successes.	×	Urban quality of life of international standard is not existent in the region; but not difficult to achieve through systematic and serious planning efforts.
8.	Tourism Development	All have vigorous tourism marketing strategies and have taken massive initiatives.	×	Although have potential, nothing substantial has been done yet in Kutch.
9.	Institutionalising planning	Most of the Asian Trade Hubs	√ / ×	Kutch as a district has its

Sr. No.	Basic Characteristics	Specific Observations		State and Potential of Kutch
	and development	with country capital have integrated capital regional planning and development authorities or their corporations or jointly both. Special agencies are formed for Putrajaya and Cyberjaya in Malaysia. Municipal governments in Chinese cities and respective provincial governments are specially empowered for facilitating development in the Pearl River Delta Region. Municipal Government of Dubai and free trade zone authorities administer development of Dubai.		administration system along with the panchayatiraj system. Cities, towns and villages have local governments. The state and central governments are an important facilitator of infrastructure. Mundra Special Economic Zone will have its own development authority. An integrated and co-ordinated development facilitating and managing system is an essential requirement for performing specialised roles and tasks as development agendas are common for all.
10.	Aggressive regional marketing / place marketing and branding	Hong Kong, Singapore, Kuala Lumpur, Shanghai are marketing their advantages vigorously; Advertisements of Kuala Lumpur as the 'Vision City', etc are the part of their attempt to develop a place-brand identity. But Asian region's are still not at par with their counter parts in Europe at this context. In Europe regions such as Stockholm, etc are extremely successful in place marketing.	×	The concept is new in India and place marketing is only attempted for tourism development, not for overall investment attraction. Kerala is successful in marketing its tourism potential through creating their brand as 'God's own country'.

From the above analysis, the key strategic areas for Kutch can be identified as following:

- Focus on spatial agglomeration and urban development
- Creation of a regional trade accounts system
- Strong relationships between regional resources (as additional advantages) to the economy of the proposed business hub
- Integration of regional economy with Special Economic Zones
- Stress on development of manufacturing including agro-processing
- Systematisation of development of manufacturing activities (for large units) with parks, zones, etc

- Tourism development
- Infrastructure development
- Urban planning (also new towns) and development
- Regional leadership and co-ordination among the stakeholders
- Place marketing and branding Kutch

1.10 Strategies and Actions for Development

1.10.1 A Vision for New Kutch; the 21st Century Business Hub

Kutch will be a vibrant region with multi-nuclei hierarchical urban areas as enterprise hubs / business nodes with high speed linking corridors and modern ports. Manufacturing clusters and specialised manufacturing clusters with state of the art infrastructure along the high-speed corridors ultimately to intensify tertiary activities in the nodes and increase population concentration. State of the art urban and port based recreational activities and eco-tourism shall bring large-scale tourists and related activities.

Kutch is a competitive region, where people love to live and work; a new Asian leader in trade with productive economy and is the envy of the South Asian regions; comprises of cleanest cities and industrial areas. It is easy to get around and is a place with a soul. Regional development initiatives facilitate identifying common values, build trust, develop collaborative solutions and engage the community at all levels. Everything in Kutch means business and higher quality of life. It's about a vision. But it's also about practical application, hard work, being able to measure the results and show that they contribute to making Kutch the place one loves to live and work.

1.10.2 Objectives

Development strategies need to focus to build a competitive advantage for a location. Creating a competitive advantage is “the one big issue that stands out above all others”:

- Exploiting maximum potentials from agriculture and allied activities and mineral availability and to develop their strong linkages to agro-processing and mineral based industries.
- Attracting investments in manufacturing, services and tourism.
- Building national and international links to develop new markets and to exploit inward and outward investment opportunities (information system based).
- Focusing on systematic development through regional economic clusters (SEZs, industrial parks, recreational zones, science parks, enterprise hubs).
- Formulation of tourism development strategies along with marketing and infrastructure development.
- Development of regional roads and road transport infrastructure to support businesses and quality of life.

- Protection and restoration of ecology and environment through careful zoning and information systems.
- Focus on tertiarisation of activities and urban development.
- To develop creating regional leadership through a shared vision, co-ordination and funding through institutional development strategies.
- Bringing education and business together.
- Creating community involvement and social development through health, sports and entertainment facilities.

1.10.3 Development Strategies

Kutch requires, spatial agglomeration of economic activities and population concentration, as dispersed, low population and scattered industrialisation will not be able to provide the optimum condition of exploiting the maximum advantages.

It also requires strong integration between local resources available as an additional advantage with the new environment of intensification of new activities, it requires integration of SEZ's and regional economy, systematic development of manufacturing and special facilitation, focus on tourism, infrastructure, urban planning and development, regional leadership and co-ordination, branding and marketing system, regional trade accounts, etc.

We propose a hyper-growth model; hyper-growth as we aspire to achieve it by 2021. The hyper-growth model is dependent on three basic strategies: continuous flow of minimum 5 thousand crores of annual investments in the potential sectors till 2021 and on 15 years of infrastructure planning and development and a growth management programme.

The sectoral focus and investments are already under consideration and have been detailed out in the previous chapters in volume I of the report. We require agglomeration strategies, spatial plans and an effective info system, which will systematise and optimise growth. Secondly institutional development, branding and marketing specially to attract investments will make more competitive than Shenzhen.

Three focus areas are identified:

- Firstly, strategies for urbanisation to support specialisation and diversification of trade, attracting investments in hi-tech and quaternary industries and for developing areas with higher quality of life.
- Secondly, to adopt corridor development strategies for attracting manufacturing investments and cost effective and systematic facilitation of ind infrastructure
- Thirdly, institutional strengthening for attracting investments and supporting and manage systematic growth.

The development actions have been identified under three separate groups addressing of all the sectoral development needs, a development support system and spatial policy and planning initiatives.

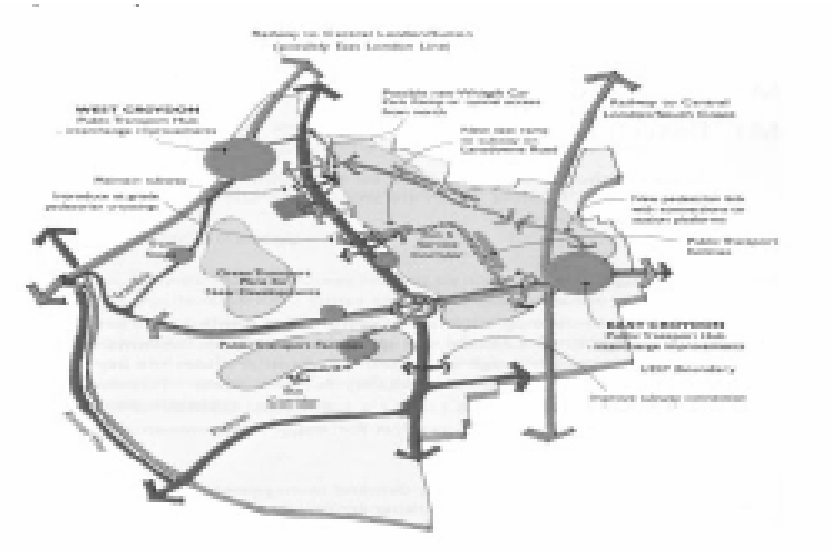
Table 1.6: Development Action Groups

Sr. No.	Action Groups	Strategies
1.	Sectoral Actions (Volume I, Part- II)	Attract minimum INR 50 billion / INR 5000 Crores of investments per annum till 2021. The potential sectors of investments are identified in the agricultural, industrial, tourism and business potential studies (Volume I, Part II). Investments to be attracted through: ▪ Vibrant Gujarat ▪ Vibrant Kutch ▪ Strategies through branding and place marketing (proposed in Action Group 3) ▪ Infrastructure and urban development projects (in Action Group 3) to support.
2.	Infrastructure Development Actions (Volume II, Part I)	Develop infrastructure to support attracting and sustaining the proposed pattern of investments. Infrastructure development strategies and actions are included in the infrastructure Development chapter. Projects, according to specific sub-sectors in a time line have been identified along with an implementation procedure.
3.	Growth Management Actions	
	▪ Framework for Spatial Development and Strategies (Volume II, Part III-A)	Focuses on spatial system's development through zoning, Hierarchical urban system, environmental protection, equitable social justice and spatial development management system and works in an integrated way with the sectoral strategies. ▪ Urban development and agglomeration strategies ▪ Corridor development strategies o Corridor cadastral information system o Corridor land uses and transportation plan o Corridor infrastructure development plan
	▪ Actions for Building up of a Development Support System / Institutional Strengthening (Volume II, Part III-B)	Institutional strengthening covers institutional support arrangements and prime actions to be undertaken. Brand development for Kutch and initiation of place marketing for tourism and investments attraction for industries and services. Development of a Kutch Resource Information System.

Vol. II, Part III A

Framework for Spatial Development

2.3



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1. Spatial Development Strategies

Spatial organisation is the most important criteria for a systematic and strategic attempt for developing Kutch as a business hub with intensification of businesses, attracting investments and allowing manufacturing to grow. Spatial enclaves are conceptualised for easy and cost effective provision of infrastructure, effective growth monitoring and management, reducing adverse effects on environment and for promoting high level of investments and urban growth. The strategy is to develop facility and function-specific systematic activity zones with corridors and urban areas and to promote spatial growth management measures.

The actions are to be taken are under two specific types of strategies:

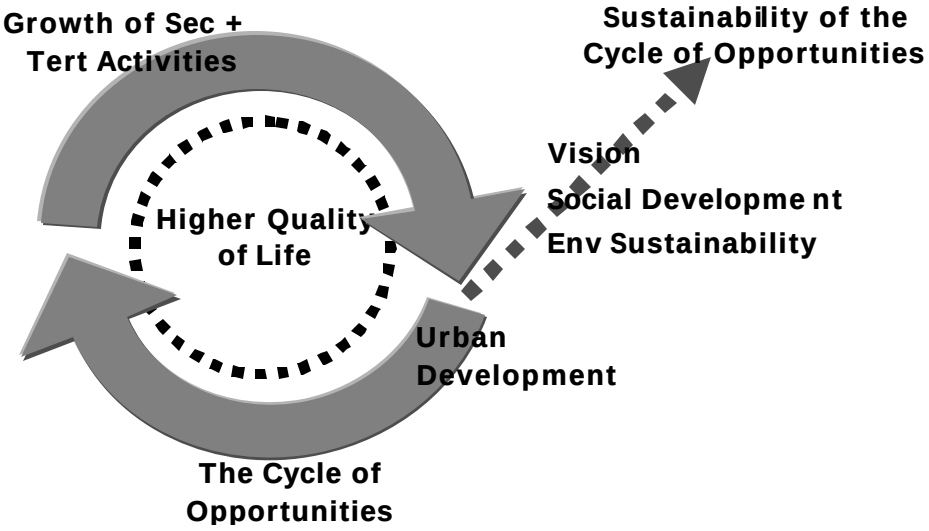
- Urban development strategies and
- Corridor development strategies.

These strategies will primarily depict how systematically land uses and transportation decision can be taken, how industrial location decisions can be facilitated and how infrastructure development cost can be optimised and increase tertiarisation through agglomeration of population and activities.

1.1 Strategies for Urban Development

Urban development strategies are important as massive investments in secondary and tertiary activities shall lead to unprecedented increase of non-agricultural population. Non-agricultural population and higher density due to agglomeration will create growth of urban population. Present trend of industrial location decision making supports that such a phenomenon in and around Gandhidham and Bhuj are to be of very high intensity.

Urban Development Cycle of Opportunities



Urban development is a principal positive factor to contribute to rapid development of the region and in attracting massive investments as systematic urban development shall push quality of life upwardly, which will eventually bring more sophisticated service industries such as financial services, technology intensive industries and R&D. Kutch will become gradually attractive for skilled labourers, foreign entrepreneurs, scientists, educationists, etc.

1.1.1 Advantages of Urban Development Strategies

Urban development strategies are to be extremely advantageous for the region. The principal advantages are:

- Growth of urban population is certain; pre-conceptualising it and being prepared for will assist in preventing negative forces related to urban population growth such as infrastructure inadequacy, growth of slums, costly development, congestion, etc.
- Formulation of urban plans will provide framework for land uses and transportation decisions; commercial and trading areas can be specifically planned, regionally important industrial areas can be systematically developed within the cities.
- The strategies shall provide precise land information if the base map for the urban areas are prepared considering precise cadastral data.
- Specific strategies can be formulated for attracting certain activities, services and investments.
- High class urban infrastructure and built-environment can be facilitated in a limited area; on one hand limiting cost of development and on the other creating state of the art places.
- This will also boost private investments in real estate and infrastructure development.
- Provides quality social infrastructure for original population, investors, skilled labourers, etc.
- Provides opportunity for international business dealing and negotiations.
- The strategies will promote urban tourism and increase in regional income.
- Good cities to increase overall attraction to the region as a whole and will create a brand identity and pride.

1.1.2 Possible Urban Agglomeration 2021

Looking at the location of existing urban areas and existing trends of investments, it is estimated that Gandhidham, Bhuj and Mundra are the most potential hubs for agglomeration of economic activities and population concentration. In a draft calculation it is estimated that Gandhidham complex with Anjar – Adipur – Kandla and Gandhidham has the potential of being a trade centre with more than half a million population by 2021, which to be followed by Bhuj. Due to less than an hour of commuting distances from these centres to the prospective industrial belt, concentration of population and tertiarisation of activities in Gandhidham complex and Bhuj will be unprecedented. There will be rapid change of rate of urbanisation in Kutch, which is expected to be around 47 percent by 2021.

A draft scenario of possible urban agglomeration pattern in Kutch is framed following the envisaged yearly investment of INR 50 billion or 5000 crores till 2021. The relationships are based on investment to employment ratio and workforce to population ratio.

Table 1.1 A Draft Scenario of Possible Urban Agglomeration, Kutch 2021

Hubs	1991	2001	2021
Gandhidham Cmplx	Nil	Nil	611226
Bhuj	121009	136429	291530
Mundra	11652	12931	65440
Bhachau	18408	25389	54640
Mandvi	36636	42355	51553
Rapar	16466	23057	33039
Anjar	51209	68343	G'cmplx
Gandhidham	104585	151693	G'cmplx
Kandla	19787	14695	G'cmplx
Urban Population	379752	474892	1107428

Note: Population for 1991, 2001 are census figures and 2021 are estimated. Gandhidham Cmplx or G'cmplx is a large urban conurbation of present Gandhidham, Anjar, Kandla and other settlements in proximity.

Following the trends, it is assumed that the Greater Gandhidham Urban Complex and Bhuj are to be the principal cities in the region. Mundra, due to its special economic zone shall also grow as an important nodal point.

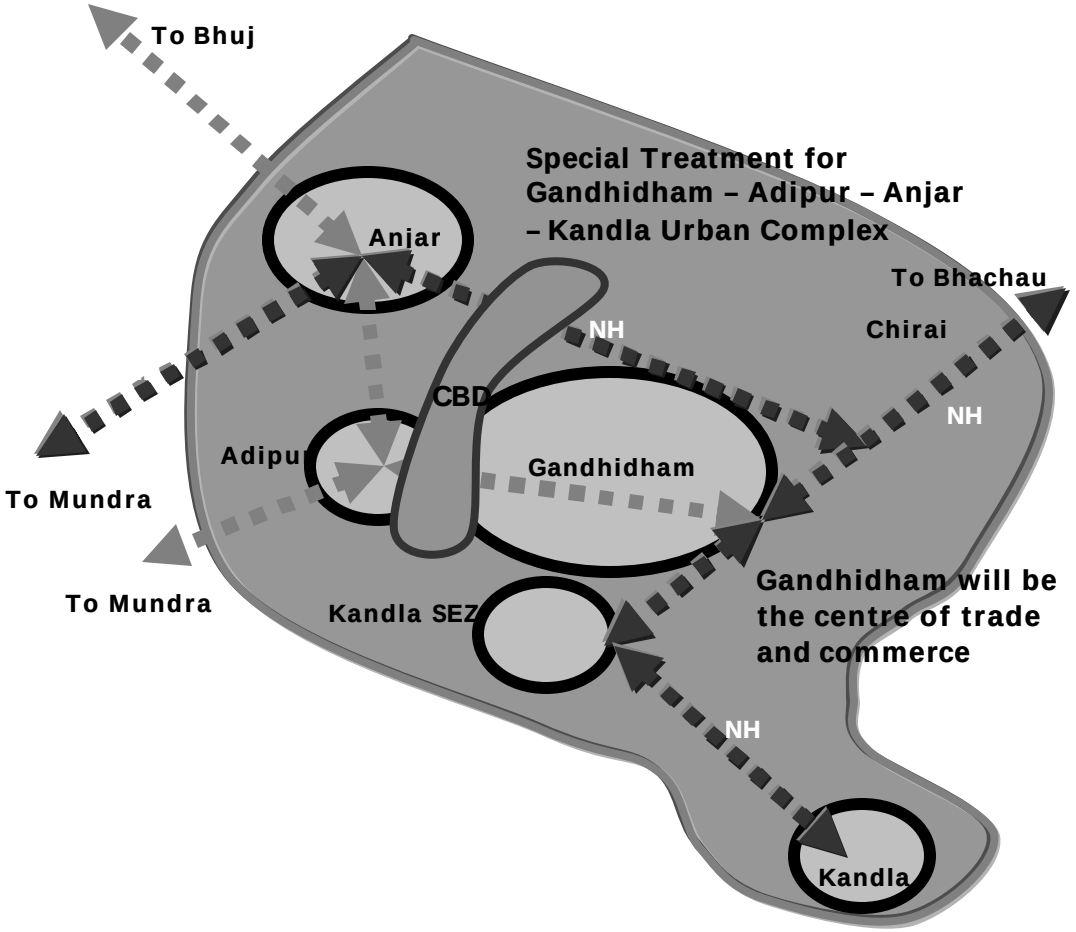
1.1.3 Key Strategies

The key strategies are inclusive of:

- Strategy to plan and develop the Greater Gandhidham Urban Complex.
- Strategy to integrate Bhuj Urban Development Authority's initiatives with regional economic development policies and timeline for revised plan for Bhuj.
- Strategies for other urban areas.

1.1.3.1 Greater Gandhidham Urban Complex (GGUC)

The best possible agglomeration initiative shall be to leverage upon the advantages of the Gandhidham – Kandla – Adipur – Anjar urban complex. These urban areas and the surrounding area can facilitate rapid growth of trade and commerce and industries if effectively managed. An integrated master plan for the whole area under a single urban development authority, which can become the co-ordinating, planning, implementing and managing growth can facilitate rapid urban development. A separate CBD plan for a selected smaller area shall be prepared and implemented to facilitate world class urban development, which will be an effective tool for attracting investments for the whole region. Separate bye-laws should be formulated.



Greater Gandhidham Urban Complex

The development strategies for the GGUC area are:

- Notify GGUC under Greater Gandhidham Urban Development Authority (GGUDA) engulfing around 300 to 400sq km area.
- Preparation of an integrated urban development plan for the notified GGCU area and identification and delineation of a new Central Business District (CBD) – with preferably 2 to 5 sq km of area.
- Integration of already prepared urban development plan of Anjar, initiatives of Gandhidham city, Kandla SEZ, etc to the integrated GGUDA's urban development plan.
- Preparation of GGUC general bye-laws.
- Preparation of a CBD Master Plan along with separate bye-laws and urban design guidelines.
- Preparation of general as well special use (e.g. industrial, institutional) town planning schemes as to be directed in the Greater Gandhidham Urban Development Plan.
- Developing tourism, industrial and infrastructure development strategies along with the Greater Gandhidham Urban Development and CBD Development plans.

- GGUDA to have their own brand and city-marketing plan and to implement it.

Greater Gandhidham Urban Development Plan (GGUDP) is to incorporate:

- A base map with cadastre details
- Land use and transportation planning
- City infrastructure development planning
- Delineation of CBD area
- Delineation town planning scheme areas
- Bye laws for development for GGUDA area

Greater Gandhidham Central Business District planning to incorporate:

- A base map with cadastre details
- Land use, transportation and traffic planning
- CBD infrastructure development planning
- Specific bye laws for development and urban design
- Guidelines for architectural designs and landscaping
- Privatisation and marketing plan

Town planning schemes are to be prepared for suitable areas in the GGUDA area in a phase wise manner prioritising development options. The GGUDP to specify nature and characteristics of development of the scheme areas according to its land uses directives. These schemes can be of following types:

- General TP Schemes.
- TP Schemes prepared for only industrial or institutional uses areas.

1.1.3.2 Bhuj Urban Development Authority Area

Bhuj Urban Development Plan is being implemented by Bhuj Area Development Authority covering sufficient area for urban development for next decade. The city has bye laws and TP Schemes have been prepared for the inner city areas as part of the earthquake redevelopment process. The city's physical environment has been transformed through newly developed four lane urban roads, new buildings and other utility infrastructures. Re-consideration of city's potentials to contribute to regional economic growth through area development authority's initiatives and sub-city or smaller area or specific road development projects can be of great value. The identified strategies are:

- BhADA develops partnerships with industries, business houses or any other investors for area specific development plans and programmes.
- Prepares a separate tourism development plan for the city.
- Create land mark structures or places and sport infrastructure.

1.1.3.3 Other Urban Areas

Mundra SEZ is to grow as a separate urban area in a planning environment, but there is requirement for urban development initiatives at the existing Mundra town. Population in the other urban centres such as Bhachau, Mandvi, Rapar, Nakhatrana, and Lakhpat is not envisaged to be very high in future.

But it will be of extreme importance to make these small towns ready with adequate infrastructure facilities, so that people living and working there gets good quality of life. These towns will also contribute to regional economy through development of tourism and recreation industry, agro-processing, fish processing and with some amount of industries.

- Preparation of sustainable urban development plans for Mundra, Mandvi, Rapar, Nakhatrana and Lakhpat (Bhachau and Rapar have plans and area development authorities) with tourism development strategies (wherever applicable).
- Adopt local institutional strengthening programmes.

1.1.4 Proposed Urban Development Actions, Timescale and Implementation Procedure

The proposed urban development initiatives are arranged in a timescale for project integration and effective implementation. These follows logical need based sequencing. Refer the Annexure I for the detailed urban development actions, timeline and implementation procedure.

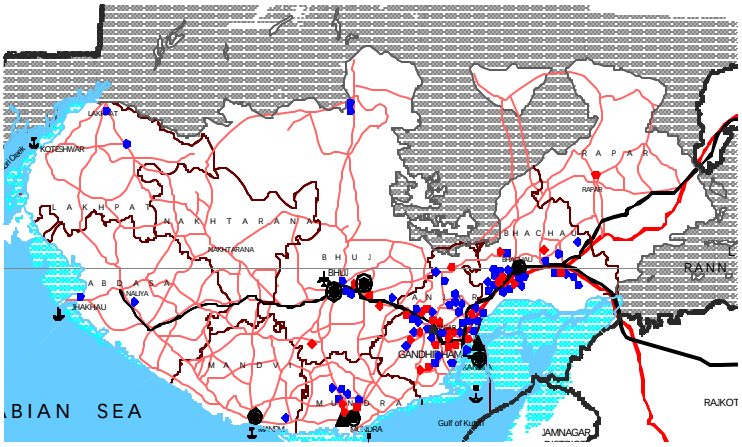
1.2 Corridor Development Strategies

There is a typical pattern of industrial location decisions in Kutch. A closer look on the pattern location decision of the commissioned and under implementation industries (2001 to 2004) reveals that it follows a typical pattern of corridor alignments connecting the major urban areas. Bhachau – Gandhidham, Gandhidham – Anjar – Bhuj and Bhachau – Bhuj are the most important three corridors, where majority of the industries are being located. These corridors provide:

- Greater connectivity between Kandla, Gandhidham – Anjar and Bhachau with four lane national highways and their connectivity to other parts of Gujarat and North India.
- Little more than an hour's travel distances between Gandhidham and Bhuj and less than an hour between Gandhidham and Bhachau.
- Recently strengthened Bhuj – Bhachau Road.
- Availability of barren and almost flat land for rapid and cost effective implementation for industrial projects.
- Narmada water supply pipeline alignment along the major roads.
- Location of Kandla port.

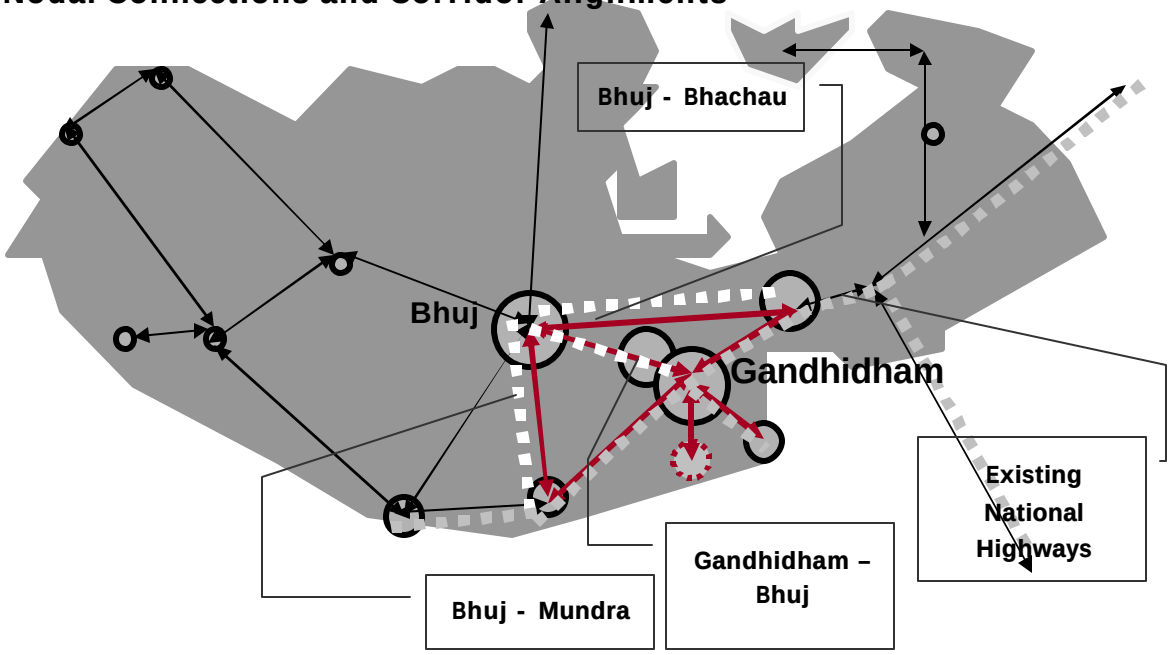
Mundra SEZ, GAPL and MICT have created another three potential corridors for industrial development. These are Gandhidham – Anjar – Mundra, Bhuj – Mundra and Mundra – Mandvi. Concentration of industries have been already noticed in an around Mundra. The National Highway 8 A has been extended initially to Mundra and then to Mandvi from Gandhidham – Anjar.

Emerging Pattern of Industrial Location Decisions in Kutch



According to these trends, the best possible option for industrial development for Kutch will be to develop these six corridors through systematic spatial planning measures.

Nodal Connections and Corridor Alignments



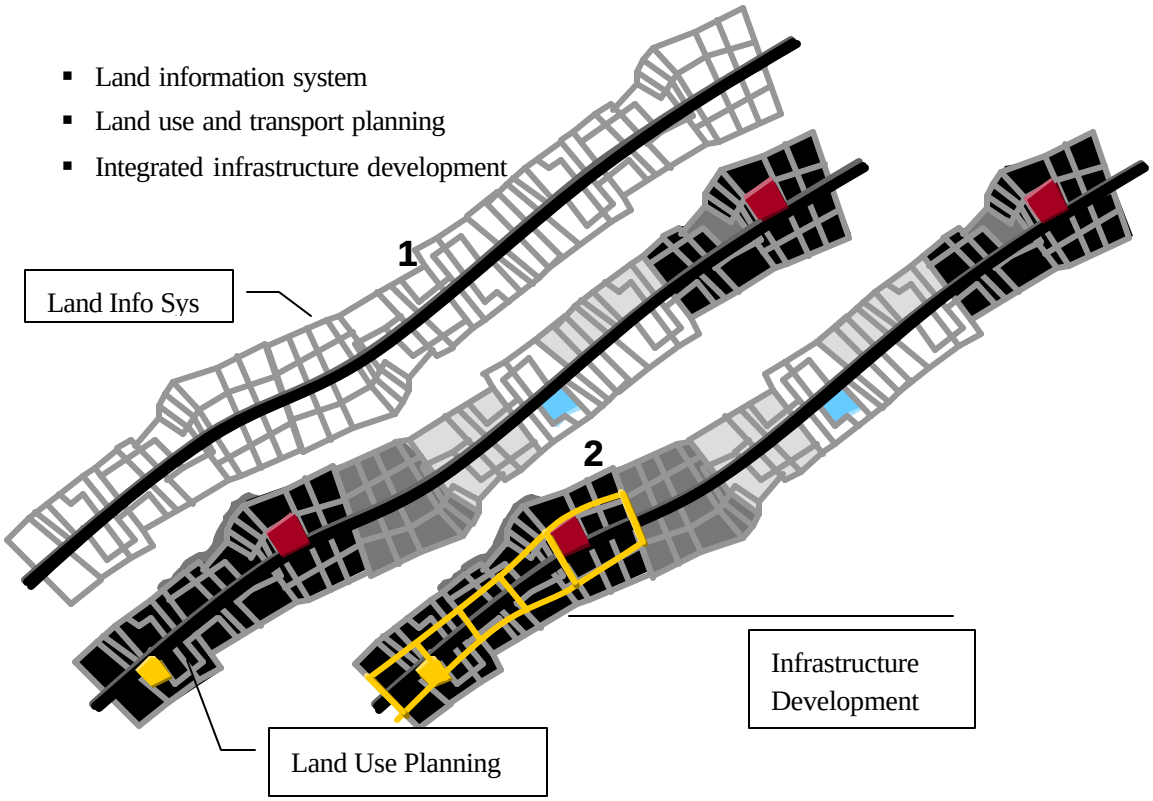
1.2.1 Advantages of the Corridor Development Strategies

Corridor development strategies will be advantageous as these will provide precise land information to the entrepreneurs; a cost effective and detailed information system can be established as these corridors are limited areas. Developing a similar system for whole Kutch will be costlier and time consuming. These will ensure land uses conformity and identify focused areas for industrial

development when a land use plan is prepared. This will also help in industrial infrastructure development avoiding duplication and facilitating fast and extendable implementation.

- Corridors shall provide precise land information to the entrepreneurs.
- Limited area of the corridors shall provide cost effective and quicker development of the land information system.
- Shall provide framework for land use and transport planning.
- Shall provide framework for detailed infrastructure planning.
- Limited and defined area shall provide cost effective planning and implementation of infrastructure.
- Shall avoid duplication and unnecessary costlier extension of infrastructure.

Advantages of Corridor Development Strategies



1.2.2 Key Strategies

These corridors are to accommodate parks for large, medium and small sizes of industries, small nodal facility areas and recreational zones. The corridors are usually a zone of 1 km (500mt from both the sides of the corridor roads) stretched along the road length. Six corridors are identified with approximate area of 300 sq km of land. Industrial parks of different intensities and different types can be accommodated in these initially. The corridors will be planned and developed in phases.

Major linking roads to play significant role in corridor development. Among the corridor roads, all the roads except the Tuna – Gandhidham connection (as proposed by KPT) are presently existed. The Bhachau – Bhuj road is recently upgraded and Mundra – Anjar – Gandhidham – Bhachau is a National Highway to be completely converted into a four lane highway (Gandhidham – Bhachau part already completed) and has been recently extended to Mandvi.

Therefore, converting three roads: Gandhidham – Bhuj, Bhuj - Bhachau and Bhuj – Mundra, in to very good roads will be able to facilitate the desired corridor development in the zone. The 55-60 km Gandhidham – Bhuj road can be an expressway (four lane / 120 km per hr design speed) to reduce journey time between the two places to less than half an hour.

The Gandhidham – Bhuj Expressway will facilitate:

- Less than half an hour travel time to access Bhuj Airport, administrative offices in Bhuj for business establishments and industries in Gandhidham and similar conditions for industries and people in Bhuj to access port and business establishments in Gandhidham,
- Building up of a vibrant impression to attract industries, businesses and skilled people in to Kutch and
- Higher quality of life and higher accessibility to social and cultural infrastructure for regional population.

Bhuj – Mundra and Bhuj – Bhachau roads are to be four lane highways and to be considered as primary corridors in the region to facilitate industrial development.

The corridors to be planned and industrial areas to earmarked for phase-wise development. Detailed plans for such type for limited areas can be prepared and such areas can be allowed completely for private development or for creation of separate industrial estates.

Therefore, the key strategies are:

- Identification and delineation of six corridors and areas under these.
- Notification of areas under these corridors.
- Develop three highways (also refer road section of infrastructure development):
    - Gandhidham – Anjar – Bhuj Expressway for Gandhidham – Bhuj Corridor
    - Bhachau – Bhuj Four Lane Highway for Bhachau – Bhuj Corridor and
    - Bhuj – Mundra Four Lane Highway for Bhuj – Mundra Corridor
- Preparation of corridor development plans.
- Using land pooling as the technique wherever applicable (as per the development plan guidelines) and preparation of detailed industrial zone plans.

1.2.3. Content of a Corridor Development Plan

- A base map with cadastre details
- A corridor land information system
- Land use and transportation planning

- Corridor infrastructure development planning
- Delineation of land pooling areas specifically for industrial zones (as guided in the land use plan).
- Bye laws for development for corridor area.
- Privatisation and marketing plan.

1.2.4 Proposed Corridor Development Actions, Timescale and Implementation Procedure

The proposed corridor development initiatives are arranged in a timescale for project integration and effective implementation. These follows logical need based sequencing. Refer the Annexure I for the detailed corridor development actions, timeline and implementation procedure.

1.3 Focus on the Intensive Activity Zone

In the later stages the urban areas and the industrial corridors together shall form an intensive activity zone in the talukas of Gandhidham, Anjar, Bhachau, Bhuj (southern part), Mundra and in Mandvi. The intensive activity zone with its corridors and urban centres will also facilitate a co-ordinated approach of development with the proposed Mundra and Kandla Special Economic Zones, Gandhidham Urban Complex, Bhuj as the District headquarter and cultural centre and also with Mundra Port, Mundra International Container Terminal, Kandla Port and proposed post-panamax extension of Kandla Port at Tuna. The six industrial corridors will facilitate extensive industrial development and systematic extension is possible towards Tuna. The areas in between Mundra SEZ and Gandhidham Urban Complex along the Mundra – Anjar portion of the National Highway and the coast are low density areas (approximately 500 sq km), which can be converted into a special zone in the later phases to result into massive agglomeration of economic activities. Advantages of this intensive activity zone shall be:

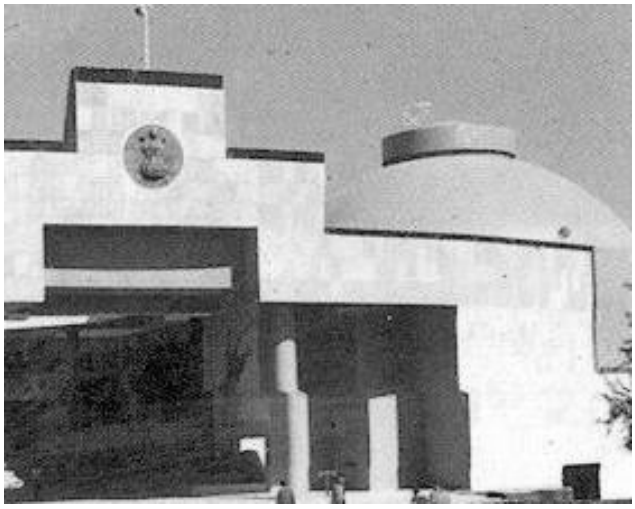
- Creating conditions of urban and industrial agglomeration.
- Preventing haphazard industrial growth and ensuring environmental sustainability.
- Lowering down of infrastructure development and management cost.

Therefore, focus on this intensive activity zone shall be beneficial for meaningful spatial organisation of activities in the region and shall create a condition of rapid sustainable development.

Vol. II, Part III B

Institutional Strengthening

2.3



Mott MacDonald

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2. Institutional Strengthening

2.1 Assessment of Institutional Set up and Establishment of a Planning, Development Support and Management System

Development is a continuous process. Planning and development management must go hand in hand. One point planning without an effective management system is going to only lead towards waste. The system will support identification of planning areas, preparation of plan for detailed development along with participations from local population, will support development decisions, attract investments through branding and place-marketing and will manage growth. The components of the planning, decision support and development management system are:

- The concept of a Kutch Economic Region
- Kutch Economic Regional Development Committee under 74th Constitutional Amendment
- Kutch Land and Spatial Data Information System
- Marketing and Branding

2.2 Kutch Economic Region

Kutch economic region is a spatially defined region covering the complete jurisdiction of the district of Kutch under the purview of the Kutch Economic Regional Development Committee.

2.3 Kutch Economic Regional / District Planning Committee

The institutional set-up required for the purpose of regional development must also have capacity and power to prepare plans and programmes, prepare action plans which would cover entire district-area, to raise resources for implementation, to recover the part of the expenditure from the benefits derived to meet with the expenditure.

2.3.1 Assessment of Existing Institutional Set Up

2.3.1.1 District Panchayat and Collectorate

Panchayat administration under Gujarat Panchayat act 1993 with its setup at district level has limited resources at its disposal apart from its merge administrative setup created for the purpose of discharging its duties under schedule III specified as required under section 154 of the Act. All its actions are mainly directed to words promotion of

(a) the health, safety comfort and convenience and
(b) Social economic or cultural well-being of the inhabitants of the area

District fund consists of local taxes, contribution by the State Government as provided in section 158 of the Act. The provisions of section 218 to 225 of the Panchayat act 1993 deals with financial assistance to Panchayat mainly by State-Government. Such district level setup is not capable of meeting with the requirement of planned regional development of the district. It is not desirable to load it with any other responsibility which is certainly bound to affect its present performance, powers and duties at local level.

The office of District Collector and the Director of Municipalities can safely be over ruled for out consideration with out any discussions.

2.3.1.2 DRDA

Another institutional setup working at district level is District Rural Development Agency (DRDA). This agency is mainly utilising the financial assistance from the Central Government means for rural development. It has Skelton administrative staff and cannot be considered for regional development.

The third agency is district planning committee. Its present formation is not aimed at development of the regional, but mainly works implement through State Government grants.

2.3.1.3 Role of State Parastatal Agencies

Agencies such as the Gujarat Water Supply and Sewerage Board (GWSSB) are performing their sectoral development tasks all over Gujarat and also within Kutch. For instance, the GWSSB Act 1978 makes provisions for establishment of the Board section 14 of the act provides for the duties and functions of the Board which are as under

(a) to prepare, execute, promote and finance the schemes for supply of water and for sewerage and sewage disposal;
(b) to render all necessary services in regard to water supply and sewerage to the State Government and local bodies and on request to private institutions or individuals also;
(c) to prepare draft State Plans for water supply, sewerage and drainage on the directions of the State Government:
(d) to review and advice on the tariff, taxes, fees, and charges of water supply and sewerage systems, in the areas comprised within the sphere of operation of the water supply and sewerage services of the Board and in the areas of the local bodies which have entered into an agreement with the Board;
(e) to assess the requirements of materials and arrange for their procurement and utilisation;
(f) to establish State standards for water supply and sewerage services;
(g) to review annually the technical, financial, economic and other aspects of water supply and sewerage system of every scheme of the Board or the local bodies which have entered into an agreement with the Board;
(h) to establish and maintain a facility to review and apprise the technical, financial, economic and other pertinent aspects of every water supply and sewerage scheme in the State;
(i) to operate, run and maintain any water works and sewerage system, if and when directed by the State Government, on such terms and conditions and for such period as may be specified by the State Government;
(j) to assess the requirements for man-power and training in relation to water supply and sewerage services in the State;
(k) to carry out applied research for efficient discharge of the duties and functions of the Board;

(l) to perform such of the duties and functions, which are being performed by the Gujarat Public Health Engineering Service, as may be specified, from time to time, by the State Government;

(m) to perform and discharge such other duties and functions as are allotted to the Board under other provisions of this Act or as may be entrusted to it by the State Government.

It is clear that the Board is an instrument for the State to seek advice, get the plans prepared for water-supply, sewerage and drainage. However the Board is only concern with the sector specific water-supply and sewerage project and is not required looking into comprehensive devebpment aspect of the district, or region as a whole.

Other agencies working at State-level are GIDC, GMFB & CTP office. The first two have limited purpose and the third one is only planning authority dealing with the provision of Town Planning Act. None of these three institutions will perform a role of comprehensive planning and implementing agencies at regional level. Similarly almost all the state parastatal agencies are performing sectoral roles.

2.3.1.4 Urban Local Bodies

It may also be noted that in Kutch region, there are no municipal corporation. The urban-level bodies are governed by municipal act 1963 having powers and functions to look after the areas within their jurisdiction only.

It may also be mentioned that Regional Plans were also prepared by the Maharashtra Government under the provisions of Town Planning Act and none of them are implemented by any agency so far and are lying safely on the shelves of the town planning department of the Maharashtra Government till today. A true regional approach and participation of a regional agency in preparation and implementation of plans and management of regional growth is a necessity.

2.3.1.5 Article 371 (2)

The Constitutional law for the purpose Article 371 (2) of the Constitution makes special provis ion with respect to Kutch of Gujarat State. The President may by order provide for any special responsibility of the Governor for establishment of separate development Board with the provision that a report on the working of this Board will be placed each year before the State legislative assembly. It may provide for the equitable allocation of funds for development expenditure over the said areas, subject to the requirement over the said areas, subject to the requirements of the State as a whole and may provide for any equitable arrangement providing adequate facilities for technical educations and vocational trainings and adequate opportunities for employment in service under the control of the State area subject to the requirement of the State as a whole.

It appears that the time of framing the Constitution, the Kutch was considered to be backward area of the State and that the potential of the Kutch for development was frames at that time. Now that we may not proceed on the footings of old thinking as backwardness and that this area is always to be subsides by the State. Having known its potential, the State must think in terms of exploring the potential and provide it with suitable institutional setup supported by active support of the State on all fronts. Another weakness in the establishment of the Board lies in the fact that all aspect of the

formation and working of the Board will be governed by the President and the Governor of the State, though allocation of the funds will be the responsibility of the State. It is apprehended that such a Board would lack in local representation and under the present political scenario at the State & Central level, the formation of Board would create more problems instead of aiming at the strategic development as desired by the State.

The provision of Article 371 (2) is silent on all the issues which would be actively required to be considered for institutional set-up for Development and implementation as envisaged.

2.3.2 Institutional Strategies for Kutch

Two steps are proposed to be followed for institutional strengthening in Kutch:

- Establishment of a temporary high powered committee and
- Establishment of a District Planning Committee

2.3.2.1 Establishment of a Temporary High Powered Committee (HPC)

For rapid initiation of and implementation of the proposed sectoral, spatial and other institutional development actions, establishment of a temporary high powered committee has become an urgent issue. A temporary committee can be formed within a span of two years and can specifically provide attention to development and development facilitation in Kutch. Such a high powered committee can settle the legal issues related to land and land development, initiate corridor development and urban development actions and also can attempt for investment attraction.

2.3.2.2 Possibility of Formulation of a District Planning Committee (DPC) under the Article 243 ZD under the 74th Constitutional Amendment

There is a scope for formation of a permanent district planning committee to take charge of the high powered committee in future. Another Constitutional provision, Article 243 ZD which is introduced under 74th Constitutional Amendment provides suitable support for formation of such an institution. According to the Amendment a District Planning Committee (DPC) to be formed as per the following provisions:

1. There shall be constituted in every State at the district level a District Planning Committee to consolidate the plans prepared by the Panchayats and the Municipalities in the district and to prepare a draft development plan for the district as a whole.

2. The Legislature of a State may, by law, make provision with respect to-

    (a) the composition of the District Planning Committees;

    (b) the manner in which the seats in such Committees shall be filled:

    Provided that not less than four-fifths of the total number of members of such Committee shall be elected by, and from amongst, the elected members of the Panchayat at the district

level and of the Municipalities in the district in proportion to the ratio between the population of the rural areas and of the urban areas in the district;

(c) the functions relating to district planning which may be assigned to such Committees;

(d) the manner in which the Chairpersons of such Committees shall be chosen.

3. Every District Planning Committee shall, in preparing the draft development plan, -

(a) have regard to –

(i) matters of common interest between the Panchayats and the Municipalities including spatial planning, sharing of water and other physical and natural resources, the integrated development of infrastructure and environmental conservation;

(ii) the extent and type of available resources whether financial or otherwise;

(b) consult such institutions and organizations as the Governor may, by order, specify.

4. The Chairperson of every District Planning Committee shall forward the development plan, as recommended by such Committee, to the Government of the State.

If the provision is critically examined, it provides for and gives power to the State Government to legislate with a power to

(1) to decide composition of the committee
(2) to provide for local representation
(3) to decide and fix the functions of the committee
(4) the control and appointment of the chairperson of the committee
(5) to provide for consultation of other institutions and organisation as and when required
(6) to plan for matter related to common interest, natural resources and integrated development of infrastructure and environmental conservation
(7) to provide for extent and type of available resources whether finance or otherwise

Such an institutional setup with allocation of development and implementation functions with power and duty to consult other expert institution or organisation is necessary. It is desired by the Constitution as the words used are “there shall be constituted in every State at the District level a District planning committee”. This is altogether a different type of District setup enforced under the Constitution to meet with the requirement at District level. The present setup established by the State as district planning committee may be discarded and or reconsidered/ reviewed under the requirement of Article 243 ZD of the Constitution law of India.

It may also be noted that such committee can take assistance or direct other institutions to implement the schemes proposed by it. The State can also provide that all financial assistance received from State or Central Government will be placed under the disposed of such committee, which shall have power to converge the funds for utilisation in implementation of its plans prepared by the committee for District Development.

The powers of the committee may include

(1) to enter into contract if agreement with any person or institute or ogranisation for performing it duties and discharging its functions
(2) to raise finance through borrowing of loans
(3) to direct any urban or rural local bodies, other district agencies or State agencies to take suitable actions so as to assist the committee in implementation of development plan or to implement the part of the action plan for the area within its jurisdiction.

The objective of developing Kutch as a business hub can be facilitated substantially through initiating an institutional arrangement as prescribed in the 74th Constitutional Amendment in India.

The Kutch Economic Regional Development Committee aims to improve the way the region works - delivering quality regional intelligence, effective partnership and increased influence. Building on the region's strengths and then lobbying for additional investment and grant; further understanding the region's opportunities and ensuring broad support for agreed regional priorities are key activities that will underpin the committee's work at regional level.

2.3.2.3 Functions of the District Planning Committee

In general, the committee's priorities will be to

- encourage an integrated, partnership approach to economic development;
- improve the effectiveness of regional lobbying and advocacy at Gujarat, national and international levels;
- improve understanding of the region's social, environmental and economic conditions.

The statutory functions of such a District committee can include

(1) preparation of comprehensive development proposal of the district keeping in view the natural resources including utilisation of minerals
(2) to prepare resource mobilisation plan
(3) to converge all financial aids, grants and subsides available from State and Central Government and prepare Plans and Schemes for its optimum utilisation
(4) to prepare, execute and finance the action plans & programmes envisages under the comprehensive strategic plan of development prepared by if for the district

Moreover, the committee may perform non-statutory functions as follows:

Concretisation of Regional Development Agenda

The committee shall build upon the study on 'Development Potential of Kutch' and the action plan prescribed by it.

Support Business Growth

Business is at the heart of wealth creation. It is vital that the committee encourages and supports companies helping them to become more productive and more profitable. The committee's focus is on developing businesses within the region, strengthening the most important business sectors and building trading links.

The committee's priorities will be to:

- support the development of key sectors;
- encourage increased exports and international trade by region's companies;
- promote the development of regional and local supply chains;
- attract and retain domestic and foreign direct investment into the region;
- support business growth through access to appropriate finance and advice.

The committee supports Business Excellence, Lean Manufacturing Excellence and Technology Excellence to improve the region's global competitiveness. It promotes sustainable development and the environment as key enablers of long-term business growth and economic prosperity for the region.

Management of Regional Development Work

The committee will operate as regional development and planning authority and is thus the nodal agency in charge of regional planning and looking after regional interests. On the basis of 74th Constitutional Amendment of India they articulate common regional needs and work to promote the material and cultural well-being of their regions.

The committee will also perform other tasks besides the statutory responsibilities to act as a centre of development for the region. It will also pursue the interests of the region, its municipalities, panchayats, inhabitants and businesses and carry out research, planning and analyses. The committee is also the organisation for cooperation between the various influences within the region.

Regional Scheme - Regional Development Strategy

Planning for a region covers a regional scheme, a regional plan and a regional development programme. A regional scheme is the fundamental document when developing a region. It defines the objectives of the long-term development in the region. The key task of the Regional Councils is in fact to create a development strategy for the region, to maintain it and to revise it quickly when necessary.

Responsibility for Regional Development

The committee is the authority responsible for regional development under the 74th Amendment Act of India. The goal of this legislation is to promote regional development initiatives and regional balance and in so doing, to promote environmentally sustainable development.

The Committee therefore

- draws up regional development programmes and reconciles them with the regional development measures of the regional ad-ministration authorities,
- presents objectives for the development of regional infra-structure,
- develops the framework for business activity to generate new enterprises and new jobs within the region,
- reinforces the regional economy in every possible way,
- improves the occupational skills of the population.

The committee draws up plans and programmes in cooperation with state and local governments and with businesses and organisations within the region. When preparing programmes the following elements in the regional scheme are observed: development targets and strategies, regional and industrial objectives and the environmental impact of the programmes. In addition to its regional development work with legal effects also the committee concludes programme agreements with the state, the business community and non-governmental organisations.

Regional policy can be implemented according to the peculiar characteristics of the region and this leads to specialisation and differentiation. Intensive interaction with the inhabitants, local authorities and sub-regional units is an essential requirement for success.

Responsibility for Regional Land Use Planning

The land use plan defines the use of areas needed for particular purposes and the principles of urban structure from the point of view of regional development. It provides guidelines for the member communities and for all other land use planning in the region.

The regional plan and the land use plan reconcile the interests of state government with the interests of regional and local levels. They also harmonise the land use objectives with the aims of economic growth and environmental control. Key issues in planning Kutch are man, nature and the built environment, its use and sustainable development.

Providing Sites and Premises

For Kutch to be competitive in a national and global market place there must be an adequate supply of business premises and serviced development sites to cater for the needs of new business start ups, expanding local businesses and inward investors - both foreign direct investment and investment from companies outside the region. The committee has to develop a strategy for Incubation and Science Parks which sets out policies in respect of these facilities. The guidelines for Sites and Premises to be prepared for providing business premises for growth and prosperity to complements this strategy and to clarify the priorities for the committee for investment in the physical works.

Promoting Innovations

Innovation helps improve economic performance. It should be seen as an important element of regional policy and a way to improve regional and national productivity and competitiveness. Innovation is one of the priority themes for the committee. The committee's role in encouraging innovation is a mixture of direct delivery and influencing the strategies, policies and actions of a wide range of other organisations. The main aim is to ensure that the 'innovation agenda' is fully recognised throughout the region. It is important that the region fully utilises the experiences of all its residents. People in the Kutch make a crucial contribution to our economy so we need to ensure that all can participate in and benefit from a growing economy.

Regional Infrastructure Development

Modern societies and economies increasingly rely on sophisticated and efficient transport and communications networks. Kutch, as a peripheral region, needs excellent national and international links. This has to be achieved, however, without destroying the special qualities of the environment.

Investment Promotion

Perception is critical to business and investment decisions. Kutch needs to compete with other successful economies around the world to attract funding, people and companies. To do this, it markets the dynamism of its cities, quality of its natural environment and the excellent opportunities for business growth across the region. Working closely with the Tourism Corporation of Gujarat Limited, the committee markets Kutch, internationally, nationally and within the region, both as a tourist destination and as an excellent business location. A 'Kutch Brand' can be developed.

It is important to project a positive image of Kutch to a variety of audiences at home and abroad. The committee will be required to demonstrate to potential inward investors that the region is an excellent place to do business, and a great region in which to live and work. Specifically the committee needs to celebrate and promote the region's business excellence to potential investors, and encourage the region's businesses to promote the region through their national and international business dealings.

Skills and Learning Development

The committee's skills and learning team provides a focus for skills and learning in the Kutch and in its relationships with partner organisations and develop a regional skill strategy, the Framework for Regional Employment and Skills Action (FRESA). The committee works with other partners to improve the skills of the region's workforce. It focuses on the skills needs of key business sectors as well as the needs of communities in urban and rural areas where integrated plans and programmes are being planned or delivered. Sector specific skill projects (e.g. vocational excellence, etc) to be developed with IIMA, CEPT, Kutch University, etc.

Financing

Apart from the state allocations and other grants, a Kutch Regional Holdings can be created as responsible for owning and managing regional assets - the money from which will be used by the committee to fund infrastructure development projects.

The assets may include:

- Investments.
- Shareholding in Ports.
- Infrastructure in other regions.
- Other feasible business ventures.

Each year, the regional holdings can produce a long term funding plan, which will outline how it will manage its assets successfully so that it is able to provide the committee with enough money to fund projects. On the other hand committee will outline each year on spending in developmental projects and prioritise these.

2.4 Land and Spatial Data Information System and Management

A system for capturing, storing and using data which is spatially referenced data. Usually not associated with specific technologies and in the NT used as the generic term for land / geographic / spatial information systems including the institutional framework and standards established to create and manage the LIS across the government and community. Land and resource information management is the activity of capturing, organising, integrating, managing and distributing digital land related information and derived products for use by government, private entrepreneurs and the community.

The Information System Kutch (ISK) is a whole of government integrated land information infrastructure with a web based delivery system. The ISK is a showcase of what can be achieved through cooperation, leadership, smart technology and smart thinking.

Key Issues are:

- Creation of a regional data base and its management procedure
- Establishment of a land information and management system and its linkages to planning and business development

The district planning committee is to take the responsibility for developing policies and strategies that ensure appropriate data quality and services are available to the community. The committee performs this role by providing a policy framework that coordinates the collection, collation, display and access to land information from the State and Government, Local Government and Business Enterprises.

2.4.1 ISK Data

The ISK's data can be divided, in broad terms, into two distinct areas. The first area of information includes the on-line access to live and scanned documents and information held by the DILR. This service is available to members of the public and subscribers. Subscribers to this service, typically real estate agents and solicitors, have the capacity to electronically lodge priority notices.

The second area is spatial information and includes information about topographical data, natural resource data, roads and community facilities, cadastre (property boundaries), images including aerial photo flight lines, administrative boundaries, area information, survey control points and nomenclature. All of this information is available free through a web browser (earnings will be advertisements) and additional information is being added based on client demand and data availability.

This information will be used by the following client groups:

- Government departments
- Business Enterprises / national and multinational
- Real estate agents

- Valuers
- Surveyors
- Financial Institutions
- Solicitors
- Energy providers
- Natural resource managers
- Cartographers
- Planners
- Mining industry
- Forestry industry
- Agriculture
- Information Technology providers
- Consultants
- Interest groups
- Community groups

2.4.2 Benefits

The data can be tailored to one's particular location and needs, and provides one with rapid access to current and fully maintained land information. This data can provide benefits that include:

- Improved planning and management decisions;
- Automation of some administrative tasks;
- Improved allocation of resources; and
- Targeted market development.

One will be also able to add his /her own information to the data and develop own business applications.

2.4.3 Data Access

The can be deliverable through three channels:

- Public access or subscription services through The ISK web interface;
- Purchasing digital data tailored to the client's requirements; and
- Capacity for on-line, real time access to ISK data in the support of 'off-site' applications.

Data can be available in CD-ROMs or can be accessible online.

2.5 Branding and Marketing Kutch

Branding and marketing of Kutch shall be specifically carried out by the Kutch Economic Regional / District Planning Committee.

2.5.1 Objectives of Place Marketing

- Often a well-known name creates good opportunities to fix associations, and build a place brand, which acts as the catalyst for investment attraction.
- Places in general have to perform many objectives at the same time: attract new companies (domestic and foreign), retain their industrial base and develop the tourist and business visitor industries.
- At the same time, places need to develop their internal services like transportation or health care for the demanding community. Increasing investments will increase sources for income for the region.

2.5.2 Place Marketing of Kutch

Place marketing means designing a place to satisfy the needs of its target markets. Place marketing is a strong element to be integrated in the economic development of Kutch. Each place needs its own solutions to be successful and visions as the leading star for the development strategy. Place marketing is used for multiple goals, such as to build a positive image for the place and attract enterprises, tourists, institutions, events etc. Today, places need to attract tourists, factories, companies and talented people, as well as find markets for their exports, and this requires that places adopt strategic marketing management tools and conscious branding.

2.5.3 Branding Kutch

Branding means to build an offering from a known source; the intangible value proposition is made physical by an offering, which can be a combination of products, services, information and experiences. Place branding means bringing added attraction to a place, the central issue being to build the brand identity. Place product is total offering-mix of the place to place customers.

When geographical locations are branded like products and services, the brand name is then often the actual name of the location. A branded place makes people aware of the location and connects desirable associations. Places comprise many components, such as name, symbols, packaging and reputation.

In contemporary marketing, branding is very central, as it integrates all strategic elements into one success formula. Brands are the basis for long-term success for numerous firms and organisations. Building strong brands requires clear brand identity and brand position, and also consistency over time.

2.5.4 Brand Identity

Brand identity is the state of will of the organisation, and the active part of the image building process. The brand identity is how the brand is wanted to be perceived. The brand identity is a unique set of brand associations that the management wants to create or maintain. The associations represent what the brand stands for and imply a promise to customers from the organisation. Brand identity creates a

relationship between the brand and the customers with a value proposition that consists of functional, emotional and self-expressive benefits

2.5.5 Brand Image

Brand image is the perception of a brand in the minds of people. The brand image is a mirror reflection (though perhaps inaccurate) of the brand personality or product being. It is what people believe about a brand – their thoughts, feelings, expectations. Brand image is perceptions about a brand as reflected by the brand associations held in consumers´ memory.

A strong positive image can lead to a powerful and distinctive competitive advantage for a place. The emphasis in brand communication should not be on what the brand physically does but on what the brand stands for to the customer. Branding or marketing are not just loose marketing activities, but something holistic that influence the whole place and its organisation.

2.5.6 Places with First five images

- Belgium Brussels, chocolates, Tintin, beer, capital of Europe
- Denmark Vikings, Hans Christian Andersen, Copenhagen, Lego, football
- Germany Beer, Berlin, motorways, Goethe, serious
- Spain Barcelona, bullfighting, paella, art, Juan Carlos
- France Paris, wine, Gérard Depardieu, food, fashion
- Ireland Green, the Irish pub, James Joyce, Celtic design, U2
- Italy Rome, pasta, art, shoes, Pavarotti
- Luxembourg Castles, banks, small court of justice, the Echternach dancing
- The Netherlands Van Gogh, tulips, drugs, Amsterdam, flat
- Austria Vienna, Klimt, Sissi, skiing, Mozart
- Portugal Port wine, the cock of Barcelos, Lisbon, explorers, Algarve
- Finland Lapland, Santa Claus, forests, saunas, telecommunication
- Sweden Blondes, cold, Nobel prize, Ingmar Bergman, Pippi Longstocking
- United Kingdom Shakespeare, London, BBC, The Royals, Beatles

2.5.7 Target Markets

The potential target markets of place marketing are defined as place customers, which are producers of goods and services, corporate headquarters and regional offices, outside investment and export markets, tourism and hospitality, and new residents. Target markets mean the selected segments and customers to which a place chooses to send marketing messages. Marketing factors are the attractions and infrastructure of the place, its people and image and quality of life.

The four main target markets of place marketing in Kutch are visitors, residents and employees, business and industry and export markets. The place customers are free to choose between comparable

products of a place. The pricing of Kutch as a product will be indirect, intangible and often non-monetary.

2.5.8 Approach

In order to compete effectively, Kutch must develop a real marketing approach. Consequently, the region must produce services that current and potential citizens, companies, investors and visitors need. Place marketing, especially in the U.S., is a multi-billion dollar industry where places have been "commodities to be consumed", and sold aggressively. Kutch shall have to build a new image of the place to replace negative images. Place marketing adapts the place product to make it more desirable to place customers, by creating a place identity from the substance of a place and then communicating it to the selected customers.

Kutch is to be marketed like products and services in private firms, and in a similar sophisticated way. The tools of marketing can be transferred to "place marketing". When a region has managed to create favourable conditions for the desired target markets like foreign inward investment or tourism, and the hard attraction factors on a satisfactory level, it is then a task of place marketing to transfer the wanted identity to be understood by the selected target markets as favourable images towards the place. Place marketing can plant these images in the minds of the place customers.

2.5.9 Marketing Process

Advertising and promotion is one of many possible sets of marketing measures. The choice of measures depends on the choice of marketing strategies and goals of the organisation. Each strategy will require a different mix of marketing activities, and numerous strategies may be simultaneous. The intangibility of non-business products, the non-monetary price of purchase, the extreme lack of frequency of purchase, the lack of behavioural rein forcers, the need to market to an entire but heterogeneous market, and the extreme levels of involvement are features of a place product.

A place can make various investments to improve liveability, 'investability' and 'visitability' of the place product, which comprises four components, namely:

- Place as character. Aesthetic urban design reveals a great deal of "the sense of the place", and makes a statement about a place, because it reflects how values and decision-making combine on issues affecting development.
- Place as a fixed environment. A compatible basic infrastructure with the natural environment makes the urban design possible, but cannot guarantee a place's growth, although its absence is a serious liability. Strategic market planning must deal intelligently and creatively with the various infrastructure proposals. Also, infrastructure development needs to be adjusted to the overall place development priorities.
- Place as a service provider. Like place design and infrastructure, successful places demand good public services, which can also be marketed as a place's primary attraction and product. Programmes for improving security, education and attractions need to be developed.

- Place as entertainment and recreation. The traditional institutions serving this function are the restaurants, parks, zoos, sports arenas, and more complex combinations of attractions are emerging.

2.5.10 Stress Areas

- There can also be a gap between the realities of a place as a product and its marketing communication.
- Place marketing needs to be successful in both strategic and operational skills.
- With low implementation strategy and low strategic ability a place is a "loser".
- Strategic brand management involves the design and implementation of marketing programmes to build, measure and manage brand equity.
- Successful branding requires an understanding of how to develop a brand identity, a brand differentiation and a brand personality.
- Core identity is also a central driving force in place branding, including the major elements of place attraction.
- A well chosen place brand makes the product more identifiable for the place buyer, and brings added value.
- Most place images are in fact stereotypes, extreme simplifications of the reality that are not necessarily accurate, and might be based on impressions rather than facts, but are nonetheless pervasive.

Brands facilitate decision-making, they identify, guarantee, structure and stabilise supply, and branding is the leading issue in the marketing strategy of a company because successful brands can be a financial dynamo for the owner.

Costa Rica beat out Brazil, Chile and Mexico to become the site of Intel's first Latin American plant in 1996 by drawing on the resources of its own investment promotion agency and the Irish Development Agency. Likewise, Columbia is today the major exporter of coffee to the US, largely because the National Federation of Coffee Growers of Colombia built a successful marketing campaign for Café de Colombia.

2.6 Key Strategies

- Detailed proposal preparation for establishing a temporary high powered committee within a span of two years (by 2007).
- Detailed proposal (organisational and financial) for developing Kutch Economic Regional Development Planning Committee under 74th Constitutional Amendments by 2012.
- Development of a web based Kutch Information System (to be linked to integrated land and resource information and management system for the proposed corridors and urban areas – refer framework for spatial development and actions).
- Preparation of branding and marketing strategy development plan for Kutch

2.7 Proposed Institutional Development Actions, Timescale and Implementation Procedure

The proposed institutional development initiatives are arranged in a timescale for project integration and effective implementation. These follows logical need based sequencing. Refer the Annexure I for the detailed institutional development actions, timeline and implementation procedure.

Vol. II, Appendix

Schedule of Actions

2.A

Mott MacDonald

Dalal Mott MacDonald

Hyper Growth Model, Kutch

Draft Specific Hyper Growth Model Support Projects and Timeline

A	Regional Infrastructure	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Nodal Agency and Co-ordination	Nodal Agency - Regional	Concept - Design - Planning Support	Implemetor	Manager
1	Intentive activity area development plan				INTENSIVE ACTIVITY AREA DEVELOPMENT PLAN / SPACE AND INFRASTRUCTURE														GIDB > DC	DC + HPC > DPC	Private Consultants Pack 1	DC	DC
2	Subsequent corridor development plan				THREE DETAILED CORRIDOR DEVELOPMENT PLANS / SPACE AND INFRASTRUCTURE														GIDB > DC	DC + HPC > DPC	Private Consultants Pack 2	DC	DC
3	Develop a land information system				LAND INFORMATION SYSTEM FOR CORRIDORS														GIDB > DC + DILR	DC + HPC > DPC	Private Consultants Pack 2	DC	DC
4	Sub-regional and internal roads dev				SUB-REGIONAL LINK AND APPROACH TO INDUSTRY ROADS														GIDB > DC > SPV	DC + HPC > DPC	Private Consultants Pack 1	SPV	SPV
5	Sub-regional water pipeline network				SUB REGIONAL INDUSTRIAL WATER SUPPLY NETWORK AND INDUSTRY CONNECTIONS														GIDB > GWSSB + GWIL > SPV	DC + HPC > DPC	Private Consultants Pack 1	SPV	SPV
6	Sub-regional power distribution infrastructure				SUB-REGIONAL POWER DISTRIBUTION INFRASTRUCTURE														GIDB > DC > GEB	DC + HPC > DPC	Private Consultants Pack 1	GEB	GEB
7	Gandhidham - Bhuj Expressway						GANDHIDHAM - BHUJ EXPRESSWAY												GIDB	DC + HPC > DPC	Private Consultants Pack 3	SPV	SPV
8	Mundra - Bhuj Four Lane Highway				MUNDRA - BHUJ 4 LANE HIGHWAY														GIDB > R&B	DC + HPC > DPC	Private Consultants Pack 4	R&B	R&B
9	Bhachau - Bhuj Four Lane Highway							BHACHAU - BHUJ FOUR LANE HIGHWAY											GIDB > R&B	DC + HPC > DPC	Private Consultants Pack 5	R&B	R&B
10	Third port															THIRD MODERN PORT			GIDB > GMB > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV
11	Water desalination plant 300 MLD						1ST WATER DESALINATION PLANT, 300 MLD												GIDB > GWIL	DC + HPC > DPC	SPV Decides	SPV	SPV
12	Water desalination plant 300 MLD															2ND DESAL PLNT 300 MLD			GIDB > GWIL	DC + HPC > DPC	SPV Decides	SPV	SPV
13	Coal based power plant 500 MW						1ST COAL BASED POWER PLANT 500 MW												GIDB > GEB > SPV	DC + HPC > DPC	SPV Decides	Private	Private
14	Coal based power plant 500 MW								2ND COAL BASED POWER PLANT 500 MW										GIDB > GEB > SPV	DC + HPC > DPC	SPV Decides	Private	Private
15	LNG Terminal									LNG TERMINAL									GIDB > GSPC > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV
16	LNG based power plant 1000 MW												LNG BASED POWER PLANT 1000 MW						GIDB > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV
17	Mega-chemical Industrial Estate									MEGA CHEMICAL INDUSTRIAL ESTATE									GIDB > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV
18	Wind power generation capacity 500 MW																		GIDB > GEB > Private	DC + HPC > DPC	SPV Decides	Private	Private
19	International airport																		GIDB > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV

B	Urban Development - Tourism	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Nodal Agency and Co-ordination	Nodal Agency - Regional	Concept - Design - Planning Support	Implemetor	Manager
1	Formulation of G'dham Urb Dev Authority				GREATER GANDHIDHAM URBAN DEVELOPMENT AUTHORITY														GIDB > IMDG + UDUHD + CS	DC + HPC > DPC	Nil	UDUHD	GGUDA
2	G'dham urban development plan by 2007 end				GREATER GANDHIDHAM URBAN DEVELOPMENT PLAN														UDUHD > GUDC	DC + HPC > DPC	Private Consultants Pack 6	UDUHD > GUDC	
3	Implementation of Urban Dev Plan, G'dham					GR. G'DHAM URBAN DEVELOPMENT PLAN IMPLEMENTED													UDUHD > GGUDA + GUDC	DC + HPC > DPC	Private Consultants Pack 6	GGUDA + GUDC	
4	Detaliled G'dham CBD dev plan with bye laws				GR. G'DHAM CDB PLAN														UDUHD > GGUDA + GUDC	DC + HPC > DPC	Private Consultants Pack 7	GGUDA + GUDC	
5	Implementation of G'dham CBD dev plan						GR. G'DHAM CDB PLAN IMPLEMENTED												UDUHD > GGUDA + GUDC	DC + HPC > DPC	Private Consultants Pack 7	GGUDA + GUDC	
6	Revised plan for Bhuj, Bhachau and Anjar					BHUJ, BHACHAU, ANJAR REV. PLAN													UDUHD > ADAs + GUDC	DC + HPC > DPC	Private Consultants Pack 8	UDUHD > GUDC	
7	Implementation of Rev Plan Bhuj, Bhachau, Anjar															BBA PLAN IMLNTD			UDUHD > GUDC	DC + HPC > DPC	Private Consultants Pack 8	UDUHD > GUDC	
8	Regeneration of old areas by 2015																REGEN		UDUHD > LOCAL BODIES > ADAs	DC + HPC > DPC	Private Consultants Pack 9	UDUHD > LOCAL BODIES + ADAs	
9	Mundra, Jakhau, Lakhpat, Nakhatrana UD Plans +						MUNDRA-JHAKAHU-LAKHPAT-NAKHATRANA PLN												UDUHD > GUDC	DC + HPC > DPC	Private Consultants Pack 10	UDUHD > GUDC	
10	Bhuj and Gandhidham Indoor Games Complex + Impl							INDOOR GAMES CMPLX, BHUJ AND G'DHAM											GIDB > DC > BHADA+ GGUDA	DC + HPC > DPC	Private Consultants Pack 11	BHADA+GGUDA	BHADA+GGUDA
11	Urban tourism dev plan with DP Gandhidham				URBAN TOURISM DEVELOPMENT PLAN WITH GGUDP														GGUDA + GTDC	DC + HPC > DPC	Private Consultants Pack 6		
12	Attracting a Five Star Hotel in G'dham CBD					MOU GGCBD FIVE STAR HOTEL														DC + HPC > DPC	Nil		
13	Implementation of the Five Star Hotel						FIVE STAR HOTEL IN GGCBD													DC + HPC > DPC	Nil		
14	Water Sport Facilities at Mandvi, Jhakhau									WATER SPORT TOURISM										DC + HPC > DPC	Private Consultants Pack 11		
15	International convention - exhibition centre									CONV. EXHIBITION CENTRE									GGUDA	DC + HPC > DPC	Private Consultants Pack 12		

C	Regional Governance and Growth Management - Tourism	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Nodal Agency and Co-ordination	Nodal Agency - Regional	Concept - Design - Planning Support	Implemetor	Manager
1	Power to DC and a high powered temporary committee				HIGH POWERED COMMITTEE														IMDG + UDUHD + CS	Nil	Nil	IMDG + UDUHD + CS	IMDG + UDUHD + CS
2	Dissolve the high powered committee by 2012							HIGH POWERED COMMITTEE DISSOLVED											IMDG + UDUHD + CS	DC + HPC > DPC	Nil	IMDG + UDUHD + CS	IMDG + UDUHD + CS
3	Agenda for Participatory Regional Development				PEOPLE'S PARTICIPATION AGENDA														IMDG + UDUHD + CS > DC	DC + HPC > DPC	Private Consultants Pack 13	DC + HPC	DC + HPC > DPC
4	Develop high powered district planning committiee				HIGH POWERED DISTRICT PLANNING COMMITTEE														IMDG + UDUHD + CS > DC	DC + HPC > DPC	Private Consultants Pack 14	IMDG + UDUHD + CS	IMDG + UDUHD + CS
5	Regional brand development				REGIONAL BRAND DEVELOPMENT														DC + HPC > DPC	DC + HPC > DPC	Private Consultants Pack 15	DC + HPC > DPC	DC + HPC > DPC
6	Regional Marketing with City Marketing																		C + HPC > DPC	DC + HPC > DPC	Private Consultants Pack 15	DC + HPC > DPC	DC + HPC > DPC
9	Starting - Organising Rann of Kutch Annual Car Rally				RANN OF KUTCH CAR RALLY														DC + HPC + GTDC > DPC > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV
10	Organising Kutch Annual Balloon Festival					KUTCH BALLOON FESTIVAL													DC + HPC + GTDC > DPC > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV

Annex I

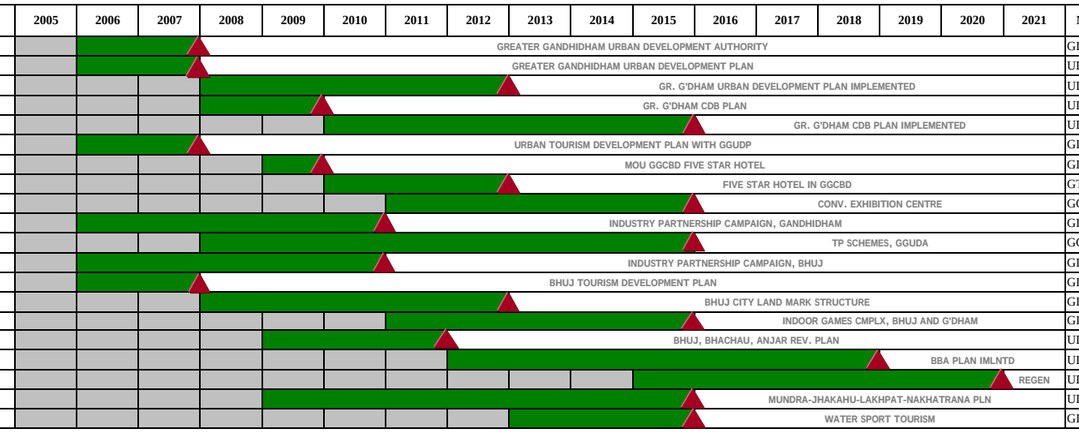
A. Regional Infrastructure Development Support Projects and Timeline

Sr. No.	Regional Infrastructure	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Nodal Agency and Co-ordination	Nodal Agency - Regional	Concept - Design - Planning Support	Implemetor	Manager
1	**Sub-regional and Internal Roads Dev**	To be planned, undertaken and implemented through the urban / corridor development plans (refer Urban and Corridor Development Projects and Timeline)																	GIDB > DC > SPV	DC + HPC > DPC	Refer Urban / Corridor Projects	SPV	SPV
2	**Sub-regional Water Pipeline Network**	To be planned, undertaken and implemented through the urban / corridor development plans (refer Urban and Corridor Development Projects and Timeline)																	GIDB > GWSSB + GWIL > SPV	DC + HPC > DPC	Refer Urban / Corridor Projects	SPV	SPV
3	**Sub-regional Power Distribution Infrastructure**			SUB-REGIONAL POWER DISTRIBUTION INFRASTRUCTURE															GIDB > DC > GEB	DC + HPC > DPC	Private Consultants Pack 1	GEB	GEB
4	**Gandhidham - Bhuj Expressway**						GANDHIDHAM - BHUJ EXPRESSWAY												GIDB	DC + HPC > DPC	Private Consultants Pack 2	SPV	SPV
5	**Mundra - Bhuj Four Lane Highway**			MUNDRA - BHUJ 4 LANE HIGHWAY															GIDB > R&B	DC + HPC > DPC	Private Consultants Pack 3	R&B	R&B
6	**Bhachau - Bhuj Four Lane Highway**							BHACHAU - BHUJ FOUR LANE HIGHWAY											GIDB > R&B	DC + HPC > DPC	Private Consultants Pack 4	R&B	R&B
7	**Development of Other Identified Stretches**		GOOD OVERALL REGIONAL ROADS																GIDB > R&B	DC + HPC > DPC	Nil	R&B	R&B
8	**Development of Rural Roads (refer actions)**		GOOD RURAL ROADS (100% SURFACED)																GIDB > R&B	DC + HPC > DPC	Nil	R&B	R&B
9	**Modernisation of Kandla**			MODERN KANDLA PORT															KPT	KPT	KPT decides	KPT	KPT
10	**Development of Kandla - KASEZ - Tuna Cmplx**												KANDLA - KASEZ - TUNA IND + PORT COMPLEX						GIDB > KPT + HPC / DPC > SPV	DC + HPC > DPC	SPV decides	SPV	SPV
11	**Third port**															THIRD MODERN PORT			GIDB > GMB > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV
12	**Water Desalination Plant 300 MLD**							1ST WATER DESALINATION PLANT, 300 MLD											GIDB > GWIL	DC + HPC > DPC	SPV Decides	SPV	SPV
13	**Water Desalination Plant 300 MLD**															2ND DESAL PLNT 300 MLD			GIDB > GWIL	DC + HPC > DPC	SPV Decides	SPV	SPV
14	**Coal based Power Plant 500 MW**							1ST COAL BASED POWER PLANT 500 MW											GIDB > GEB > SPV	DC + HPC > DPC	SPV Decides	Private	Private
15	**Coal based Power Plant 500 MW**												2ND COAL BASED POWER PLANT 500 MW						GIDB > GEB > SPV	DC + HPC > DPC	SPV Decides	Private	Private
16	**LNG Terminal**				LNG TERMINAL														GIDB > GSPC > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV
17	**LNG based Power Plant 1000 MW**												LNG BASED POWER PLANT 1000 MW						GIDB > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV
18	**Mega-chemical Industrial Estate**				MEGA CHEMICAL INDUSTRIAL ESTATE														GIDB > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV
19	**Wind Power Generation Capacity 500 MW**			WIND POWER GENERATION CAPACITY 500 MW															GIDB > GEB > Private	DC + HPC > DPC	SPV Decides	Private	Private
20	**Attracting Low-cost Pvt Airlines**				LOW COST AIRLINES														GIDB > AAI + HPC	DC + HPC > DPC	Nil	Private	Private
21	**Up-gradation of Airport Infrastructure, Bhuj**					BETTER AIRPORT INFRASTRUCTURE, BHUJ													GIDB > AAI + HPC	DC + HPC > DPC	AAI decides	Private	Private
22	**International Airport**																		GIDB > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV
23	**Telecommunication and Broadband Connectivity**	As per the urban and corridor development plans																	HPC > Private + BSNL	DC + HPC > DPC	HPC + Private	Private + BSNL	Private + BSNL
24	**8 Gen Hospitals and 21 Int Hosp + industry partnership / pvt**		8 NEW GEN HOSPITALS AND 21 INTERMEDIATE HOSPITALS (PUB/PVT)																GIDB > HPC > Private	DC + HPC > DPC	HPC + Private	HPC + Private	HPC > DPC + Private
25	**Marketing Bhuj Gen Hospital / Hosp Tourism**		HOSPITAL TOURISM																GIDB > HPC > Private	DC + HPC > DPC	HPC + Private	HPC + Private	HPC > DPC + Private
26	**Health Infrastructure Management Plan**		HEALTH INFRASTRUCTURE MANAGEMENT PLAN																GIDB > HPC > Private	DC + HPC > DPC	HPC + Private	HPC + Private	HPC > DPC + Private
27	**100 Secondary / Higher Sec Schools by 2015**												100 SEC / HIGHER SEC SCHOOLS						GIDB > HPC > Private	DC + HPC > DPC	HPC + Private	HPC + Private	HPC > DPC + Private
28	**Attracting DPS or Amity / Quality Schools + ind partnership**		INTERNATIONAL QUALITY SCHOOLS																GIDB > HPC > Private	DC + HPC > DPC	HPC + Private	HPC + Private	HPC > DPC + Private
29	**Long-term Strategic Tertiary Education Development Plan**		TERTIARY EDUCATION DEVELOPMENT STRATEGIES AND PLAN																GIDB > HPC > Private	DC + HPC > DPC	HPC + Private	HPC + Private	HPC > DPC + Private
30	**Indoor Stadia in Bhuj and Gandhidham**	As per urban development projects and timeline																	refer urban development projects and timeline				
31	**District Level Sport Infrastructure Bye Laws for All Schools**		CONDUCIVE BUILT ENVIRONMENT FOR SPORTS IN SCHOOLS																GIDB > HPC > DPC	DC + HPC > DPC	HPC + Private	HPC + Private	HPC > DPC + Private

Annex I

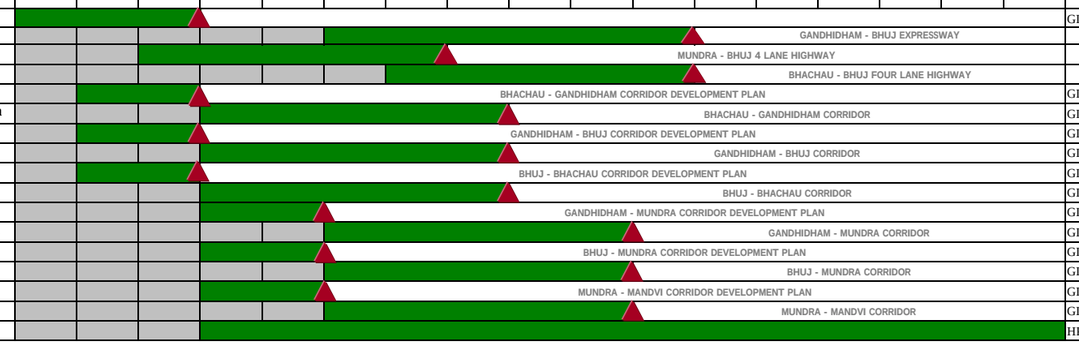
B. Urban Development Support Projects and Timeline

Sr. No.	Urban Development	Nodal Agency and Co-ordination	Nodal Agency - Regional	Concept - Design - Planning Support	Implemetor	Manager
1	Formulation of Greater G'dham Urban Development Authority	GIDB > IMDG + UDUHD + CS	DC + HPC > DPC	Nil	UDUHD	GGUDA
2	Greater G'dham Urban Development Plan by 2007 end	UDUHD > GUDC	DC + HPC > DPC	Private Consultants Pack 1	UDUHD > GUDC	GGUDA
3	Implementation of Urban Dev Plan, G'dham	UDUHD > GGUDA + GUDC	DC + HPC > DPC	Private Consultants Pack 1	GGUDA + GUDC	GGUDA
4	Detailed G'dham CBD Dev Plan with Bye Laws	UDUHD > GGUDA + GUDC	DC + HPC > DPC	Private Consultants Pack 2	GGUDA + GUDC	GGUDA
5	Implementation of G'dham CBD Dev Plan	UDUHD > GGUDA + GUDC	DC + HPC > DPC	Private Consultants Pack 2	GGUDA + GUDC	GGUDA
6	Urban Tourism Dev Plan with DP Gandhidham	GIDB > GUDC + GTDC	DC + HPC > DPC	Private Consultants Pack 1	GGUDA + GTDC	GGUDA
7	Attracting a Five Star Hotel in G'dham CBD	GIDB > GTDC + GGUDA	DC + HPC > DPC	Nil	GGUDA + GTDC	GGUDA
8	Implementation of the Five Star Hotel	GTDC + GGUDA > SPV / Private	DC + HPC > DPC	Nil	SPV / Private	SPV / Private
9	International Convention - Exhibition Centre, Gandhidham	GGUDA	DC + HPC > DPC	Private Consultants Pack 3	GGUDA + GUDC	GGUDA
10	Gandhidham Industry Partnership Campaign	GIDB > GGUDA + GCCI	DC + HPC > DPC	Nil	GGUDA + GCCI	GGUDA
11	Preparation of Town Planning Schemes in GGUDA Area	GGUDA + UDUHD	DC + HPC > DPC	Private Consultants Pack 4	GGUDA + UDUHD	GGUDA
12	Bhuj Industry Partnership Campaign	GIDB > BHADA + BCCI	DC + HPC > DPC	Nil	BHADA + BCCI + ULB	BHADA / ULB
13	Bhuj Tourism Development Plan	GIDB > BHADA + GUDC + GTDC	DC + HPC > DPC	Private Consultants Pack 5	BHADA + GUDC + GTDC + ULB	BHADA / ULB
14	Land Mark Structure, Bhuj	GIDB > BHADA + GUDC	DC + HPC > DPC	Private Consultants Pack 6	BHADA + GUDC	BHADA / ULB
15	Bhuj and Gandhidham Indoor Games Complex + Impl	GIDB > DC > BHADA+ GGUDA	DC + HPC > DPC	Private Consultants Pack 7	BHADA+ GGUDA	BHADA+GGUDA
16	Revised plan for Bhuj, Bhachau and Anjar	UDUHD > ADAs + GUDC	DC + HPC > DPC	Private Consultants Pack 8	UDUHD > GUDC	ADAs / ULBs
17	Implementation of Rev Plan Bhuj, Bhachau, Anjar	UDUHD > GUDC	DC + HPC > DPC	Private Consultants Pack 8	UDUHD > GUDC	ADAs / ULBs
18	Regeneration of Old Areas Starts by 2015	UDUHD > ULBs + ADAs + GUDC	DC + HPC > DPC	Private Consultants Pack 9	UDUHD > ULBs + ADAs	ULBs
19	Mundra, Mandvi, Jakhau, Lakhpat, Nakhatrana UD Plans + Impl	UDUHD > ULBs + GUDC	DC + HPC > DPC	Private Consultants Pack 10	UDUHD > GUDC	ULBs
20	Water Sport Facilities at Mandvi, Jakhau	GIDB > GTDC > ULBs	DC + HPC > DPC	Private Consultants Pack 11	GTDC + ULBs	ULBs



C. Corridor Development Support Projects and Timeline

Sr. No.	Corridor Development	Nodal Agency and Co-ordination	Nodal Agency - Regional	Concept - Design - Planning Support	Implemetor	Manager
1	Delineation and Notification of Corridors	GIDB > UDUHD + HPC	DC + HPC > DPC	Private Consultants Pack 1	HPC	HPC
2	Gandhidham - Bhuj Expressway (also in infrastructure actions)	refer infrastructure development projects and timeline				
3	Mundra - Bhuj Four Lane Highway (also in infrastructure)	refer infrastructure development projects and timeline				
4	Bhachau - Bhuj Four Lane Highway (also in infrastructure)	refer infrastructure development projects and timeline				
5	Preparation of Bhachau - G'dham Corridor Development Plan	GIDB > HPC + UDUHD	DC + HPC > DPC	Private Consultants Pack 2	HPC	DPC
6	Implementation of Bhachau - G'dham Corridor Development Plan	GIDB > HPC + UDUHD	DC + HPC > DPC	Private Consultants Pack 2	HPC	DPC
7	Preparation of G'dham - Bhuj Corridor Development Plan	GIDB > HPC + UDUHD	DC + HPC > DPC	Private Consultants Pack 3	HPC	DPC
8	Implementation of G'dham - Bhuj Corridor Development Plan	GIDB > HPC + UDUHD	DC + HPC > DPC	Private Consultants Pack 3	HPC	DPC
9	Preparation of Bhuj - Bhachau Corridor Development Plan	GIDB > HPC + UDUHD	DC + HPC > DPC	Private Consultants Pack 4	HPC	DPC
10	Implementation of Bhuj - Bhachau Corridor Development Plan	GIDB > HPC + UDUHD	DC + HPC > DPC	Private Consultants Pack 4	HPC	DPC
11	Preparation of G'dham - Mundra Corridor Development Plan	GIDB > HPC + UDUHD	DC + HPC > DPC	Private Consultants Pack 5	HPC	DPC
12	Implementation of G'dham - Mundra Corridor Development Plan	GIDB > HPC + UDUHD	DC + HPC > DPC	Private Consultants Pack 5	HPC	DPC
13	Preparation of Bhuj - Mundra Corridor Development Plan	GIDB > HPC + UDUHD	DC + HPC > DPC	Private Consultants Pack 6	HPC	DPC
14	Implementation of Bhuj - Mundra Corridor Development Plan	GIDB > HPC + UDUHD	DC + HPC > DPC	Private Consultants Pack 6	HPC	DPC
15	Preparation of Mundra - Mandvi Corridor Development Plan	GIDB > HPC + UDUHD	DC + HPC > DPC	Private Consultants Pack 7	HPC	DPC
16	Implementation of Mundra - Mandvi Corridor Development Plan	GIDB > HPC + UDUHD	DC + HPC > DPC	Private Consultants Pack 7	HPC	DPC
17	Preparation of Detailed Industrial Area Development Plans	HPC	DC + HPC > DPC	Private Consultants Pack 8	HPC / SPV / Private	HPC / SPV / Private



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D. Institutional Development Support Projects and Timeline

Sr. No.	Regional Governance and Growth Management	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Nodal Agency and Co-ordination	Nodal Agency - Regional	Concept - Design - Planning Support	Implemetor	Manager
1	**Power to DC and a High Powered Temporary Committee (HPC)**		HIGH POWERED COMMITTEE																IMDG + UDUHD + CS	Nil	Nil	IMDG + UDUHD + CS	IMDG + UDUHD + CS
2	**Dissolve the High Powered Committee by 2012**							HIGH POWERED COMMITTEE DISSOLVED											IMDG + UDUHD + CS	DC + HPC > DPC	Nil	IMDG + UDUHD + CS	IMDG + UDUHD + CS
3	**Preparation of Agenda for Participatory Regional Development**				PEOPLE'S PARTICIPATION AGENDA														IMDG + UDUHD + CS > DC	DC + HPC > DPC	Private Consultants Pack 1	DC + HPC	DC + HPC > DPC
4	**Develop High Powered District Planning Committiee (DPC)**				HIGH POWERED DISTRICT PLANNING COMMITTEE														IMDG + UDUHD + CS > DC	DC + HPC > DPC	Private Consultants Pack 2	IMDG + UDUHD + CS	IMDG + UDUHD + CS
5	**Development of Information System Kutch (ISK)**				INFORMATION SYSTEM, KUTCH (ISK)														GIDB > HPC	DC + HPC > DPC	Private Consultants Pack 3	HPC	DPC
6	**Regional Brand Development**			REGIONAL BRAND DEVELOPMENT															DC + HPC > DPC	DC + HPC > DPC	Private Consultants Pack 4	DC + HPC > DPC	DC + HPC > DPC
7	**Regional Marketing with City Marketing**																		DC + HPC > DPC	DC + HPC > DPC	Private Consultants Pack 4	DC + HPC > DPC	DC + HPC > DPC
8	**Starting - Organising Rann of Kutch Annual Car Rally**			RANN OF KUTCH CAR RALLY															DC + HPC + GTDC > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV
9	**Organising Kutch Annual Balloon Festival**				KUTCH BALLOON FESTIVAL														DC + HPC + GTDC > SPV	DC + HPC > DPC	SPV Decides	SPV	SPV

Annex I E List of Abbreviations and Symbols used in the Action Schedule

Sr. No.	Abbreviations / Symbols	Full Form / Meaning
1.	GIDB	Gujarat Infrastructure Development Board
2.	DC	District Collectorate
3.	DILR	District Institute of Land Records
4.	SPV	Special Purpose Vehicle
5.	R&B	Roads and Buildings Department, Gujarat
6.	GMB	Gujarat Maritime Board
7.	GWIL	Gujarat Water Infrastructure Limited
8.	GWSSB	Gujarat Water Supply and Sewerage Board
9.	GEB	Gujarat Electricity Board
10.	GSPC	Gujarat State Petroleum Corporation Ltd
11.	IMDG	Industries and Mining Department, Gujarat
12.	UDUHD	Urban Development and Urban Housing Department, Gujarat
13.	CS	Chief Secretary
14.	GUDC	Gujarat Urban Development Company Ltd
15.	ADA	Area Development Authority
16.	ADAs	Area Development Authorities
17.	BHADA	Bhuj Area Development Authority
18.	GGUDA	Greater Gandhidham Area Development Authority (proposed)
19.	GTDC	Gujarat Tourism Development Company Ltd
20.	HPC	High Powered Committee (proposed)
21.	DPC	District Planning Committee (proposed)
22.	Private	Private Investor
23.	KASEZ	Kandla Special Economic Zone
24.	KPT	Kandla Port Trust
25.	AAI	Airport Authority of India
26.	BSNL	Bharat Sansar Nigam Limited
27.	ULB	Urban Local Body

28.	ULBs	Urban Local Bodies
29.	ISK	Information System, Kutch (Proposed)
30.	+	In co-ordination with
31.	>	Charge handed over to