

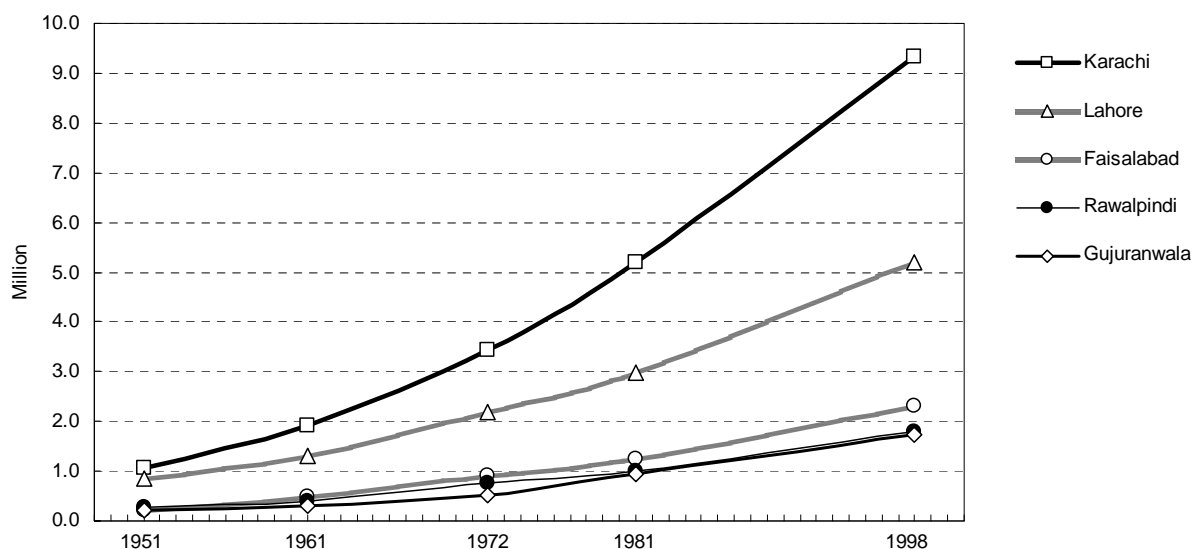
Chapter 3 Analysis of Current Situation

3.1 Socio-economic Analysis

3.1.1 Population

(1) Trends of Population Growth

Figure 3-1-1 shows population trends of major 5 cities in Pakistan, Karachi, Lahore, Faisalabad, Rawalpindi and Gujranwala. The population in Karachi was 430,000 in 1941, 1.07 million in 1951, 1.9 million in 1961. As shown in the chart, population growth level in Karachi has been higher than other cities, especially after 1960'.



Source: Population Census 1998

Figure 3-1-1 Census Population Trends of Major Five Cities in Pakistan

(2) Present Population (1998 Census and estimation in KSDP 2020)

The last population census was conducted in 1998 and there is no population statistics after the census except for some estimated data. According to the 1998 population census results, the population of Karachi was 11,335,000¹.

KSDP-2020 estimated the population growth rate from 1998 to 2005 at 4.2% per year. This is based on the estimate of population growth rate by natural increase as 3.5% per year and the continuous increase in the number of immigrants. In the same way, population in 2010 was estimated at 18.5 million with a growth rate of 4.15% per year from 2005 to 2010.

Table 3-1-1 Estimation of Population in Karachi City

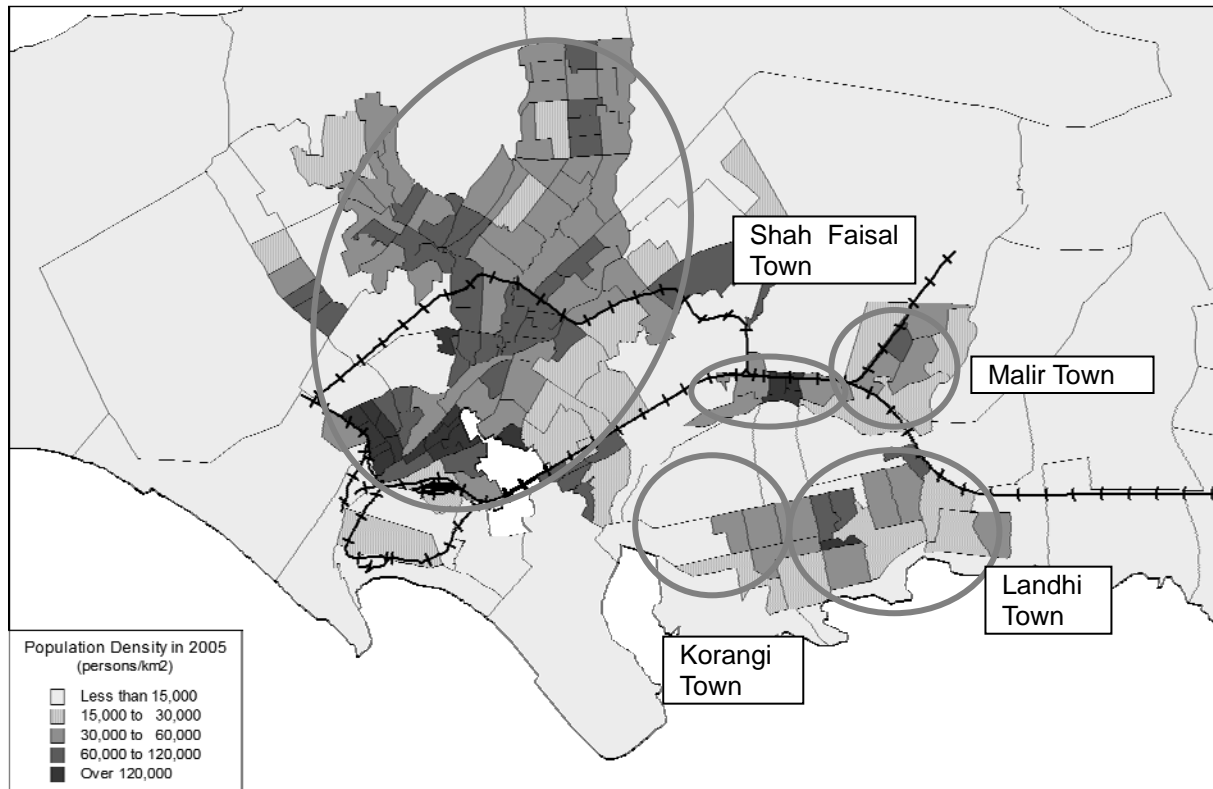
Year	Population	Average Annual Increase Rate
1998	11,335,000	4.68%
2005	15,120,000	4.20%
2010	18,529,000	4.15%

Source: KSDP-2020

¹ While the population figure in the 1998 census was 9,960,000, the numbers of residents of kachi abadis and the number of immigrants (especially from Afghanistan and Bangladesh) were underestimated. In the KSDP-2020, the scale of the underestimation was estimated at 1,375,000 and population of Karachi in 1998 was modified to 11,335,000.

(3) Population by UC

The distribution of the population by Union Council (UC) in Karachi is shown in Figure 3-1-2. It is clear that the continual urban area extends from the Karachi Port to the north. The population concentration is also high in Shah Faisal Town, Malir Town, Korangi Town and Landhi Town in the eastern part of the city.



Source: Prepared by the JICA Study Team based on "Socio-Economic Survey Report 2005, KMP-2020"

Figure 3-1-2 Population Distribution

The base year of the demand forecast in the Study was 2010. Although population by UC in 2010 was estimated in the transport sector report of KSDP 2020, some variations were found between population tables in the same report. The JICA Study Team held discussions with the consultant company that prepared the KSDP 2020 regarding the population estimation and the consultant submitted the revised population projection to CDGK. After careful analysis of the population projection, the JICA Study Team prepared population data by UC as shown in Table 3-1-2.

Table 3-1-2 Projected Population in 2010 by UC

Town Name	UC Name	Population 2010	Town Name	UC Name	Population 2010
Keamari	Butta Village	127,541	SADDAR	Old Haji Camp	121,230
	Sultanbad	101,345		Garden	114,494
	Keamari	103,572		Kharadar	115,069
	Baba Bhit	37,836		City Railway Colony	87,796
	Machar Colony	120,588		Nanak Wara	122,589
	Mauripur	97,973		Gazdarabad	116,673
	Shershar	109,540		Millat Nagar	93,589
	Gabo Pat	63,343		Saddar	96,533
S.I.T.E	Pak Colony	99,899		Civil Lines	81,047
	Old Golimar	79,244		Clifton	69,125
	Jahanabad	80,937		Kehkeshan	86,118
	Pathan Colony	91,952	JAMSHED	Akhtar Colony	102,515
	Frontier Colony	82,454		Manzoor Colony	117,678
	Banaras Colony	114,893		Azam Basti	92,102
	Qasba Colony	106,781		Chanesar Goth	100,571
	Islamia Colony	96,011		Mehmoodabad	98,145
	SITE Limited	101,499		P.E.C.H.S 1	124,767
	Metroville	0		P.E.C.H.S 2	116,162
BALDIA	Gulshan-e-Gazi	108,631		Jat Lane Lines	129,220
	Ittehad Town	114,917		Jacob Lines	122,858
	Islam Nagar	88,654		Jamshed Quarters	118,500
	Nai Abadi	86,996		Garden East	105,906
	Saeedabad	117,514		Soldier Bazar	84,663
	Mohajir Camp	130,824		Pakistan Qurts	84,259
	Muslim Mujahid Col.	107,697	GULSHAN-E-IQBAL	Dehli Mercantile	118,487
	Rasheedabad	109,181		Civic Center	140,146
ORANGI	Azad Nagar	103,754		P.I.B.Colony	102,675
	Haryana Colony	118,403		Essa Nagri	148,632
	Hanifabad	100,640		Gulshan-e-Iqbal 1	109,757
	Muhammad Nagar	116,981		Gillani Railway Sta.	138,312
	Madina Colony	93,021		Shanti Nagar	113,404
	Ghaziabad	109,400		Jamali Colony	111,383
	Chushti Nagar	107,973		Gulshan-e-Iqbal 2	107,227
	Bilal Colony	118,761		Pehalwan Goth	111,849
	Islam Chowk	114,358		Metroville Colony	112,508
	Gabol colony	103,686		Gulzar-e-Hijri	71,603
	Dada Nagar	105,155		Safooran	72,339
	Mujahidabad	96,275	SHAH FAISAL	Natha Khan Goth	100,852
	Baloch Goth	49,274		Pak Sadaat Colony	84,851
LYARI	Agrataj Colony	70,533		Drig Colony	80,173
	Darya Abad	91,512		Reta Plot	77,428
	Naw Abad	69,632		Morio Khan Goth	84,572
	Khada Memon	90,096		Rafah-e-Aam	76,826
	Bhagdadi	87,456		Al falah Society	97,159
	Shahbaig lane	89,731	LANDHI	Muzzafarabad	130,608
	Behar Colony	68,805		Muslimabad	95,608
	Rangiwara	92,809		Dawood Chowrangi	128,883
	Singo Lane	76,458		Moinabad	100,201
	Chakiwara	102,205		Sharafi Goth	85,117
	Allama Iqbal Colony	99,324		Bhutto Nagar	115,769
				Ajmeer Colony	128,096
				Landhi	92,273
				Awami Colony	105,460
				Burmee Colony	113,943
				Korangi	128,063
				Sherabad Colony	129,369

Town Name	UC Name	Population 2010
KORANGI	Chakra Goth	143,636
	Bilal Colony	145,833
	Nasir colony	144,702
	Silver Town	140,850
	100 Qurts	137,877
	Gulzar Colony	147,612
	Korangi 33	144,463
	Zaman Town	142,290
	Hasrat Mohani	138,254
NORTH NAZIMABAD	Paposh Nagar	126,550
	Pahar Gani	78,716
	Khandu Goth	97,092
	Hyderi	107,214
	Sakhi Hassan	108,875
	Farooq-e-Azam	73,686
	Nusrat Butto Colony	72,909
	Shadman	71,134
	Buffer Zone 2	106,173
	Buffer Zone 1	74,716
NEW KARACHI	Kalyan	84,973
	Sir Syed	80,125
	Fatima Jinnah Colony	99,060
	Godhra	125,638
	Abu Zar Gaffari	78,778
	Hakim Ahsan	72,863
	Madina Colony	110,981
	Faisal	105,583
	Khamiso Goth	107,046
	Mustafa Colony	103,397
	Khawaja Ajmer	96,178
	Gulshan Said	74,576
	Shah Nawaz Bhutto	86,989
	Azizabad	123,859
GULBERG	Karimabad	84,028
	Aisha Manzil	114,497
	Ancholi	116,559
	Naseerabad	126,764
	Yaseenabad	89,315
	Water Pump	81,509
	Shafiq Mill Colony	101,611
LIAQUATABAD	Rizvia Society	96,777
	Firdous Colony	94,162
	Super Market	80,384
	Dak Khana	84,258
	Qasimabad	103,143
	Bandhani Colony	82,859
	Sharif Abad	93,540
	Commercial Area	96,428
	Mujahid Colony	103,421
	Nazimabad No 1	81,768
	Abbasi Shaheed	85,267

Source: JICA Study Team

Town Name	UC Name	Population 2010
MALIR	Model Colony	123,714
	Kalaboard	117,002
	Saudabad	116,433
	Khokrapar	113,135
	Jaffar Tayyar	106,730
	Garibabad	104,508
	Gazi Brohi	99,212
BIN QASIM	Ibrahim Hyderi	50,291
	Rehri	74,409
	Cattle Colony	94,968
	Quaidabad	125,643
	Landhi	63,236
	Gulshan-e-Hadeed	49,532
	Ghaghar	59,687
GADAP	Murad Memon	58,337
	Darsanno Channo	49,983
	Gadap	49,825
	Gujjiro	79,135
	Songal	63,545
	Yusuf Goth	66,548
	Maymarabad	82,200
	Manghopir	88,617
Karachi Cantonment	Ward-I	14,525
	Ward-II	52,359
	Ward-III	18,812
	Ward-IV	2,699
Clifton Cantonment	Phase-I	41,449
	Phase-II	41,508
	Phase-IV	41,178
	Phase-VII	55,517
	Phase-V	128,034
	Phase-VI	158,786
	Phase-VIII	14,458
	Non-DHA	78,105
Faisal Cantonment	Sector-I	32,744
	Sector-II	22,097
	Sector-III	27,671
	Sector-IV	38,340
	Naval Area	92,211
	CAA	23,933
	PAF_Faisal	10,534
Malir Cantonment	Malir Military Area	119,913
	Malir Civil Area	85,898
Manora Cantonment	Manora	10,008
Korangi Cantonment	Bhittai Colony	14,693
	Korangi Industrial	13,694
	PAF Korangi	19,093

(4) Extension of Urbanized Area

1) Before partition

The origin of Karachi City consisted of 4 areas, one old pre-British city and post-British suburbs, second, Saddar shopping area, third the area between these two (administrative/civic buildings and educational), and four Lyari & Machi Miani. Its population was 450 thousand at the time.

2) During 1950's

Urbanization expanded to the north and east bounds, including Jamshed, Liaquatabad, North Korangi, Shah Faisal, and Malir. Its population exceeded one million in 1951 and reached 1,910 thousand in 1961.

3) 1960's to 1980's

During these two decades, urbanization was very significant beyond the area surrounded by KCR and built-up area covered the area 25 km in east-west and 15 km in north-south.

4) Until 2000

Continuous urbanization towards all the directions after 1980's formulated one of the biggest mega-cities in the world with its population reaching nearly 10 million.

5) Beyond 2000

Strong migration pressure into Karachi remained a main stay and still continuing, resulting in a 16 million population metropolis with densely urbanized area of 80,000 ha.



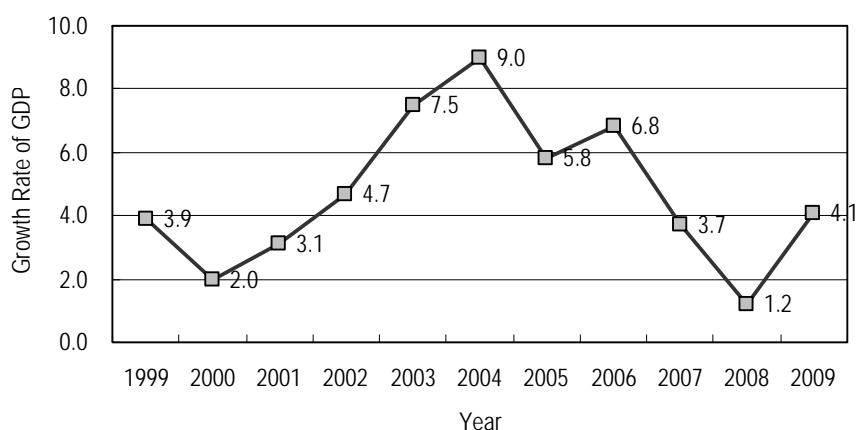
Source; JICA Study Team

Figure 3-1-3 Karachi, Historical Urbanization Trends

3.1.2 Economic Situation

(1) Pakistan's Economy

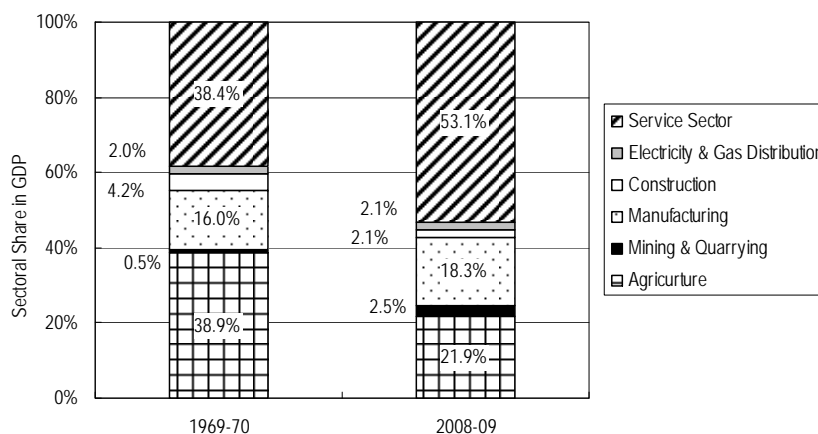
Pakistan's GDP has steadily grown each year throughout the last 50 years or so. Figure 3-1-4 shows the GDP growth rate in the last 10 years. Pakistan's economy, which had been steady since FY 2000/01 (July, 2000 to June, 2001), faced a serious crisis in 2008 due to a decline of direct foreign investment in the face of political chaos, sharp decrease of the foreign reserves as a result of international price hikes of foodstuffs and fuel and increase of the fiscal deficit on top of the traditionally weak economic base. An agreement reached in November of the same year for Pakistan to receive an IMF loan of US\$ 7.6 billion (an additional loan of US\$ 3.2 billion was approved in August, 2009) has bailed Pakistan out of this crisis for the time being. However, the subsequent slowdown of economic growth due to recession and adoption of the austerity measures of cutting the development budget and subsidies to reduce the scale of the fiscal deficit are now causing concern in regard to the aggravation of poverty and medium to long-term adverse impacts on social development.



Source: Ministry of Finance, Federal Bureau of Statistics

Figure 3-1-4 Growth Rate of GDP

Figure 3-1-5 shows the share of Pakistan's GDP by sector in 1969-70 and 2008-09. The service sector accounts for more than half with 53.1% (FY 2008/09). Compared to the figure for FY 1969/70, the decline of the agricultural sector is conspicuous (38.9% → 21.9%), suggesting a shift towards an urban type industrial composition.



Source: Pakistan Economic Survey

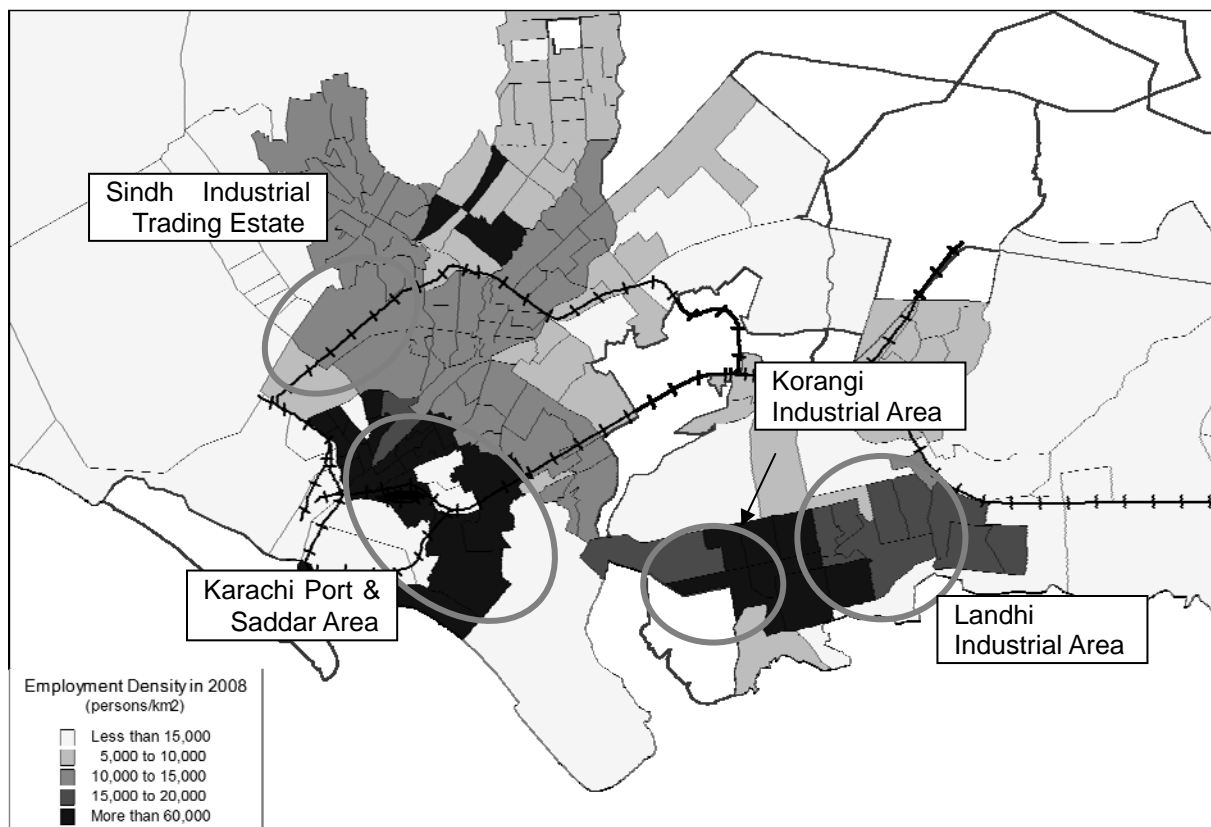
Figure 3-1-5 Sectoral Share of GDP

(2) Economic Characteristics of Karachi City

Although there are no official Pakistani statistics for the GDP by city, the UK Economic Outlook published by Price Water House Coopers in November, 2009 estimates that the GDP of Karachi City in FY 2008/09 was US\$ 8.9 billion. According to this Outlook, the second and third largest cities in Pakistan in terms of the GDP are Lahore (US\$ 4.0 billion) and Faisalabad (US\$ 1.4 billion), illustrating Karachi City's dominant position by far.

Karachi is the financial and commercial capital of Pakistan; it generates approximately 53.38% of the total collections of the Federal Board of Revenue, out of which 53.33% are customs duty and sales tax on imports¹. Karachi produces about 30% of value added in large scale manufacturing² and 20%³ of the GDP of Pakistan.

The size of the working population by UC is shown in Figure 3-1-6. Like the population distribution, there is a continual concentration area of the working population from the Karachi Port to the north. The size of the working population is also high in areas around the Port of Karachi & Saddar, Sindh Industrial Trading Estate, Landhi Industrial Area and Korangi Industrial Area.



Source: Prepared by the JICA Study Team based on "Socio-Economic Survey Report 2005, KMP-2020"

Figure 3-1-6 Working Population Distribution

¹ "Federal Board of Revenue Year Book 2006-2007". <http://www.cbr.gov.pk/YearBook/2006-2007/FBRyearbook2006-2007.pdf>.

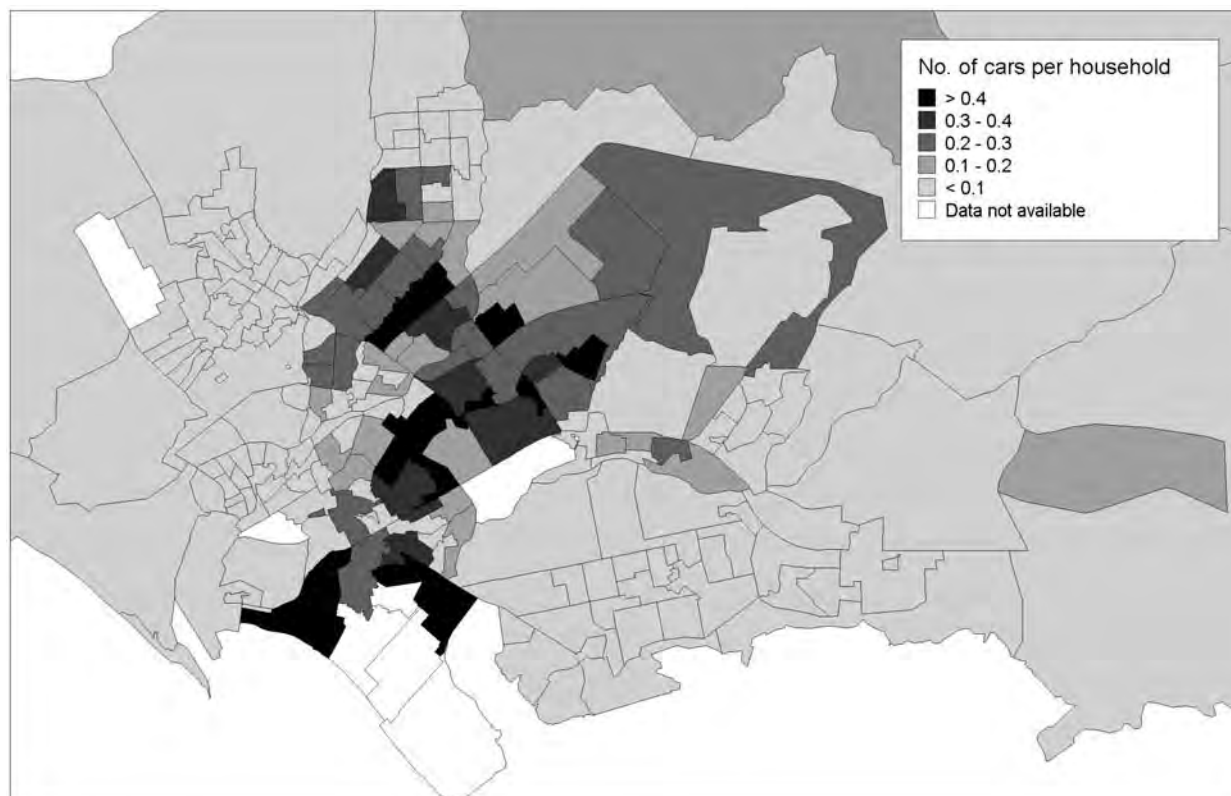
² Pakistan and Gulf Economist. "Karachi: Step-motherly treatment". <http://www.pakistaneconomist.com/database2/cover/c99-15.asp>.

³ Asian Development Bank. "Karachi Mega-Cities Preparation Project". <http://www.adb.org/Documents/Produced-Under-TA/38405/38405-PAK-DPTA.pdf>.

3.1.3 Car Ownership

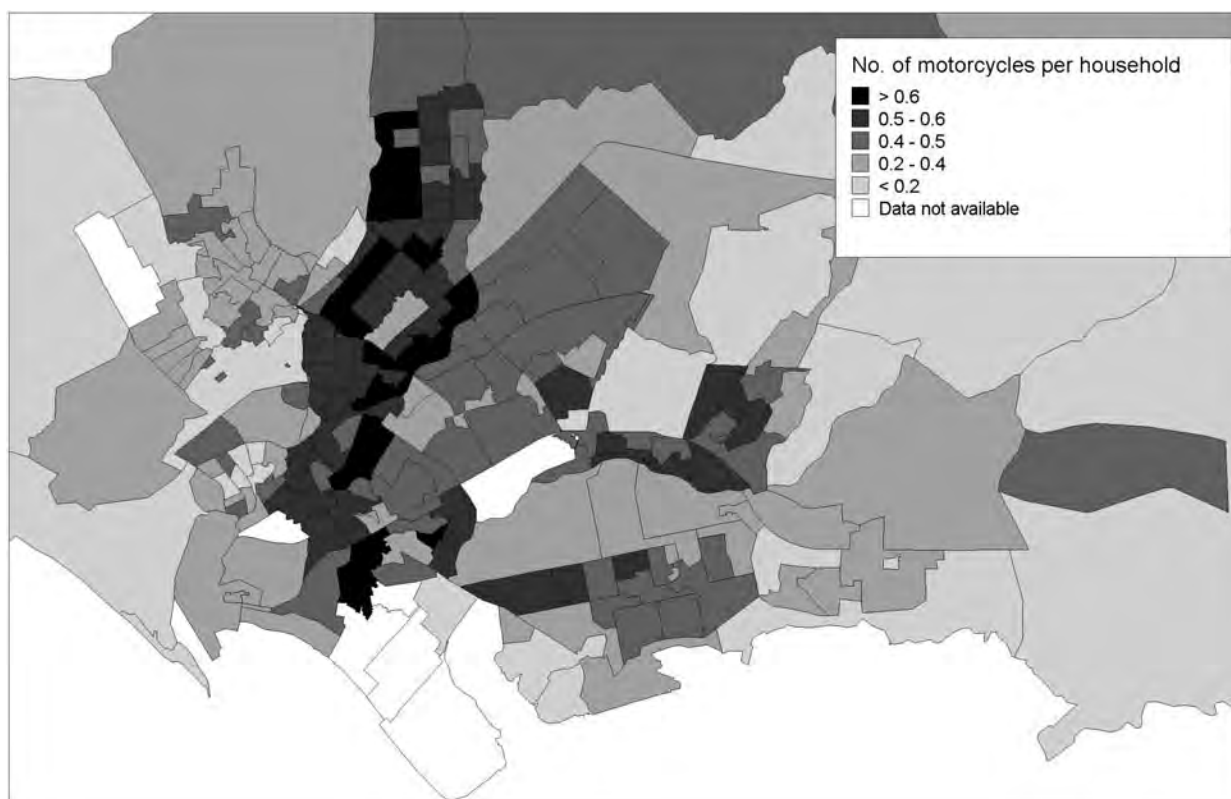
According to the HIS in KTIP, the number of cars accounts for 12.7% of that of households. Car ownership rate is high in DHA areas although the sample size is not enough to calculate the details by Phase in Clifton Cantonment. Figure 3-1-7 shows the car ownership by UC. The difference in the car ownership by Town is very large. The car ownership rate is high in Saddar, Jamshed, Gulshan-e-Iqbal, Gulberg, and North Nazimabad. In some UCs, car ownership rate exceeds 40%.

The number of motorcycles accounts for 42.3% of that of households. As shown in Figure 3-1-8, households with high motorcycle ownership spread along the north-south corridor of Saddar, Jamshed, Liaquatabad, North Nazimabad, and New Karachi.



Source: HIS in KTIP

Figure 3-1-7 Car Ownership by UC



Source: HIS in KTIP

Figure 3-1-8 Motorcycle ownership by UC

3.1.4 Electric Power

Water Resources and Power Development Authority (WAPDA) and Karachi Electric Supply Company (KESC) are the major power suppliers in Pakistan. Independent Power Plants (IPPs) also contribute additional power generation under Build-Own-Operate (BOO) base.

Electricity in Karachi is produced and supplied by KESC, which has the exclusive license to supply electric power to Karachi and the adjoining area. Presently, KESC has its own power plans with the total available capacity of 1351 MW as shown in the table below.

Table 3-1-3 Power Plants of KESC

No.	Name	Location	Capacity
1	Bin Qasim Power Station	Port Qasim Industrial Area	1,021
2	Korangi Thermal Power Station	Korangi Creek	55
3	GEJB-1	SITE	80
4	GEJB-2	Korangi Industrial Area	35
5	Combined Cycle Power Station	Korangi Creek	160
		Total	1,351

Source: www.kesc.com.pk

In addition to the generated power through its own plants, KESC purchases 1,000 MW of electricity from WAPDA, Independent Power Plants (IPP), and Aggreko Rental Power Plant. The total capacity provided by KESC amounts to 2,350 MW.

Load shedding of several hours is observed in a large part of Karachi except for some industrial area. It is said that the demand in power is larger than the generation capacity of KESC. The huge gap in demand and supply is one of the country wide issues. To save the energy, Saturdays became holidays in summer season in 2010. In addition, the Government of Pakistan (GOP) ordered retail market to close their shops after 8 p.m. in 2010.

Bin Qasim Power Station -II (BQPS-II) of KESC is planned to start operation in 2012, which will increase the capacity by 560MW and the total capacity of KESC's power plants will reach 1,911 MW.

Domestic use accounts for 34% of the power demand for KESC, while industrial use accounts for 26.7% as shown in Table 3-1-4. With increase in GDP, electricity demand will increase, especially for domestic use. The report of the table source forecasted the future power sales would become 38,972 GWh in 2020-21, and 81,654 GWh in 2030-31, which is 3 times the present demand (2009-10) and 6.4 times, respectively.

Table 3-1-4 Power Sales by Demand Category (KESC: 2009-10)

	Domestic	Commercial	Industrial	Self Generation	Others	Total
GWh	4,316	1,091	3,387	2,797	1,111	12,702
%	34.0%	8.6%	26.7%	22.0%	8.7%	100%

Source: Electricity Demand Forecast, Planning Power NTDC, Feb 2011

3.2 Land Use

3.2.1 Land Use Survey

(1) Outline of the Survey

Land Use Survey is important and basic data for working on the Land Use Plan Master Plan. Land use survey is advanced along with the collection and review of existing reference materials and data to clarify the current situation of land use. The objective was to establish the existing land use data as of 2010 based on the findings of the Land Use Survey (2006) which was the baseline survey for the Karachi Strategic Development Plan - 2020 (KSDP-2020). This survey covered an area of approximately 364,800 ha.

(2) Collection of Reference Materials and Data

For the purpose of land use analysis, existing reference materials and data relating to land use have been collected. The current land use situation in Karachi City was established with reference to these materials and data.

List of Existing Reference Materials

- Land Use Survey Report Karachi City District (2006)
- GIS data in the Land Use Survey Report (2006)
- Karachi Master Plan-2020 (2007)
- Karachi Strategic Development Plan-2020 (2007)
- Report on High Density Zones by Architects Committee for KBCA (2009)
- GIS data of the Karachi GIS Project (2009)

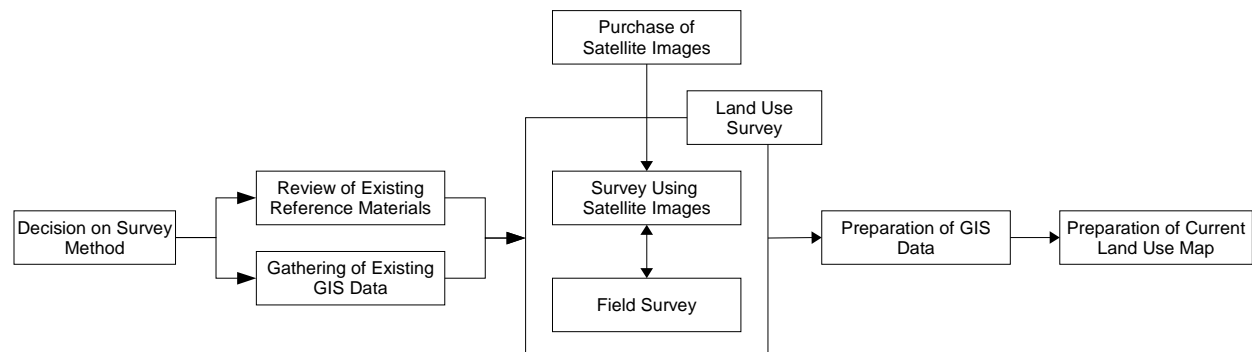
(3) Survey Method

It was decided to conduct this review by means of analysing satellite images and conducting a land use field survey. In regard to the former, the latest satellite images (April, 2010) were compared with those taken for the KMP 2020 to verify changes of the land use from the standpoints described below.

This work was followed by a field survey in areas where changes were verified by the satellite images. The results were then used to prepare GIS data maps.

Key Points of Land Use Analysis: Changes since the Previous Survey

- Expansion of urban areas
- Changes of the land use in existing urban areas



Source: JICA Study Team

Figure 3-2-1 Flow of the Land Use Analysis

Specifications of Satellite Images

- Type: QuickBird 0.61 meter satellite image
- Coverage: Karachi City District
- Data format: Geo Tiff

The current land use is checked using the satellite images for GIS mapping. The results are then used to prepare a GIS data map.

(4) Land Use Categories

The land use categories used in the Land Use Survey (2006) are mostly followed by the latest land use analysis as shown in Table 3-2-1. These are broad land use categories mutually agreed by MPGO. In this survey, the application of land use category was executed for Built up. For example, DHA phase VIII in Clifton Cantonment which is almost vacant area is “Vacant” in this survey to “Residential” on previous survey in 2006.

Moreover, this category corresponds to the land use classification indicated in Chapter 19 of Karachi Building & Town Planning Regulations 2002.

Table 3-2-1 Land Use Categories

No.	Categories for Survey	Categories for Analysis	
		Class 1	Class 2
1	Residential	Building lot	Residential
2	Residential (Semi-Pucca Houses)		
3	Residential (Katchi Abadis)		
4	Commercial (Shops & Offices)		Commercial
5	Small & Cottage Industries		Industrial
6	Industrial		
7	Ware Housing		
20	Mining/Quarries		Mixed Land Uses
8	Mixed Land Uses		
9	Goth/Village		
10	Education		Institutional
11	Health		
12	Assembly Places (Social & Cultural Institution)		
13	Religious Places(All Religious institutions)		Religious
14	Government Offices		Governmental
15	Local Govt. Offices		
16	Transport Terminals & Communications		
17	Transportation/Rights of Way	Infrastructure	Infrastructure
18	Utilities/Amenities		
19	Parks & Play Ground		
21	Agriculture	Agriculture	Agriculture
22	Irrigation		
23	Water Bodies /Flood Channels	Water Bodies	Vacant Land Including Water Bodies
24	Vacant Developed Land	Vacant	
26	All Other Vacant Land		
27	Restricted Area	Restricted Area	Restricted Area

Source: Land Use Survey(2006)

3.2.2 Current Situation of Land Use (2010)

(1) General situation of Land Use (Class 1)

In Karachi City, the actual use of land has been primarily spreading around Saddar Town which forms the hinterland of the Port of Karachi. In general, vacant land is the largest land use category in Karachi City. Such vacant land especially dominates the perimeter areas of Gadap Town, Bin Qasim Town and Keamari Town. In areas where land use other than vacant land is noticeably observed. Building lot such as residential, Commercial, Industrial use etc. is the most prominent, accounting for some 15%, followed by agricultural use at 8%, infrastructural use such as roads at 6%.

Table 3-2-2 Land Use by Categories (Class 1), 2010

Categories	Area(ha)	Area(%)
Building lot	55,500	15%
Infrastructure	20,400	6%
Park	1,800	0.5%
Agricultural	29,100	8%
Restricted Area	1,800	0.5%
National Park	73,000	20%
Water Bodies	16,400	4%
Vacant	166,800	46%
Total	364,800	100%

Source: Land Use Survey (2010)

(2) Detail situation of Land Use (Class 2)

According the results of detailed situation of Land Use excluding the National Park, Water Bodies and Vacant area, the Major land use of Karachi city is predominantly residential and covers an area of about 30% of urbanized area.

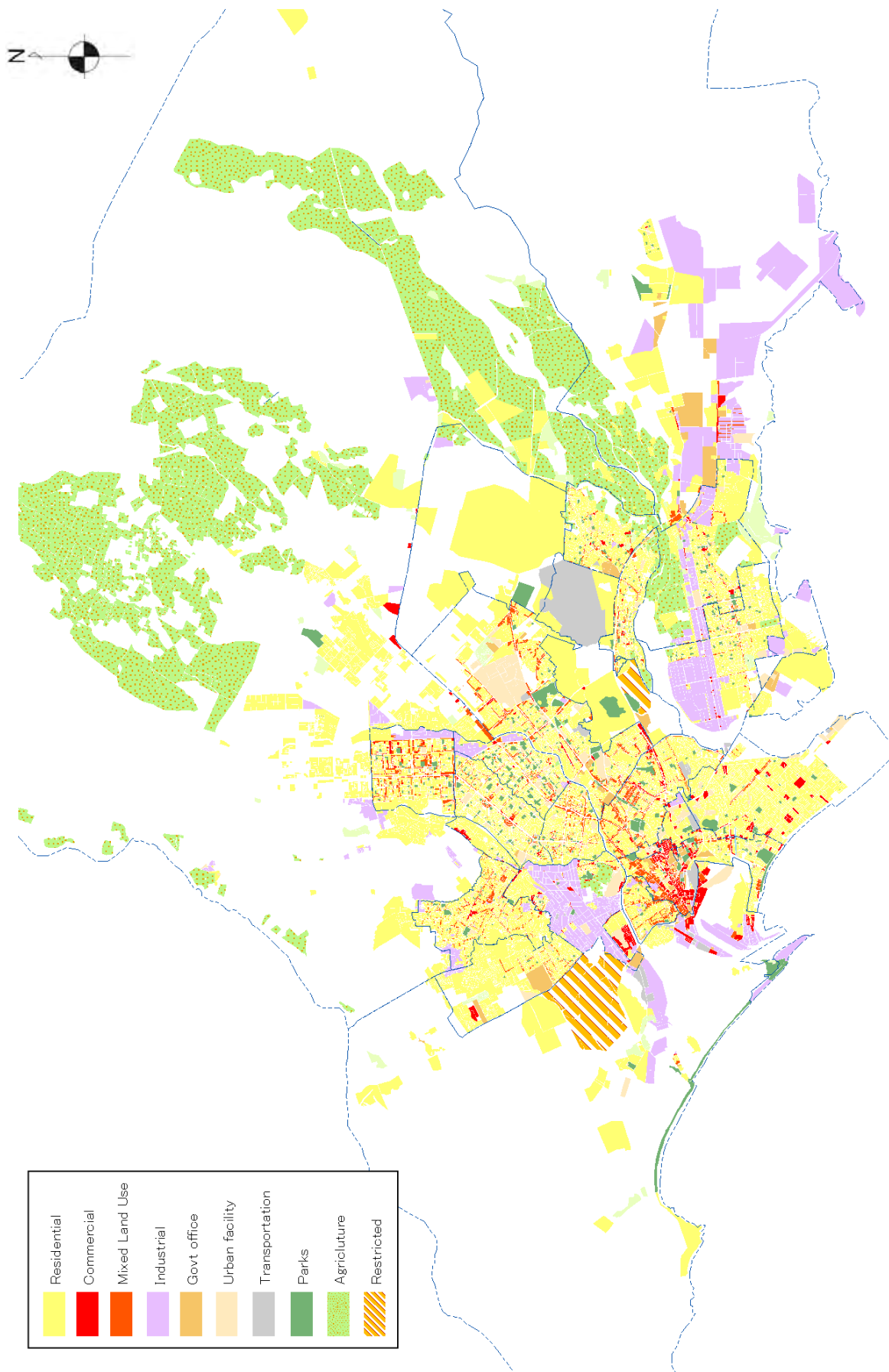
Further, Infrastructure such as Roads, Air port occupies about 26%. Industrial land use and Government offices land use is 11%. The area percentage is less than around 2% for both commercial use and mixed land use¹ (0.7%).

Table 3-2-3 Land Use by Categories (Class 2) , 2010

Categories	Area(ha)	Area(%)
Residential	32,600	41%
Commercial	1,100	1%
Mixed Land Use	1,700	2%
Industrial	8,800	11%
Govt office	8,800	11%
Urban facility	2,600	3%
Infrastructure	20,400	26%
Parks	1,800	2%
Restricted Area	1,800	2%
Total	79,600	100%

Source: Land Use Survey (2010)

¹ * Mixed land use is either residential and commercial use or residential and industrial use.



Source: Land Use Survey in KTIP (2010)

Figure 3-2-2 Current Land Use Map (2010)

(3) Characteristics of Land Use

1) Residential Land Use

In Karachi City, urbanisation is progressing from the old quarter to the area around the Port of Karachi. The inner city area (incorporating all towns except Gadap Town, Bin Qasim Town and Keamari Town) has been almost entirely urbanised. Systematic residential development is in progress in the Clifton cantonment (DHA) area near the city centre. In contrast, vacant land is conspicuous at urban planning sites in such towns as Gadap and Keamari located away from the city centre.

2) Commercial Land Use

The Central Business District (CBD) is formed by Saddar Town and neighboring Keamari Town and Jamshed Town and is an area of concentrated commercial and business activities. The main municipal administration buildings are also located in the CBD, Keamari Town and Saddar Town accounts for 39% of the land area for commercial use in the city. The third towns in the area table of commercial land use are Clifton Cantonment (12%). In other towns, the commercial use of land is primarily observed along main roads.

3) Industrial Land Use

Industrial land use is primarily observed in the hinterland of the Port of Karachi and Port of Bin Qasim, SITE Town, Korangi Town and Landhi Town.

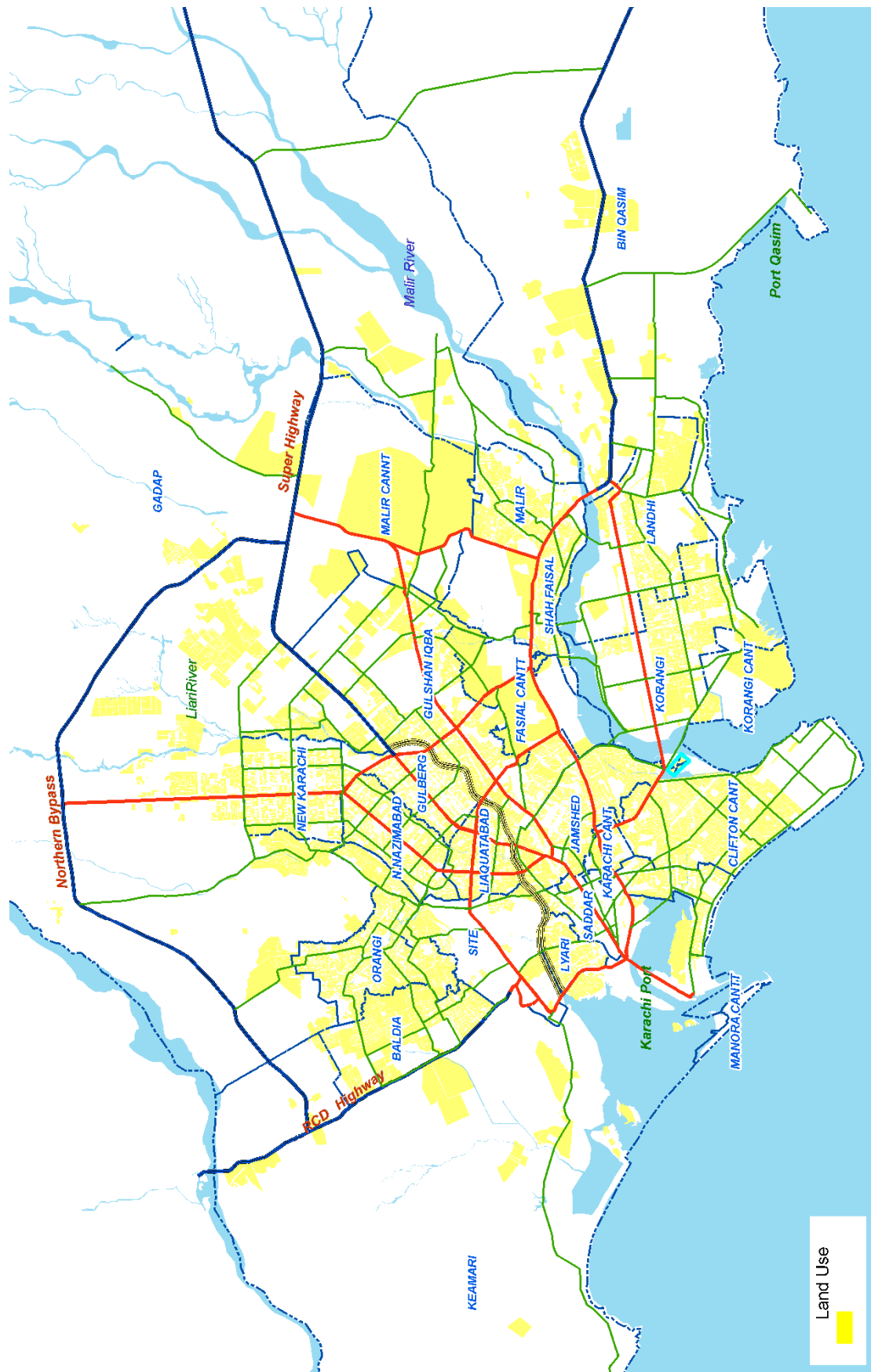
In Bin Qasim Town, industrial land use is observed in the hinterland of the Port of Bin Qasim and the total land area for industrial use in this town accounts for 46% of the total municipal area for industrial land use. SITE Town has factories of Siemens, Coca-Cola Beverages and other well-known manufacturers. The Karachi industrial area and Landhi industrial area are formed on the left bank of Malir River. Other industrial areas in Karachi City are found in the hinterland of the Port of Karachi and on the right bank of Lyari River.

4) Commercial Land Use

The Central Business District (CBD) is formed by Saddar Town and neighbouring Keamari Town and Jamshed Town and is an area of concentrated commercial and business activities. The main municipal administration buildings are also located in the CBD and Saddar Town accounts for 26% of the land area for commercial use in the city. The second and third town in the area table of commercial land use are Keamari Town (15.4%) and Jamshed Town (6.8%). In Gadap Town, clusters of commercial land are observed along the Super Highway. In other towns, the commercial use of land is primarily observed along main roads.

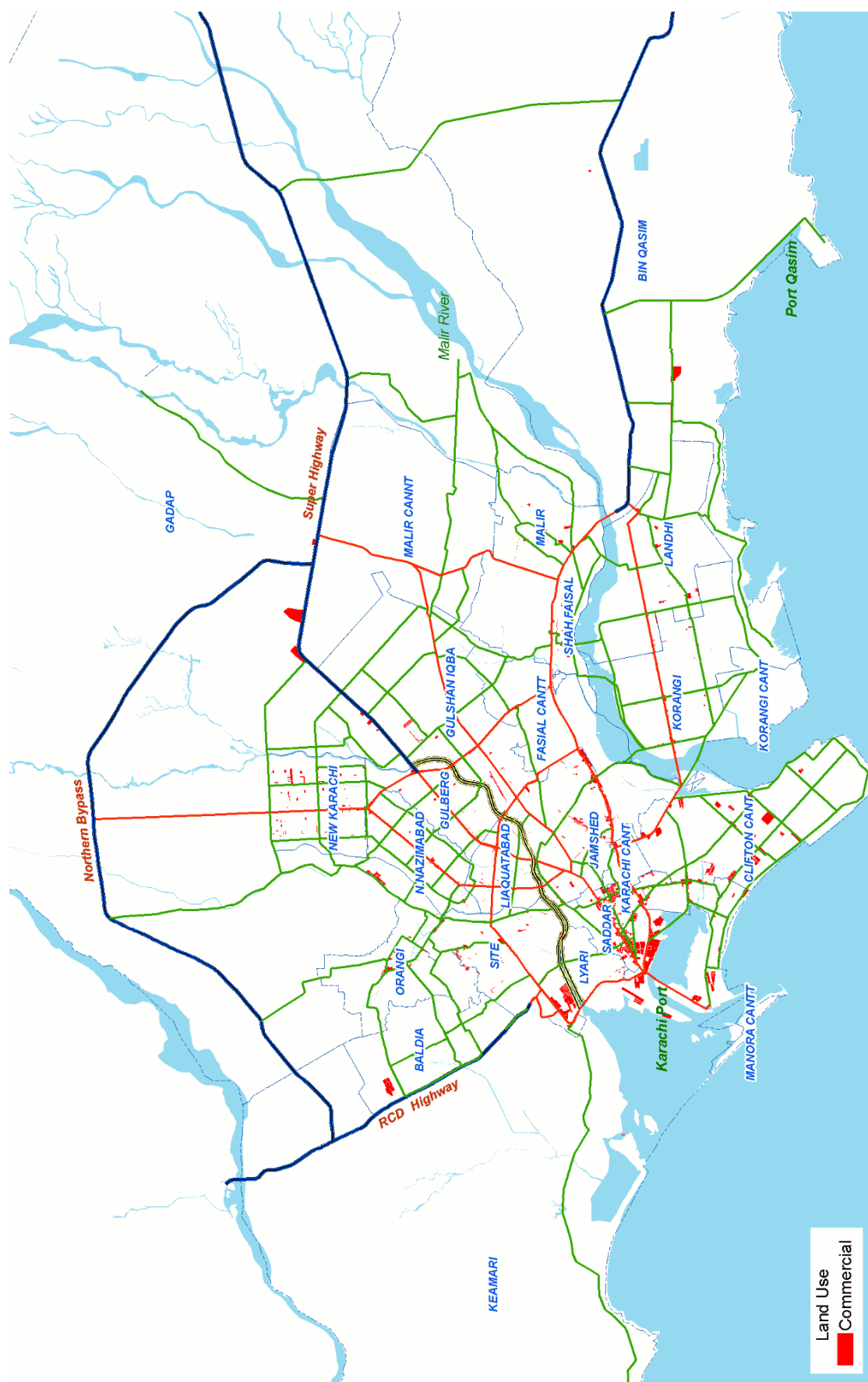
5) Agricultural Land Use

Agricultural land use in Karachi City is primarily observed in Gadap Town and areas along Malir River.



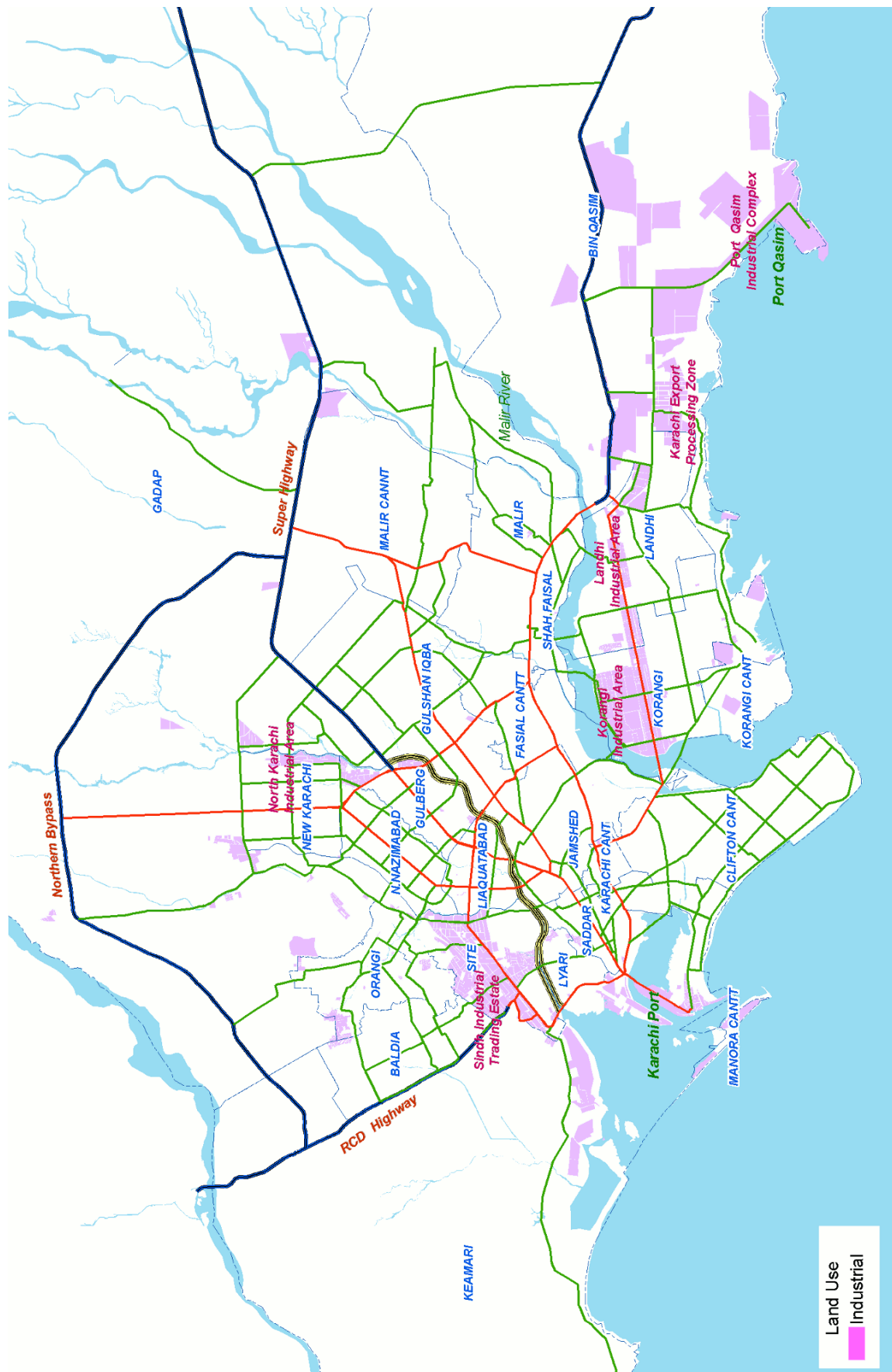
Source: JICA Study Team

Figure 3-2-3 Residential Land Use (2010)



Source: Land Use Survey (2010) in KTIP

Figure 3-2-4 Commercial Land Use (2010)



Source: Land Use Survey (2010) in KTIP

Figure 3-2-5 Industrial Land Use (2010)

(4) Characteristics of Town wise Land Use

Following is the summary of land use characteristics by 18 Towns ship.

1) Keamari Town

According to the land use survey, major portion of the area in Keamari Town is lying vacant. Total vacant land is about 90% of the total area. Residential Land use is only 5%.

2) S.I.T.E Town

The major area of SITE town is used for industrial purposes that is about 50 of total area. This town is representative of industrial area in Karachi city. Many large factories like Siemens, Coca-Cola Beverages and other well-known manufacturers are located in the industrial estate.

3) Baldia Town

Major portion of the town is for Residential purposes that is over 70% of the urbanized area. But, there is major concentration of kachi abadis in this town. It is seen that there are about 40 kachi abadis in this town covering an area of around 50 % of residential land use.

4) Orangi Town

Major portion of the area is used for residential purposes which is about 80% of a urbanization area.

5) Lyari Town

Major land use of Lyari town is residential and covers an area of around 70% of the urbanized area. However, around 50 % of residential land use is formed by kachi abadi. Due to the concentration of kachi abadi, population density is very high. Second largest landuse area is the mixed land use occupying an area of about 20%.

6) Saddar Town

Major portion of the area in this town is for commercial purpose constituting the Central Business District of Karachi City is constituted. The CBD plays the role of the financial center in Pakistan. The main service industry located here dominated by finance institutions such as National bank, stock market and headquarters of major enterprises are located here.

Most of federal and provincial offices are also located in this town with Saddar as the commercial and administration hub of Karachi city.

7) Jamshed Town

Major land use of Jamshed town is residential and covers an area of around 70% of the urbanized area. However, around 30 % of residential land use is formed by kachi abadis. Commercial and Mix land use trend is observed along Shahra-e-Faisal Road.

8) Gulshan-e-Iqbal Town

Major land use of Gulshan-e-Iqbal town is residential and covers an area of around 40% of the urbanized area of the town. This town has the feature of being University town due to the fact that eight Universities are located within it.

9) Shah Faisal Town

Major land use of Shah Faisal town is residential and covers an area of around 60% of a urbanization area.

10) Landhi Town

Landhi Town is one of the industrial towns and covers an area of around 15% of the urbanization area. Total residential area including kachi abadis is around 40% of the

urbanized area. However, a lot of kachi abadis in the city also exist.

11) Korangi Town

Korangi Town is one of the industrial towns and covers an area of around 30% of the urbanization area. The relative area allocated to industry is significant to the town's role in the city.

12) North Nazimbad Town

Major land use of North Nazimbad town is residential and covers an area of around 70% of the urbanized area.

13) New Karachi Town

Major land use of New Karachi town is residential and covers an area of around 60% of the urbanized area. Industrial land use is about 10% as New Karachi industrial area.

14) Gulberg Town

Major land use of Gulberg Town is residential and covers an area of around 50% of the urbanization area. Industrial land use occupies about 15% as New Karachi industrial area.

15) Liaquatabad Town

Major land use of Liaquatabad town is residential and covers an area of around 70% of the urbanized area in the town. The population density is very high following Lyari town.

16) Malir Town

Major land use of Malir town is residential and covers an area of around 50% of the urbanized area in the town. Approximately 20% of the area is for agriculture purposes.

17) Bin Qasim Town

The major area of Bin Qasim town is presently being used for industrial purposes, and industrial development is continuing as hinterland of Bin Qasim port.

(5) Major land marks by town

Major and distinguishable land marks of Karachi city includes the Civic center, National Cricket Stadiums, Karachi and NED engineering University, Safari Park in Gulshan Town. Zoological Garden in Garden West Area, International Air Port in Malir cantonment area, City and Cantt in Karachi cantonment areas. New Subzi Mundi in Gadap Town, Karachi Port in Keamari Town, Hawkes Bay, Sands Pit Beaches in Keamari Town and Sea view beach in Clifton cantonment area. The detail listing of important city Land Marks are given below.

Table 3-2-4 Major Land marks

Town	Land Mark
KEAMARI	Karachi Port, Sandspit and Hawksbay Beaches, Manora Island,
S.I.T.E	Gatter Baghecha, Siemens, Habib Bank Chowrangi,
BALDIA	Muhajir Camp, Police Training Institute, Murshid Hospital,
ORANGI	Banaras Chowk, Metro Cinema, Qatar Hospital,
LYARI	People Football Ground/Stadium
SADDAR	City Railway Station, Memon Mosque, Empress Market, Tower, Bagh-e-Jinnah, Frere Hall, KMC Building, Sindh Assembly, Secretariat, Civil Hospital, Marriot Hotel,
JAMSHED	Zoological Garden (Zoo), Mazar-e-Quaid
GULSHAN-E-IQBAL	National Cricket Stadium, Safari Park, Alladin Park, NED Engineering & Karachi University, ExpoCenter
SHAH FAISAL	Shama Shopping Center
LANDHI	Baber Market, Chirag Hotel
KORANGI	National Refinery, Zoo, Industrial Area,
NORTH NAZIMABAD	Matric & Intermediate Boards Offices, Hyderi Market
NEW KARACHI	Nagan Chowrangi, Kala School, Sindhi Hotel,
GULBERG	UBL Sports Complex, Taleeme Bagh, Jinnah Ground,
LIAQUATABAD	Liaquatabad Super Market,
MALIR	Liaquat Market
BIN QASIM	Bin Qasim Port, Steel Mill
GADAP	Baqai Medical University
Clifton cantonment	Sea view Beach, Nisar Shaheed Park, Golf Course, Marina Club
Cantonment	Jinnah International Airport, Cantt Railway Station, Golf Course, Race Course, Maritime Museum, PNS Shifa Hospital, Jinnah Hospital,

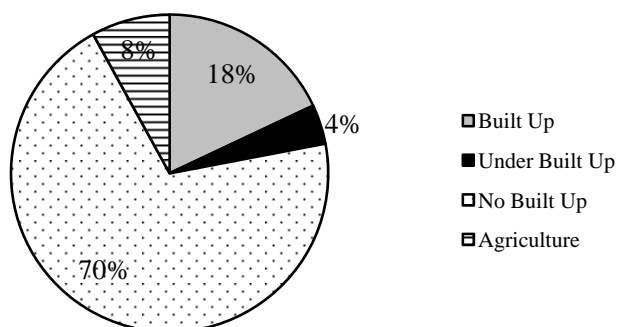
Source: Prepared by the JICA Study Team

3.2.3 Urbanization situation

(1) Current Situation of Built up area

The current situation of urbanization of Karachi city is illustrated in Figure 3-2-6. In the figure, “Built Up Area” means an area where the entire area is fully developed for urban land use, while “Under Built up Area” means an area where vacant areas remain although the area is being urbanized.

The inner city area has been almost entirely built up. Built up area is 18%, under built up area is 4%, Agriculture area is 8%.



Total area: 364,800ha

Source: Estimated from the Land Use Survey in KTIP

Figure 3-2-6 Percentage of Built up area; 2010

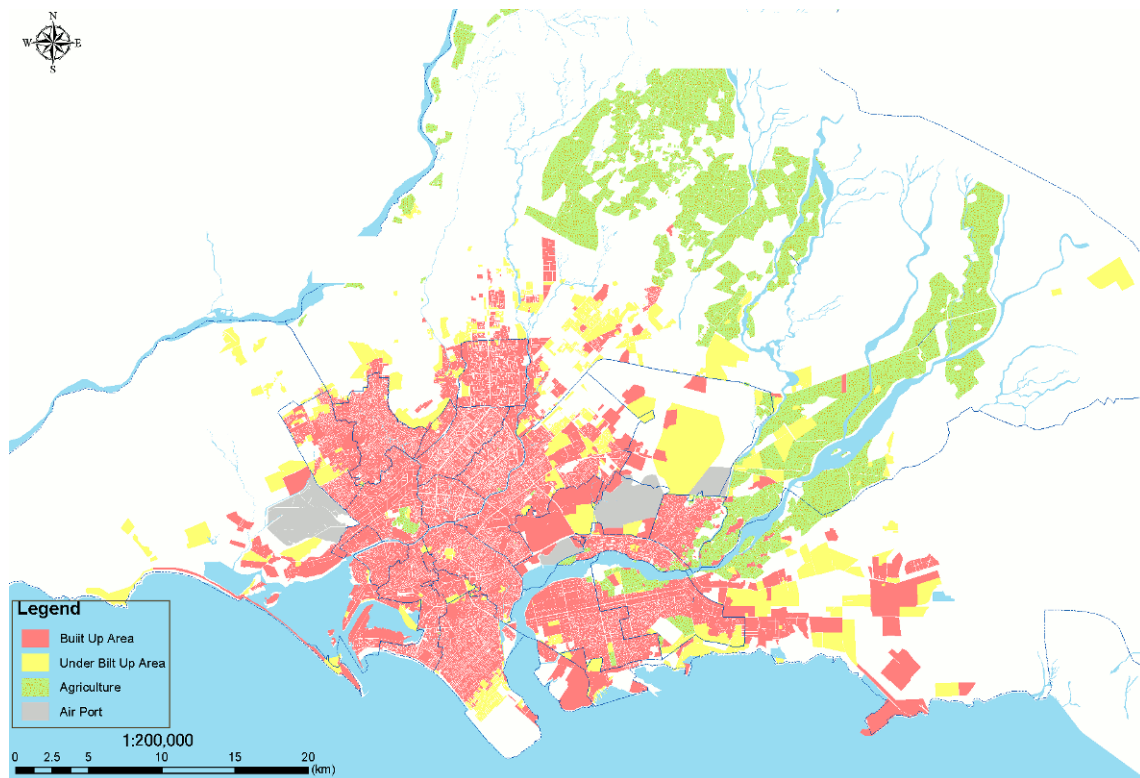
1) Trend of Urbanization

Urban sprawl area from 2005 to 2010 is as follows. The urban sprawl is observed in Gadap town, Bin Qasim town, Clifton cantonment. The built up area has increased by about 10% from 2005 to 2010. The under built up area has increased by about 40% for same five years.

Table 3-2-5 Urban sprawl area from 2005 to 2010

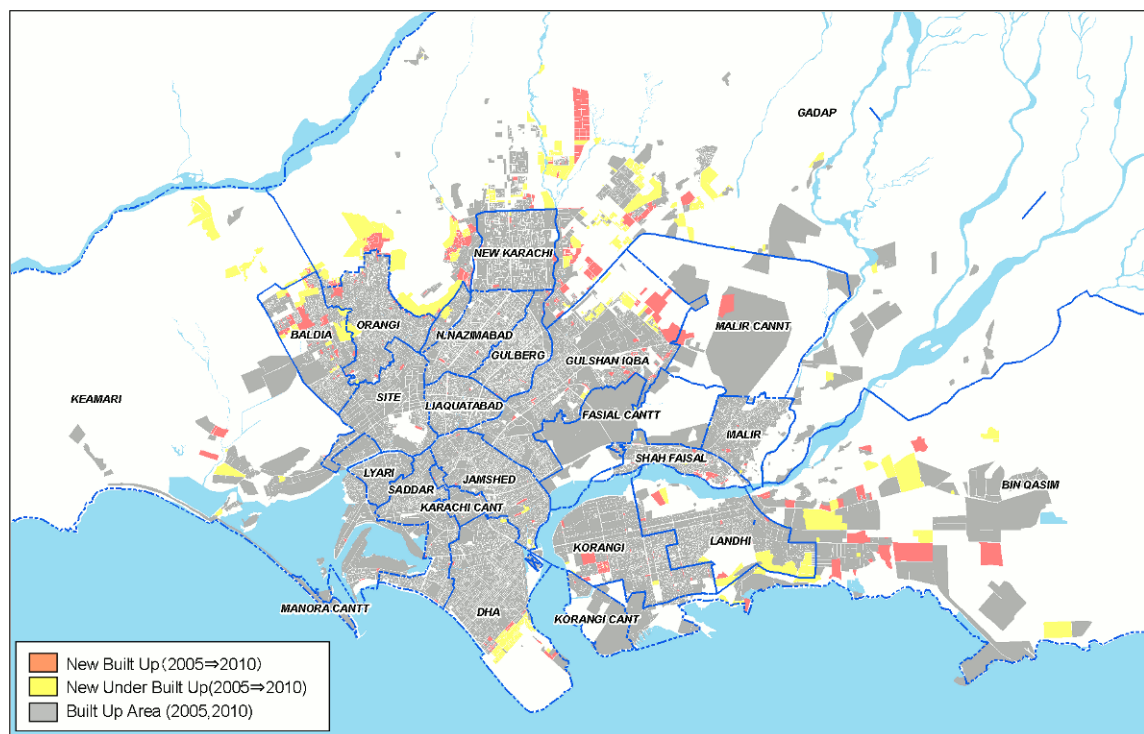
	2005 (ha)	2010 (ha)	2010 /2005
Built Up Area	55,100	64,900	1.18
Under Built Up Area	13,700	14,700	1.07
Total	68,800	79,600	1.16

Source: Estimated from the Land Use Survey in KTIP



Source: Prepared by the JICA Study Team from Land Use Survey in KTIP

Figure 3-2-7 Spreading of Built up area; 2010



Source: Prepared by the JICA Study Team from Land Use Survey in KTIP

Figure 3-2-8 Urban sprawl area from 2005 to 2010

3.3 Urban Transport Facilities

3.3.1 Roads

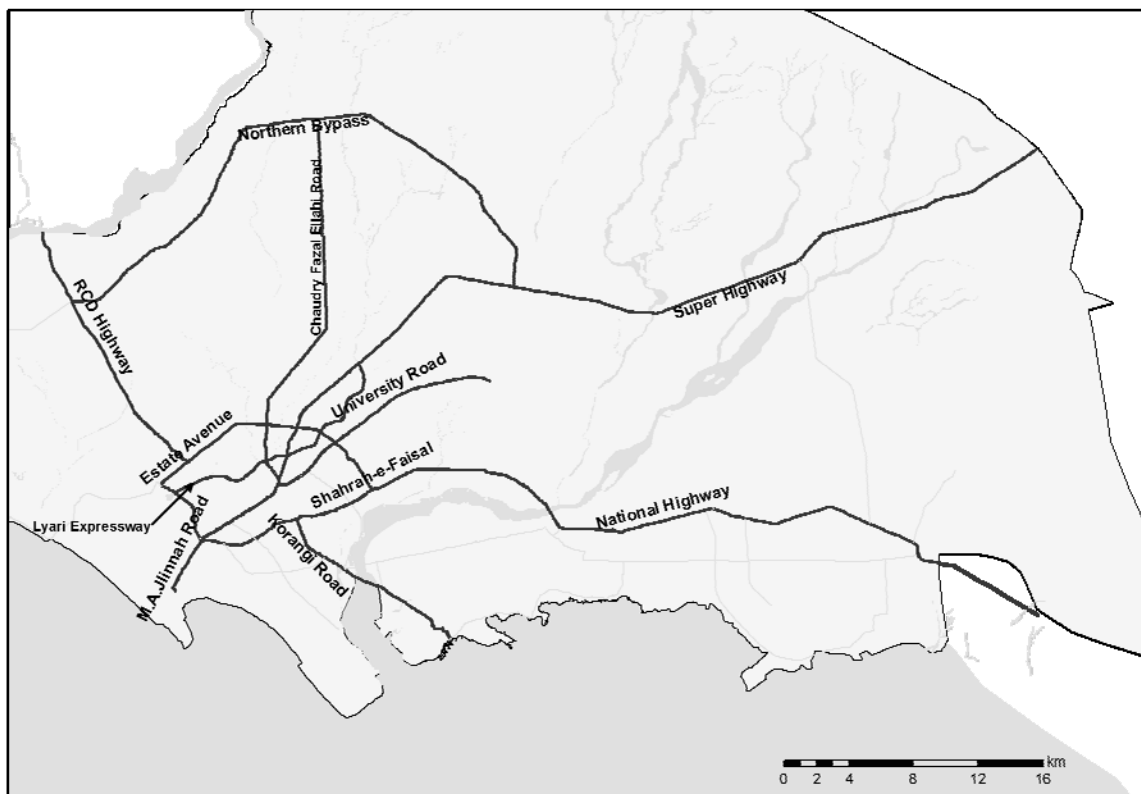
(1) Road Network

1) Overview

Three highways link Karachi to other parts of Pakistan. These are the Super Highway (M-9), National Highway (N-5) and RCD Highway (N-25). The Super Highway extends to Hyderabad while the National Highway extends to Hyderabad-Lahore-Peshawar - Torkham. The RCD Highway links Karachi to Chaman via Quetta.

Karachi has six trunk roads which extend radially from the central area. These are Korangi Road extending south eastwards, Shahrah-e-Faisal Road extending eastwards and connecting with the National Highway, University Road extending north eastwards, M.A. Jinnah Road that connects Shahrah-e-Pakistan Road extending north eastwards and connecting with the Super Highway, Chaudry Fazal Ellahi Road that connects with Nawab Siddiq Ali Khan Road via Nazimabad extending northwards and the RCD Highway extending north westwards via Maripur Road.

Meanwhile, the Lyari Expressway runs along Lyari River from the river mouth at Maripur Road to Shahrah-e-Pakistan. The section on the left bank has been completed, but the section on the right bank is currently only partially completed. The ring road is formed by Karsaz Road / Sir Shar Suleman Road, Hakim Iban-e-Seena, SITE Avenue, Maripur Road, Estate Avenue and others, and is linked to all of the radial roads, including Shahrah-e-Faisal Road and the RCD Highway. The Northern Bypass (M-10) has been built through many of the outer areas of Karachi to connect the RCD Highway with the Super Highway and is primarily used by traffic linking the Port of Karachi with Sindh Province as well as other parts of Pakistan.



Source: JICA Study Team

Figure 3-3-1 Trunk Road Network

2) Road Situation in Urban Karachi

Major roads and grade separated crossings are highly noticeable in urban Karachi. In general, the road width is very generous and such principal arterial roads as Nawab Siddiq Ali Khan Road and Sharah-i-Faisal Road have 6 - 8 lanes. Service roads run parallel to arterial roads in many places.

3) Road Length by Road Category and Town

According to the KSDP-2020, the total length of roads in Karachi City is approximately 10,000 km. By type of road, local roads account for 93%. The combined length of expressways, principal arterial roads and minor arterial roads is less than 5% of the total.

By town, local roads account for more than 95% in Organi, Baldia, North Karachi, Malir and Korangi, meaning that the ratio of trunk roads is low. Meanwhile, the ratio of main roads is relatively high in Saddar and Clifton Cantonment as local roads account for less than 80% in these towns.

Table 3-3-1 Road Length by Road Category and Town

(Unit: km)

Seq.	Town	Expressway	Principal	Minor	Collector	Local		Total
1	Baldia	8.5	0.0	0.0	3.6	409.5	97.1%	421.5
2	Bin Qasim	0.0	46.5	9.4	0.0	414.5	88.1%	470.4
3	Clifton Cantonment	0.0	4.7	12.4	1.4	56.8	75.5%	75.2
4	Defence	0.0	4.2	9.5	32.0	472.5	91.2%	518.2
5	Gadap	38.1	29.1	10.2	4.1	1,444.5	94.7%	1,525.9
6	Gulberg	5.9	9.3	0.0	6.4	276.0	92.7%	297.6
7	Gulshan-e-Iqbal	0.0	14.0	16.2	19.7	671.3	93.1%	721.1
8	Jamshed	4.6	9.9	7.8	13.5	524.2	93.6%	559.9
9	Keamari	4.9	38.5	0.0	15.8	393.7	86.9%	452.8
10	Korangi	0.0	7.5	11.6	10.3	559.5	95.0%	588.9
11	Landhi	0.0	7.0	9.7	8.7	360.8	93.4%	386.2
12	Liaquatabad	3.8	10.5	1.3	0.9	245.6	93.7%	262.0
13	Lyari	6.9	3.2	6.4	6.4	130.8	85.1%	153.7
14	Malir	0.0	4.5	3.9	7.9	338.0	95.4%	354.2
15	Malir Cantonment	0.0	29.5	16.3	3.3	691.3	93.4%	740.4
16	North Karachi	0.0	3.9	1.6	13.3	469.0	96.2%	487.7
17	North Nazimabad	0.0	5.9	0.0	19.0	311.7	92.6%	336.6
18	Orangi	0.0	0.0	3.3	4.9	614.2	98.7%	622.4
19	Saddar	0.0	12.5	39.6	36.3	244.6	73.5%	332.9
20	Shah Faisal	0.0	16.7	0.0	15.3	254.9	88.8%	287.0
21	Site	4.6	8.7	10.0	11.9	314.6	90.0%	349.7
	Total	77.2	265.9	169.1	234.3	9,197.8	92.5%	9,944.3
	(%)	0.8%	2.7%	1.7%	2.4%	92.5%	-	100.0%

Source: Karachi Master Plan-2020 Transport Sector Report Table 4.6.2 (Refer to 6.2.3 for the definition of the road category)

4) Road Lengths

The arterial road network including expressways and highways in Karachi City is shown in Table 3-3-2. Total length of the arterial road network is 884 kms.

Table 3-3-2 Arterial Road Lengths

Expressway	Highway	Principal Arterial	Minor Arterial	Total
25.6 km	173.2 km	157.2 km	527.9 km	883.9 km

Source: JICA Study Team

5) Number of Lanes

Figure 3-3-2 shows the number of lanes by arterial road network in Karachi City.

(2) Road Facilities

1) Signals

There are 185 traffic signals in Karachi City. Most of traffic signals are installed on the intersection of arterial roads. 119 traffic signals are managed by TCD in CDGK and the rest 53 traffic signals are managed by DHA among these.

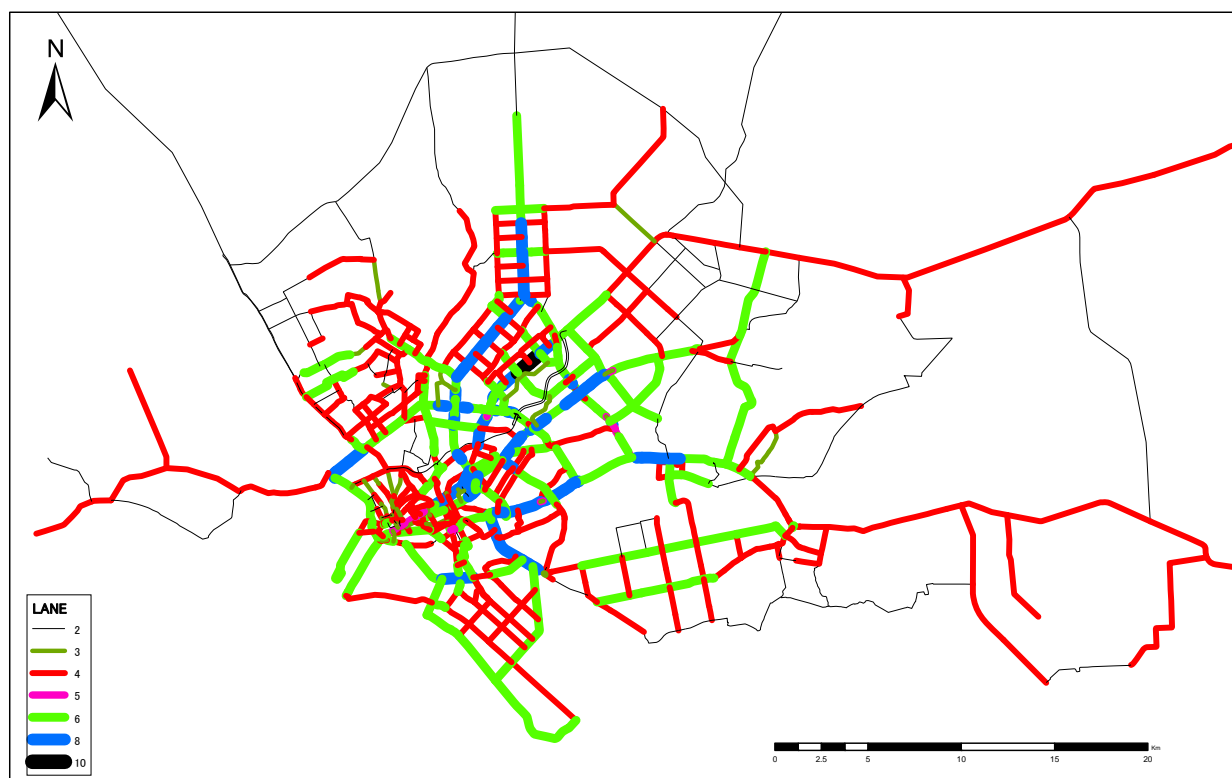
Most of the TCD controlled traffic signals consist of Urban Traffic Control (UTC) system, which can control several traffic signals in the central control room. However, a number of traffic signals which are controlled by TCD are not operated normally, and manual traffic control by the policemen is exercised on the major intersections at peak time. On the other hand, most of traffic signals which are controlled by DHA are working properly, and some of traffic signals can indicate the remaining time to the next signal phase.

2) Overpass/Underpasses

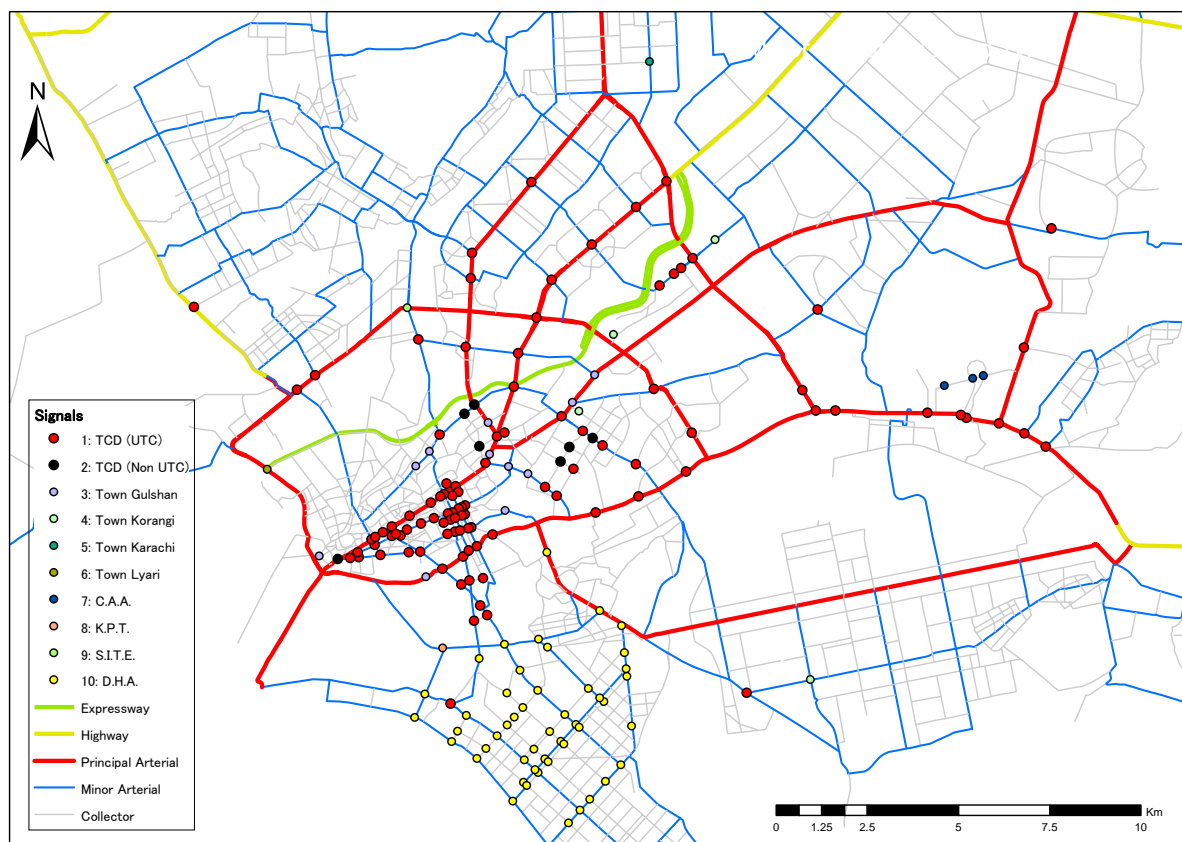
There are 45 interchanges in Karachi; of which 43 are overpass type, 2 are underpass type and 1 is mixed structure type. There are 50 viaducts in Karachi; of which 12 are crossing over the road, 29 are crossing over the railway, 6 are crossing under the railway and 3 are passing over the road and railway.

3) Roundabouts

The largest merit of roundabout is to control the junction of three or more road traffic without traffic signals, if inflow traffic to the junction is not so large. There are about 80 roundabouts existing in Karachi City. Many of the roundabouts are installed on the junction of minor arterials or collector roads, but some roundabouts are installed on principal arterial roads such as Mian S.M Farooq Road in Korangi Industrial Area and Chaudry Fazal Ellah Road in New Karachi. In those roundabouts, if inflow traffic will increase over the junction capacity in the future, traffic handling will be very difficult. On this occasion, it will be necessary to install traffic signal or overpass on the junction.

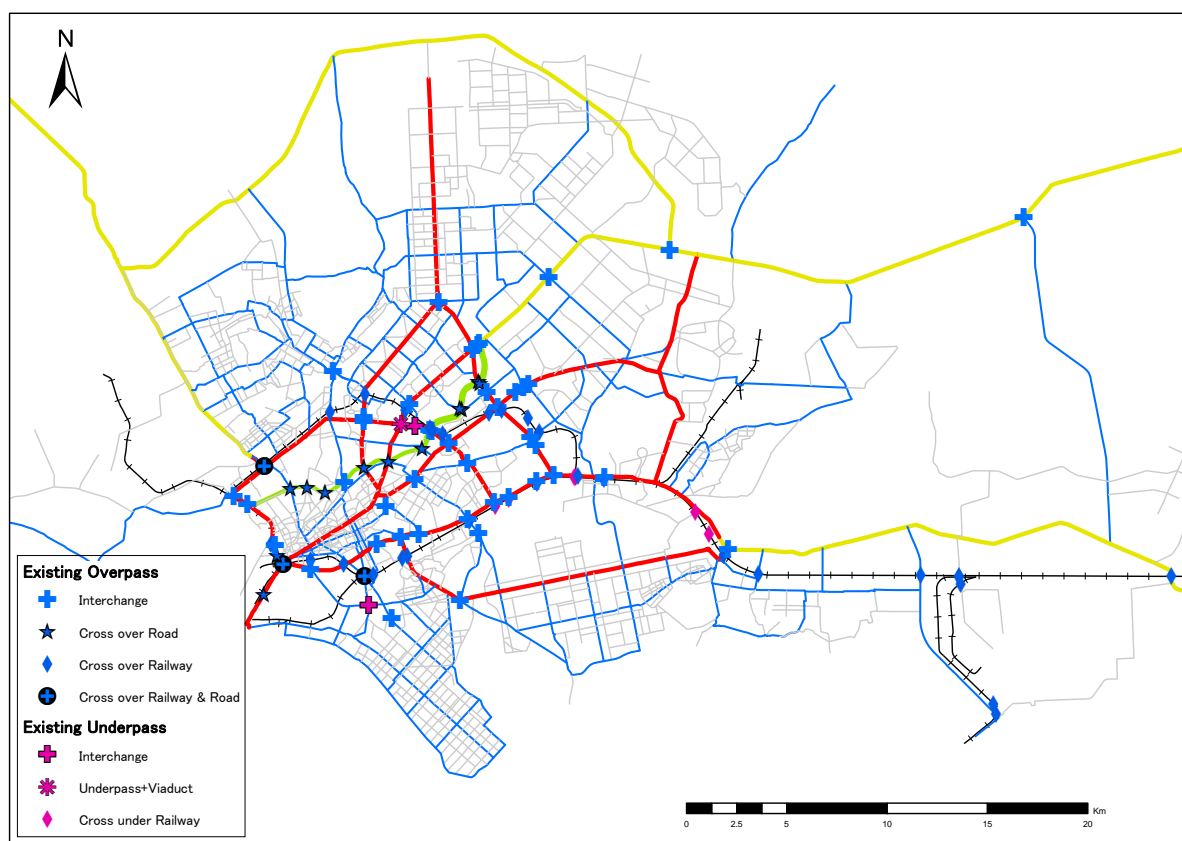


Source: JICA Study Team

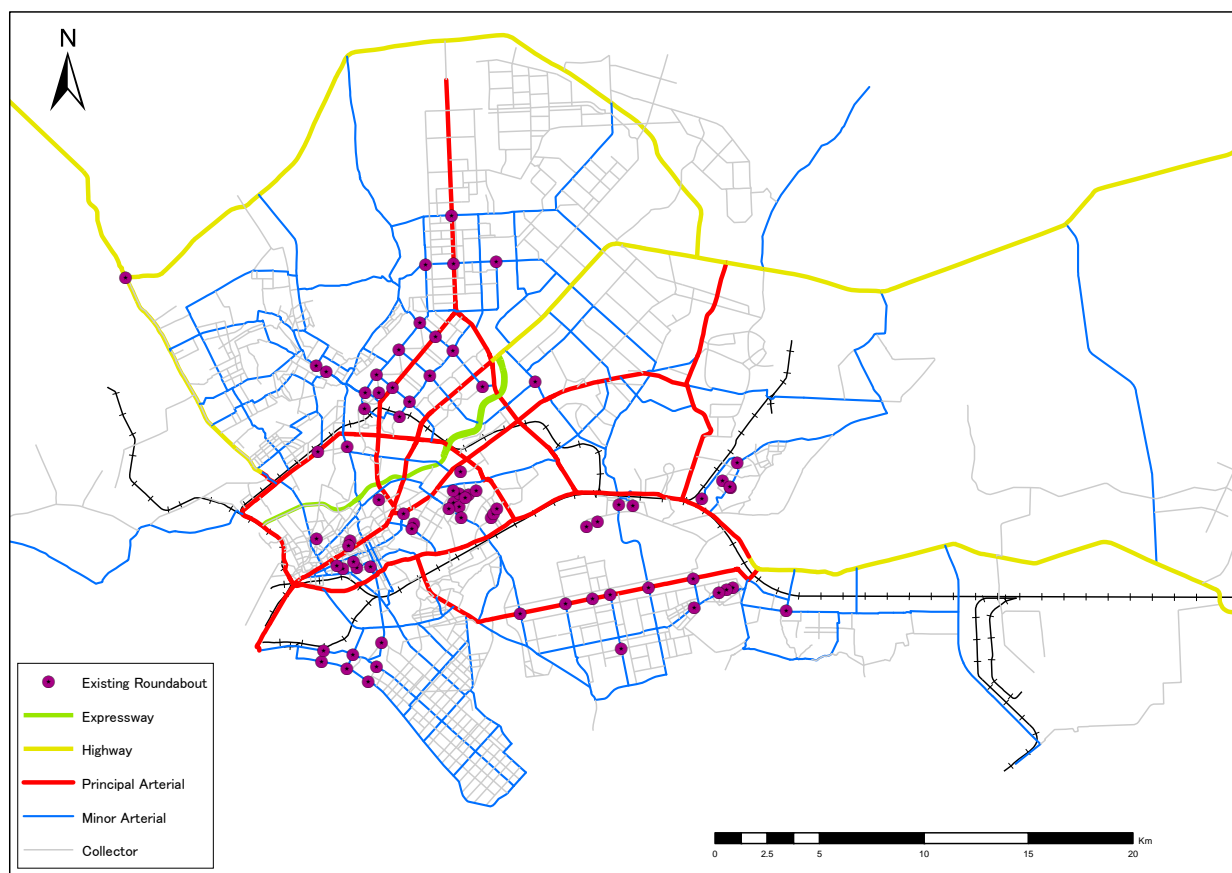
Figure 3-3-2 Number of Lanes

Source: JICA Study Team

Figure 3-3-3 Existing Traffic Signals



Source: JICA Study Team

Figure 3-3-4 Existing Overpass and Underpasses

Source: JICA Study Team

Figure 3-3-5 Existing Roundabouts

(3) Traffic Management

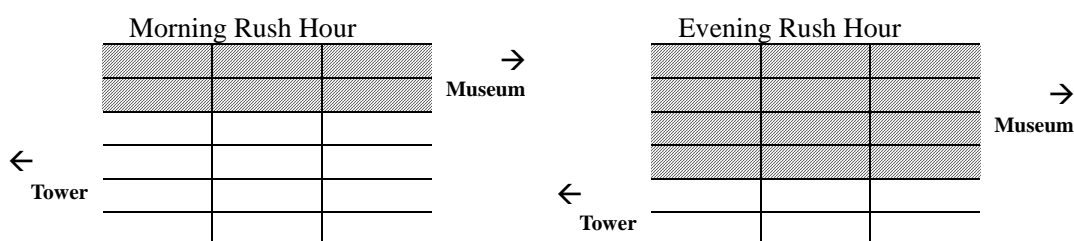
1) One-Way Traffic Control

One-way traffic control system was first introduced in CBD area and Landhi Town.

2) Tidal Flow System

Tidal flow system (or called a reversible lane or contraflow lane) is a traffic control system by altering the direction of a lane (or lanes) depending on the peak direction of the road. This system can make full use of road space when traffic demands on both directions are quite different between morning and evening peak hours.

In Karachi City, this system is installed on the I.I Chundrigar Road. In the morning rush hour, 4 lanes are allocated in the direction to the Tower and 2 lanes are allocated in the direction to the Victoria Museum. On the contrary, 4 lanes are allocated in the direction to the Victoria Museum and 2 lanes are allocated in the direction to the Tower in the evening rush hour.



Source: JICA Study Team

Figure 3-3-6 Tidal Flow System on the I.I Chundrigar Road

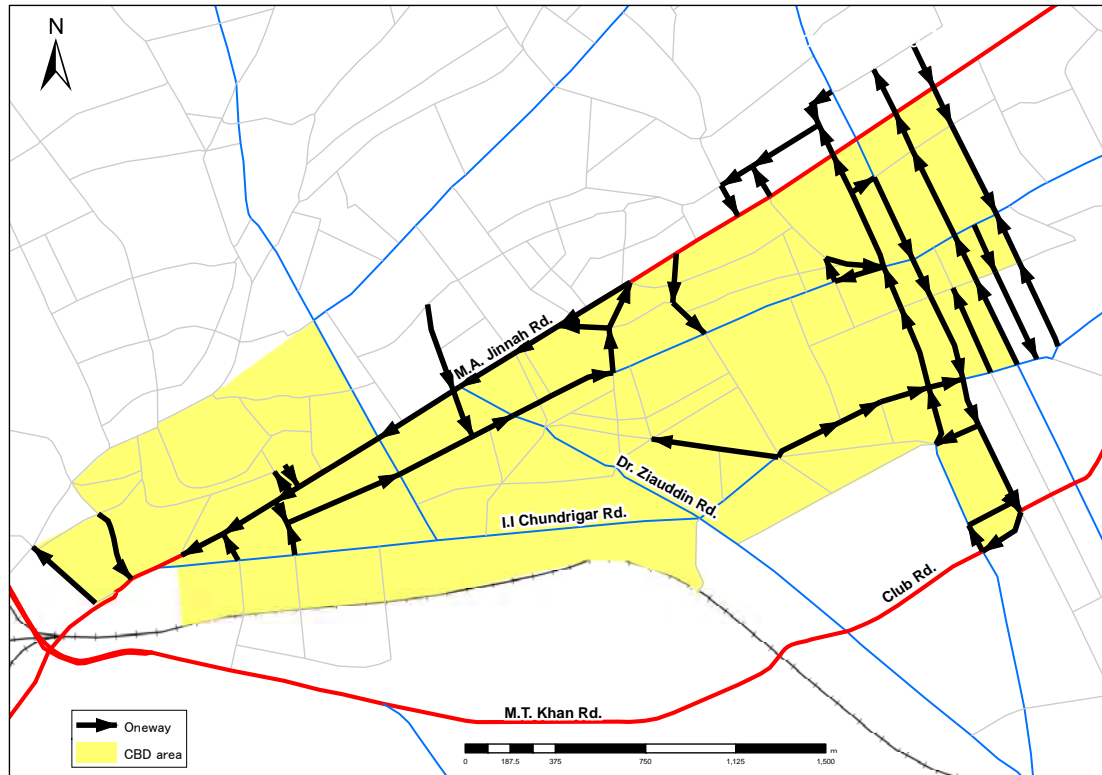
(4) Road Administration

Roads in Karachi City are administered by such bodies as the National Highway Authority (NHA), Government of Sindh (GOS), City District Government of Karachi (CDGK), Defence Housing Authority (DHA) and cantonments. The CDGK is responsible for the administration of some 40% of roads in Karachi City.

Table 3-3-3 Administrative Agency

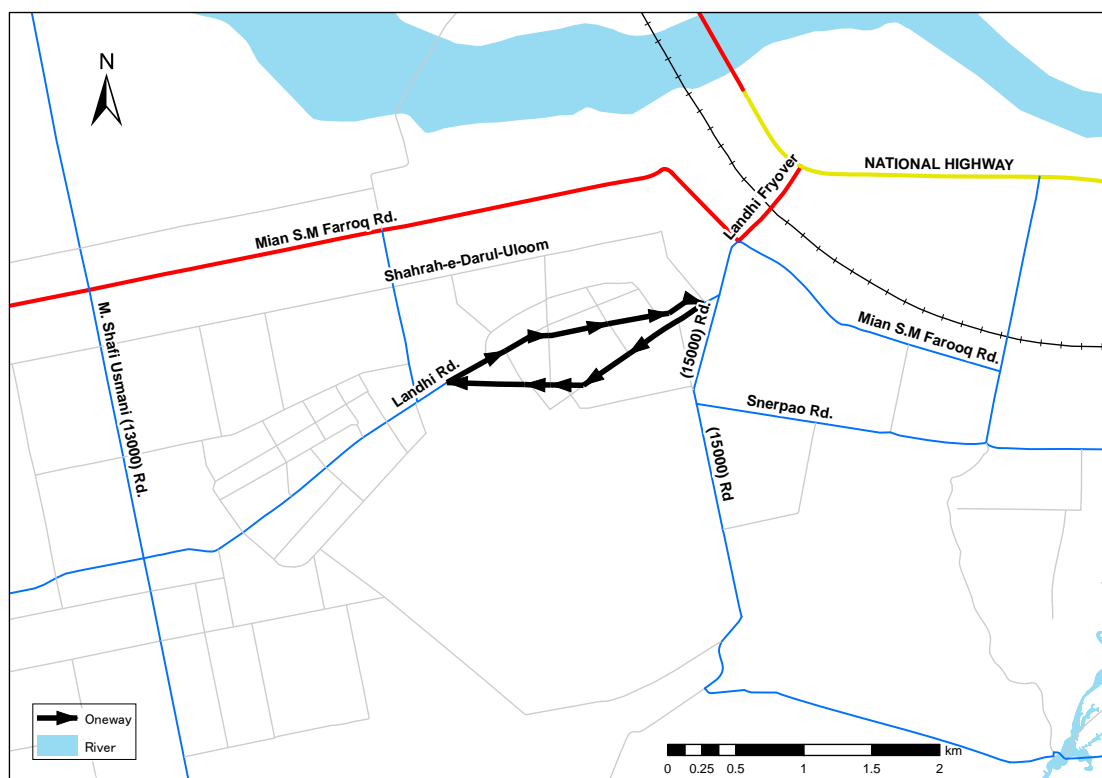
Administrative Agency	Remarks
NHA	National Highway, Super Highway, RCD Highway, Northern Bypass Lyari Expressway
GOS	Provincial Highway Department of Works and Services Department
CDGK	Approx. 40% of roads are managed.
DHA, Cantonments, etc	Remainder in their jurisdiction

Source: JICA Study Team



Source: JICA Study Team

Figure 3-3-7 One-Way Roads in CBD



Source: JICA Study Team

Figure 3-3-8 One-Way Roads in Landhi Town

(5) Parking Facilities

Table 3-3-4 and Figure 3-3-9 show multi-level parking facilities and off-street parking lots respectively. Of these, PM1 is located inside the CBD and is already operating. Other multi-level parking facilities are either at the construction stage or planning stage.

Table 3-3-4 Multi Level Parking Facilities

PM	NAME/LOCATION OF PARKING FACILITY	PLOT AREA		PARKING SPACES		Estimated Cost (RS.MILLION) / (PROGRESS/STATUS)	Situation
				Cars	M/Cycles		
1	Lines Area Car Parking Plaza, near Saddar Dawakhana, Empress Mkt	4386	Sq. Yds.	710	300	In operation from July, 2009	Open
2	Underground parking at Baradari, Dr. Ziauddin Ahmed Road, adjacent to P.C. Hotel	2.25	Acres	600	-	250 / (99%) Awarded on BOT	Under Construction
3	Car Parking Plaza in Civic Centre premises.	1.5	Acres	679	300	243 / (Under consideration on BOT)	Under Planning
4	Saddar Parking Plaza at Shahabuddin Mkt., Adjacent Empress Market	1.61	Acres	1,980	220	1694 / (Under consideration on BOT)	Under Planning
5	Clifton Parking Plaza near Schon underpass, Clifton	2932	Sq. Yds	500	100	225 / (Under consideration on BOT)	Under Planning
6	Two Parking Plazas in Jheel Park, Allama Iqbal Road, off Tariq Road.	3	Acres. (proposed)	3,000	-	(Design work in progress)	Under Planning

Source: CDGK

Parking fees for motorcycle, car and Hiace/van at Parking Plaza (PM1) are Rs. 10, 20 and 40 per day respectively. Also monthly fee for car is 1,000Rp/month. Because the parking plaza is a little distance away from Empress Market and was designed with commercial and office floor, its utilization is yet to mature. The shops have not been hold as yet and the on street parking restrictions planned within a radius of 1/4 miles have not been enforced, the facility is not being utilized by motorists at its optimum level.

Table 3-3-5 Off Street Parking

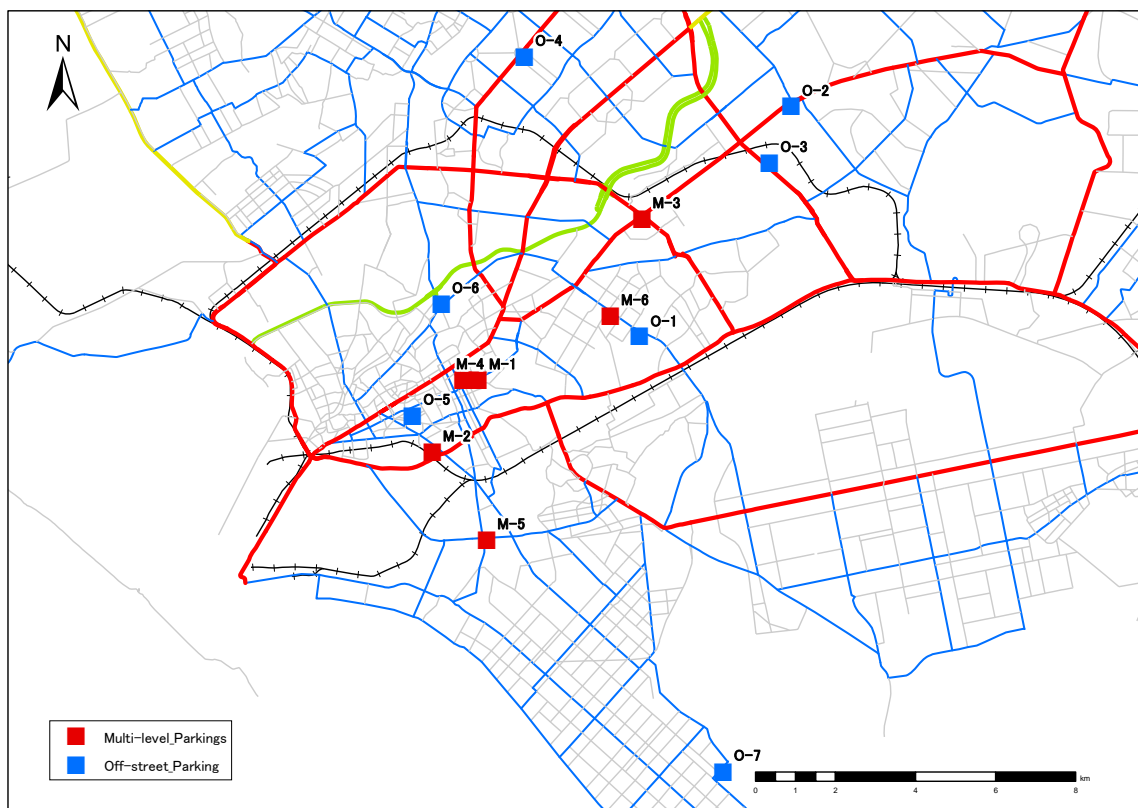
P	NAME OF SITE	LOCATION
1	Hill Park.	PECHS.
2	Safari Park.	Gulshan-e-Iqbal.
3	Sindbad.	Gulshan-e-Iqbal.
4	Hyderi Market.	North Nazimabad.
5	Faizee Rahimeen Arts Gallery.	Near Arts Council.
6	Karachi Zoo.	Nishter Road.
7	Beach Park.	Clifton.

Source: CDGK

(6) Traffic Accidents

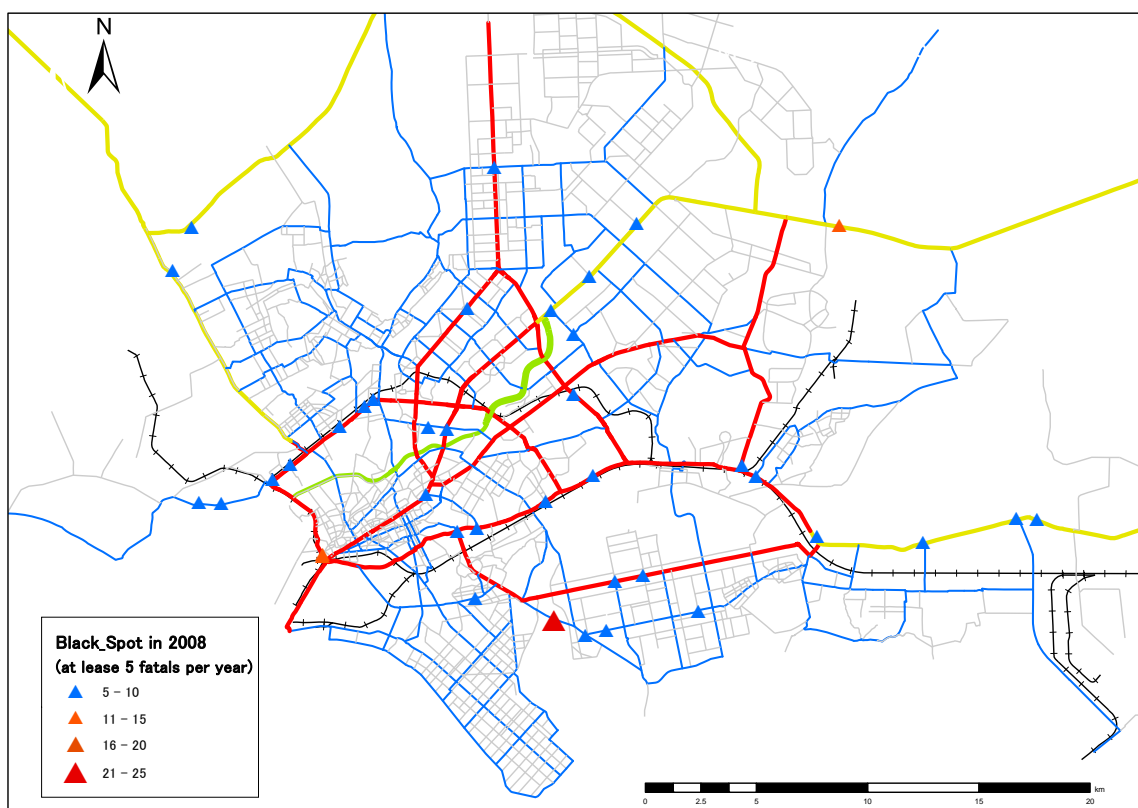
Places where frequent traffic accidents occur (black spots) are shown in Figure 3-3-10. Worst black spot in 2008 was at Korangi Naddi, second worst spots were Beneath KPT Interchange and Jinnah Bridge.

Many of traffic accidents were occurred on the highway and arterial roads. Particularly noticeable routes of high accidents were Shahr-e-Faisal – National Highway, Shahr-e-Pakistan – Super Highway and Estate Avenue.



Source: JICA Study Team

Figure 3-3-9 Location of Off Street Parkings



Source: JICA Study Team

Figure 3-3-10 Accident Black Spots

3.3.2 Public Transport

(1) Public Transport Modes

Public transport modes in Karachi can be categorized into three groups:

- Railway (Pakistan Railways)
- Public Bus (Minibus, Coach, Large Bus)
- Contract Carriage (Company bus, school bus)
- Para-transit (Rickshaw, Suzuki Carrier, Qimchis)

1) Railway

Presently, passenger trains are operated by Pakistan Railways (PR) for inter-city services only. PR is a state-owned railway service company under the Ministry of Railways of the GOP. The track of the inter-city railway runs parallel with the important east-west corridor along Shahrah-e-Faisal Avenue. The route is called as “Main Line”. There were 18 trains departing and arriving Karachi Cant Station a day with 24,000 passengers, according to JICA 2008 survey. The number of trains dropped to 15 in 2010, and the daily number of passengers was estimated at 17,000 in the Cordon Line Survey in KTIP Study. Trains seldom arrive on schedule.

There are five stations currently used for passenger trains including: (i) Karachi City, (ii) Karachi Cant., (iii) Drigh Road, (iv) Drigh Colony, and (v) Landhi Jn. Within Karachi (among these stations), fares of passenger trains are follows:

Table 3-3-6 Passenger Fare of PR in within Karachi (Unit: Rs.)

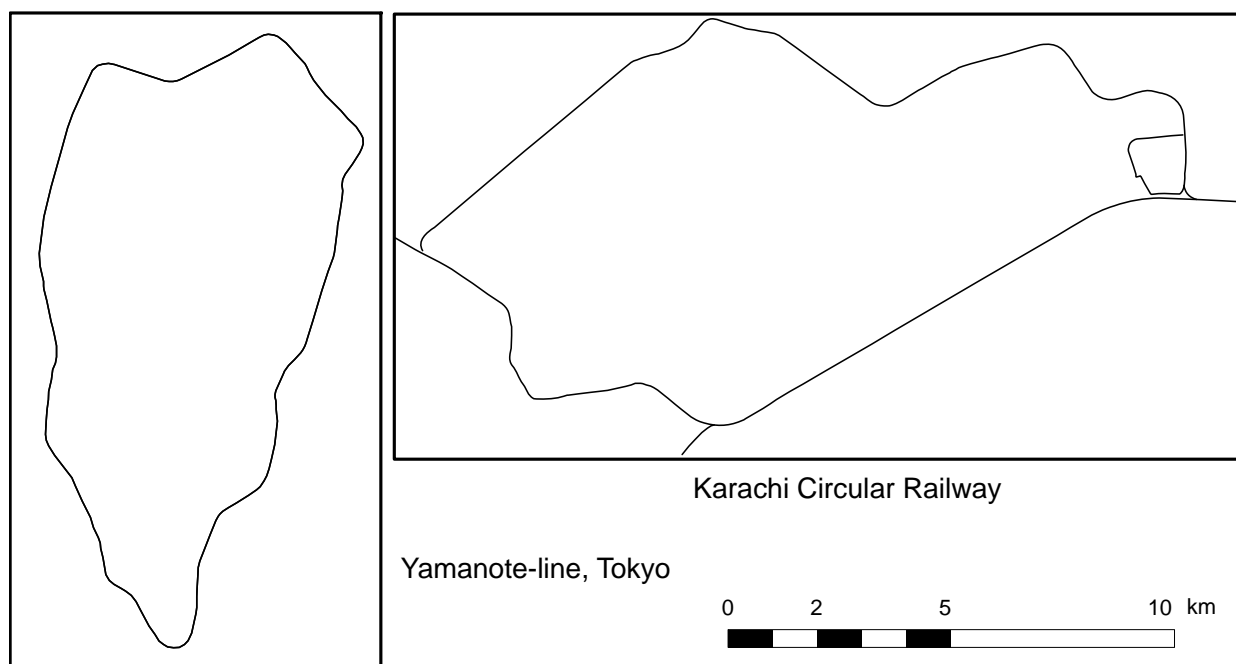
	AC Sleeper	AC lower	First Sleeper	Economy
Full Berth	210	190	150	80
Full Seat	210	140	120	40

Source: <http://www.pakrail.com> (As of July 2011)

There is no local train service after the closure of Karachi Circular Railway (KCR) in 1999. KCR was introduced in 1969 by PR and has provided the service until 1999. The length of the circular line is approximately 40km. The reason for the closure was that KCR could not attract public passenger demand due to its insufficient and inefficient services. The suspended circular line had many at-grade intersections with important radial direction roads, which reduced the travel speed and capacity of KCR. The access to the stations from major roads was inconvenient at most stations. The conditions of the rolling stock and station facilities were bad. The signaling and telecommunications were out of date, and the schedule of train operation was unpredictable.

KCR is expected to formulate a circular and radial structure of mass transit system in Karachi. The scale of KCR is quite similar to that of Yamanote-line in Tokyo, which is very successful circular railway in Japan (Figure below). The route of KCR is shown in Figure 1-2-9 (Chapter 1).

JICA has supported a series of studies to reopen KCR and the study in 2008 proposed to upgrade KCR as a modern urban railway system. The revival project of KCR was approved by the GOP on September 3, 2009.



Source: JICA Study Team

Figure 3-3-11 Scale Comparison between KCR and Yamanote-line, Tokyo

2) Bus

The bus is the major transport mode in Karachi. Minibus is the popular bus with a rich decoration and roof seats. The usage of roof seats is prohibited in principal but the seats are commonly used by many passengers because of insufficient bus capacity. Coach is similar to minibus but its quality is slightly better. The Metro Bus is more comfortable bus than minibus and coach in Karachi. The CNG Green Bus is operated by T&C Dept., CDGK, as the CNG Bus Pilot Project. There are 50 large buses introduced for the pilot project.

There are approximately 10,000 minibuses in Karachi. It should be noted that the number of bus fleet has been decreasing while the population is increasing and the city is apparently expanding.

Large-scale companies usually operate contract buses for the pick and drop of their workers, which is reflected the poor services of public transport system in terms of quantity and quality.

The number of routes and permits issued are shown in Table 3-3-7.

Table 3-3-7 Classified Routes and Number of Permits

Classified	Total Route	Total no. of permit
Bus	88	3,065
Mini-bus	145	5,948
Coach	34	3,386
Total	267	12,399

Source: RSOQ for Bus Operators/ Investors, SHAHEED BENAZIR BHUTTO CNG BUS PROJECT, 2009, CDGK

Buses in Karachi are operated at average speeds of 15-24 km/h as shown in the table below. The difference of travel speeds of buses between peak hours and off-peak hours is not large because of frequent stoppage both in peak hours and off-peak hours.

Table 3-3-8 Average Travel Speed of Buses

Bus Type	Large Bus	Minibus	Coach	UTS	KPTS
Speed (km/h)	15	17	18	15	24

Source: Confirmatory Green Routes Study for Karachi, March 2010, Exponent Engineers

3) Para-transit

The Rickshaw (Auto Rickshaw) is a popular transport mode in Karachi, which supplements the insufficient bus network. Rickshaws with two-stroke engine have been blamed for serious environmental damages such as air pollution and noise. The government of Sindh urges conversion of rickshaws from two-stroke engine of gasoline to four-stroke engine of CNG. There are many new rickshaws with CNG four-stroke engine observed on the roads in Karachi, although there still remain a lot of rickshaws with two-stroke engine.

Qingqi Rickshaw is similar to Auto Rickshaw, having three wheels and passenger sheets in the rear. Qingqi Rickshaws are mostly operated in local streets as a feeder service of bus network and operation along main roads are restrained.

The Suzuki carrier is a kind of taxi with 10 seats in the rear of a pick-up truck. It also provides supplemental service of public transport.



Photo: JICA Study Team (Left: mini bus, Right: Coach)



Photo: JICA Study Team (Bus)



Photo: JICA Study Team (Suzuki pickup)



Photo: JICA Study Team (Left: Auto Rickshaw, Right: Qingqi Rickshaw)

(2) Transport Authorities

Fare of public transport is regulated by Transport Department of the Government of Sindh. Table 3-3-9 shows the existing fare structure in Karachi.

Table 3-3-9 Fare Structure of Buses in Karachi

Distance	Bus	Minibus	Coach	KPTS	UTS/AC	UTS/non-AC
- 5	Rs. 11	Rs. 12	Rs. 17	Rs. 13	Rs. 15	Rs. 13
5 – 10	Rs. 13	Rs. 14	Rs. 17	Rs. 13	Rs. 15	Rs. 13
10 – 15	Rs. 14	Rs. 15	Rs. 18	Rs. 15	Rs. 20	Rs. 16
15 – 20	-	-	Rs. 18	Rs. 15	Rs. 20	Rs. 16
20 – 25	-	-	Rs. 18	Rs. 17	Rs. 24	Rs. 18
25 – 30	-	-	Rs. 18	Rs. 17	Rs. 24	Rs. 18
30-	-	-	Rs. 18	Rs. 19	Rs. 28	Rs. 21

Source: Notification of Transport Department, Government of Sindh (NO. SO (T-II) / 2-26 / 2010)

District Regional Transport Authority (DRTA) issues route permission of public transport in Karachi. However, the decision making for the permission is governed by a board, which consists of DIG Traffic, EDO Transport, DG KMTC, EDO Works and Services, EDO Revenue, and Secretary DRTA.

DRTA has not given new permissions to minibuses and coaches since 1985 because of the policy to replace minibuses and coaches to large size buses. However, DRTA issues renewal of the existing permits to those buses.

The number of permits issued by DRTA is shown in Table 3-3-10.

Table 3-3-10 No. of permits issued by DRTA, Karachi

Mini Buses	Coaches	Buses	UTS/KPTS	Rickshaw	Taxis	Contract Carriage
5,929	3,367	5,297	UTS 230 262	43,325 CNG 5,177	24,260	4,680

Source: <http://www.sindh.gov.pk/dpt/Transport/route.html>

Public sector plays a limited role in public transport service in Karachi after the Government of Sindh withdrew its bus operation (Karachi Transport Corporation) in 1997. Planning, regulation, and permission are the major functional role of public sector in Karachi, and providing road facility is also one of the government's roles. For example, bus stops and bus terminals are developed and maintained by CDGK, although the capacity of bus terminals is not sufficient. The diesel fuel used by bus operators had been traditionally subsidized by the Government; however the Government has withdrawn this lately. The financial support by public sector for purchasing new buses has not been sufficient except for some pilot projects.

(3) Bus Operator

In the late 1980's, the government decided to restrict the number of minibuses. Based on the policy, the government has not issued new route permits to minibuses coaches since 1985 except for the short period in 1992 when some coaches were imported under a scheme by the Government of Pakistan (GOP). On the other hand, the government has tried to introduce standard size buses for better service. The idea is good because minibuses and coaches provide poor service and are operated disorderly which cause traffic problem in the city, while standard buses are expected to be operated in organized manner. However, minibus and coaches are still dominant mode in Karachi while every attempt to introduce standard buses has not been successful.

Karachi Transport Corporation (KTC) was a federal corporation (later transferred to the Government of Sindh) of bus services in Karachi. Due to a lot of problems, KTC was closed in 1997 after the Government decided not to subsidize the corporation.

Karachi Public Transport Society (KPTS), a non-governmental organization established in 1998 under the Government of Sindh, took over 54 KTC routes. The Metro Bus, introduced under KPTS, was a successful bus service better than minibuses and coaches. KPTS was dissolved in 2006 to be integrated with the CDGK management.

Urban Transport Scheme (UTS) was established in 2000 by Transport and Communication (T&C) Department of CDGK. Under UTS, the exclusive right to operate bus services on designated routes and zones were given to bus operators on the condition that route capacity and fleet type satisfied the requirements. The operators were given duty free import of buses facility if they financed the buses with their equity contribution. The Government offered to provide subsidy on the Mark up shared by CDGK and Government of Sindh. The operators were given lucrative routes and some companies operated A/C Services. The UTS was able to bring 350 buses on various routes. Due to the change of the government policy, some companies sold out the buses to similar schemes in Punjab.

	Population Million	Master Plan	Corridor-1	BRT	Bus	KCR	Authority
1952	1.0	MRVP First Master Plan of Karachi					
1964						Open	
1974	3.4	Master Plan of Karachi			Minibus		
1984							
1987-90		Karachi Mass Transit Study (KMTS)			Stop new permission	6mil per year	
1991						F/S, JARTS	
1994		6 corridors Approved by the Federal Gov't				BOT call	NMTA
1995			1st Attempt IMTC				
1996			failed				KMTA
1997					KTC collapse	Close	
1999	9.3		2nd Attempt Maglev		KPTS		
2000			failed		UTS		
2001							
2003							
2004							
2005							
2006	14.0		3rd IDC	PPP Study BRTS, ADB CNG Bus		F/S, JETRO	KMTC
2007						KUTC	
2008						SAPROF, JICA	SMTA
2009			failed				

NMTA National Mass Transit Authority, Federal Government

KMTA Karachi Metropolitan Transit Authority, Provincial Government

KMTC Karachi Mass Transit Cell, CDGK

SMTA Sindh Mass Transit Authority

PPP Study Private-Public partnership based environmental friendly public transport system for Karachi, 2006

Source: JICA Study Team based on PPP Study, information from KMTC, KMP-2020 Transport Sector Report

IMTC Indus Mass Transit Co.

KTC Karachi Transport Corporation (Sindh)

KPTS Karachi Public Transit Society (Sindh)

UTS Urban Transport Scheme (CDGK)

Figure 3-3-12 Brief History of Public Transport in Karachi

(4) Bus Service

Bus service suffers from unstable law and order situation. According to a local newspaper, 50 bus drivers were killed and 150 bus drivers were injured in 2010. Buses are often the target of enraged public's riot and in most case set on fire when the law and order situation deteriorates, which causes stop of bus services in the city, until the situation normalizes.

Previously, a documented ticketing system was in operation for public and private operators. In this system, passengers need to buy a ticket from a conductor inside their buses, and conductors must keep the record so that the number of ticket sold becomes clear. This system could ensure the transparency of fare revenue of bus operators. However, the on-board ticket selling takes more time than paying money without ticket, and such ticking system cannot prevent unfairness and cheating. At present, bus fares are collected by conductors without issuing a ticket, because it is not mandatory.

(5) Bus Network

There were 41 bus routes, 102 minibus routes, 34 coach routes, 12 KPTS routes, and 19 UTS routes according to the Person Trip Survey in 2005. Figure 3-3-13 shows the bus network in Karachi.



Source: Public Transport Survey in KTIP

Figure 3-3-13 Bus Network in Karachi

Most bus routes are of radial direction. The shuttle service connecting Tower and suburban area, such as “W-11”, is the major type of the radial direction (Figure 3-3-14-a). Some routes connect the central area and two different residential areas at both ends (Figure 3-3-14-b). On the other hand, not a few routes connect adjoining residential areas directly without passing through the central area like “D-7” and “F-18” (Figure 3-3-14-c).

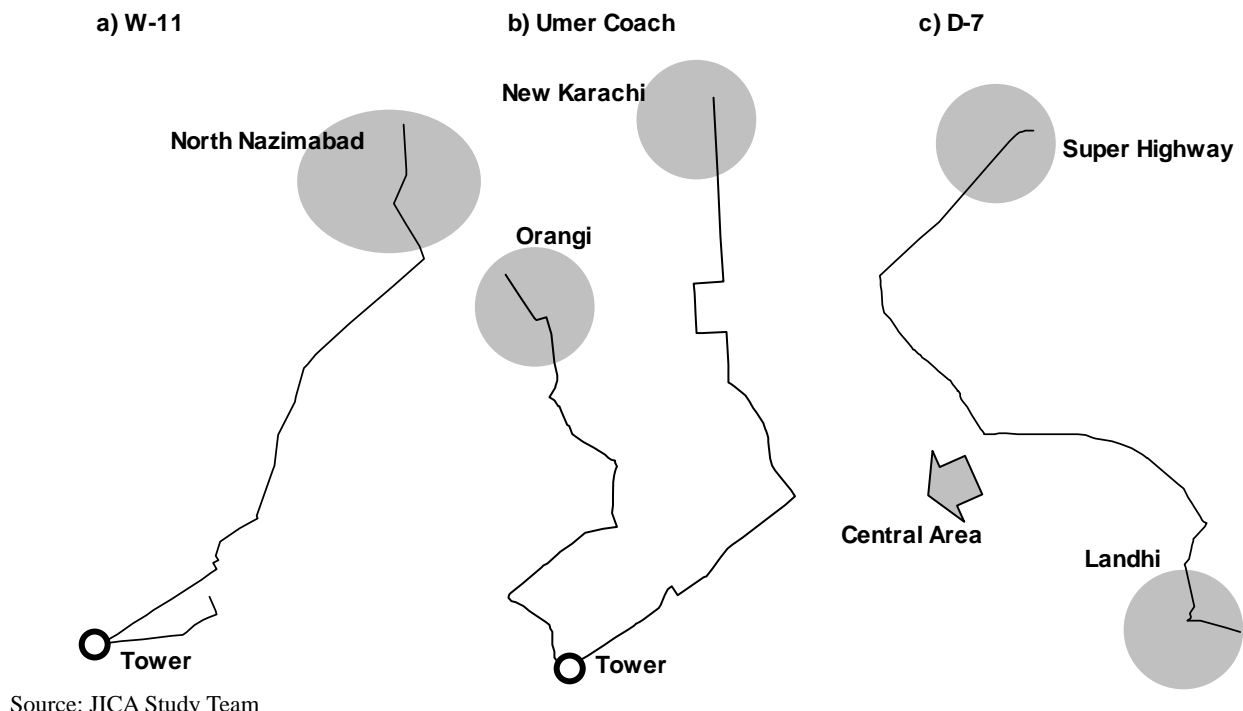


Figure 3-3-14 Bus Route Type

(6) Bus Traffic

Public Transport Survey was conducted to investigate bus frequency.

Frequency for 12 hours (6:00–18:00) varies from 10 to 495. Route “W-11”, which connects Tower and North Nazimabad, is the most frequent route, where a bus runs every 45 seconds in peak time. The 12-hours frequency of “W-11” in front of KMC building (along M. A. Jinnah Road) was as large as 495. There are about 30 routes concentrating on M. A. Jinnah Road, which is the busiest bus transit route. Route “D-7” is the second at 397, which connects Super Highway and Landhi through Rashid Minhas Road. Public Transport Survey recorded 132 routes during the survey in which 70% of bus routes have less than 100 bus trips within 12 hours.

Figure 3.3.3 shows bus traffic estimated from “Public Transport Survey” in KTIP. The widths represent the number of buses operated. From this figure, two major corridors are observed: one is M.A. Jinnah Road – Super Highway corridor, and the other is Shah Waliullah Road - Rashid Minhas Road - National Highway (N-5) corridor.

The number of female passengers is less than male passengers but one fourth seats are allocated for women. It is estimated from “Green Route Confirmatory Study for Karachi (2008)” that female passengers account for 25% of passengers.



Note: The width of each road line represents the number of buses operated for both directions per day.

Source : Public Transport Survey in KTIP

Figure 3-3-15 Bus Frequency

3.3.3 Inter-modal Transfer Facility

The major inter-modal transfers in Karachi are transfers between inter-city buses and local buses, transfers at the airport, and transfers at PR stations. There are four inter-city terminals in Karachi as follows.

- Karachi Cantt Station (inter-city for National Highway),
- Lee Market Bus Terminal (inter-city for National Highway and Super Highway),
- Daewoo Bus Terminal (inter-city for Super Highway), and
- RCD City Terminal (Karachi – Balochistan)

Car and taxi are the major modes of the feeder transport from/ to RCD City Terminal because public transport service between RCD City Terminal and the center of the city is poor. Illegal parking of inter-city buses is observed in Saddar Area because there is no inter-city bus terminal in Saddar Area except for Karachi Cantt Station but the passenger demand is high.

3.4 Institution, Organization, and Legal Analysis

3.4.1 Introduction

For the past two decades, 11 studies were carried out on the Karachi Mass Transit Systems, including Karachi Mass Transit Study (KMTS); KMTS developed in the late 1980's is, probably, one of the most credible studies ever completed for mass transit systems for Karachi. The Study recommended six (6) priority corridors with a total length of 87.4 km of a network of bus-ways convertible to light rail (LRT). The final report submitted in 1990 was approved by the Government of Pakistan (GOP) at various levels, as well as the World Bank, keeping in view its technical feasibility and favorable economic and financial analysis, e.g. IRR 21.2 %, etc. Moreover, the transit-ways were so designed as to serve initially as exclusively fast bus-ways, which could be easily convertible as high capacity LRT without any disruption to serve, as and when the travel requirements justify such a measure, or initially to be LRT on some corridor if suitable BOT offers are received.

The GOP quickly deployed a Public Private Partnership (PPP) approach, first on a BOT basis and later on a concession basis, for the implementation of the first and second corridors (hereinafter referred to as "Corridor-1" and "Corridor-2", respectively). After a decade of repeated attempts by GOP, Government of Sindh (GOS) and later by City District Government Karachi (CDGK) all of the projects conceived by the KMTS and other major rail-based mass transit systems for Karachi like the Karachi Circular Railway (KCR) have failed to attract either public or private investments.

One of the main causes of the failure of attracting private capital to the development of Karachi mass transit systems is the absence of a cohesive government policy and strategy for PPP transactions; this include legal authority to grant concessions, tender procedures and bid evaluation criteria. The exposures to political and regulatory risks over a long PPP period are still remaining constraints and cast cloud over the government ability to complete the PPP transactions. If there had been a cohesive government policy and strategy the political interferences and bureaucratic mismanagement of PPP transactions would have been avoided or at least minimized. The case supports the needs for proper legal, regulatory and institutional arrangements should the government continue to pursue the implementation of mass transit systems through PPP modalities. There is a need for a strong implementation body/agency to be created within local government administration.

This Progress Report, therefore, will look at, first, the existing institutional, governance and legal structure of CDGK and assess the capacity and capability of the local government administration to plan and implement the mass transit systems. It will then discuss the issues and problems of the government policy and strategy for the implementation of mass transit development, followed by a proposal for institutional development.

3.4.2 Existing Institutional, Governance and Legal Framework

(1) Institutional, Governance and Legal Framework: An Overview

1) Institutional and Administrative Arrangements

The City-District of Karachi is divided into eighteen (18) towns governed by elected municipal administrations responsible for infrastructure, spatial planning, development facilitation, and municipal services (water, sanitation, solid waste, repairing roads, parks, street lights, and traffic engineering), with some functions being retained by the CDGK.

The towns are further sub-divided into 178 localities governed by elected union councils (UC's), which are the core element of the local government system. Each UC is body of thirteen directly elected members including a Nazim (mayor) a Naib Nazim (deputy mayor). The UC Nazim heads the union administration and is responsible for facilitating

the CDGK to plan and execute municipal services, as well as for informing higher authorities about public concerns and complaint.

Furthermore, land planning and municipal control was fragmented into about twenty federal, provincial and local agencies with separate legal and administrative frameworks and engaged in little institutional coordination. This resulted in a fragmented management system with each agency responsible for multiple services within its own jurisdiction and in many cases with its own set of regulatory laws and frameworks. This poor institutional, governance and legal arrangements in Karachi have affected negatively not only the quality of city planning, infrastructure development and public and municipal services, but also impacts adversely in the country's economic growth.

2) Legal Framework

Sindh Local Government Ordinance (SLGO) 2001 called for major restructuring of the sub-provincial government structure. This comprised the transfer of political and administrative power and authority to the three-tier elected local governments, through an elaborate legal, administrative and financial structure backed by detailed rules and regulations. The local government's establishment under SLGO 2001 has provided unprecedented opportunity to the CDGK to steer and guide the growth of Karachi-country's commercial and business capital-. The change holds immense promise for the city of Karachi, especially in facilitating a central governing authority for the city in the form of a City District Government which, in principle, is to be the central player in managing city affairs, and in providing a clear development framework for Karachi's future growth.

Two new laws have been promulgated recently in the State of Sindh which are directly related to the development of mass railway systems. The first is the Sindh Public Procurement Act 2009, including Rules of 2010. This law regulates public procurement of goods, services and works in the public sector, and expedites the establishment of the Public Procurement Regulatory Authority.

The second piece is the Sindh Public-Private Partnership Act, 2010, aim to create an enabling environment for private sector participation in infrastructure projects in the province of Sindh through public-private projects.

3) Centralization of Planning and Development Control

Regulatory and institutional changes brought about by the enforcement of SLGO 2001 have raised the prospects of centralizing planning and development control that takes care of the entire city district. Now the CDGK will be entrusted with the responsibility of guiding and managing the growth of the whole district through a holistic and integrating planning, since the local government has acquired vastly expanded function of management and development, while the functions of the Karachi Development Authority (KDA) have been taken over by the CDGK, the Karachi Building Control Authority (KBCA) and the Karachi Water & Sewerage Board (KWSB) have also come under the management of CDGK. The CDGK, however, still needs to shares planning and development responsibility horizontally with other government entities that own land and in some way participate in regulation of development in the district. Along with the CDGK, seven institutions have been delegated powers and duties as covered in the Karachi Building and Town Planning Regulations 2002 (as amended in 2005). These are:

- Cantonment Boards under the Ministry of Defense
- Karachi Port Trust
- Pakistan Railways
- Ministry of Works
- Sindh Industrial Trading Estate (Karachi)
- Sindh kachi abadis Authority

- Sindh Board of Revenue

Added to the above are Pakistan Steel, Port Qasim Authority, Defense Housing Authority, Exports Processing Zone, Malir Development Authority and Lyari Development Authority. CDGK's powers, therefore, extend to all the area under its jurisdiction except those under the jurisdiction of the above public agencies.

4) Land Planning, Development Controls and Coordination

Due to the fragmentation of authority over land between the various governments agencies which have significant land holdings, and poor enforcement of the planning regulations as they do exist planning and development controls within Karachi city remain weak. The major planning and development control issues include: (i) absence of effective coordination of planning process between land- holding and controlling agencies; (ii) the distribution and development of public land which does take place is not guided by development policies and strategies (or spatial planning); (iii) control systems for land development by private developers are ineffective; (iv) building and construction provisions for leasing of public land are not enforced; and (v) conditions in building permits are seldom followed. It was reported, for example, that there are cases where approval was granted with retrospective effect for buildings that did not meet the requirement under Building and Town Planning Regulations. Nearly 90 percent of city land is under public ownership, but the owners are reluctant or unable to make this land available for development and housing. Partly for political, and partly procedural reasons (public land can only be disposed through public auction), land is not being released for development. One result of the absence of land available for development and the demise of KDA is that there is now no government agency actively pursuing the opening up of land for serviced plots.

(2) Regulatory and Supervisory Framework

1) Sindh Building Control Ordinance (SBCO), 1979: A legal basis for exercising building control functions.

Karachi Development Authority (KDA) is a defunct regulatory and supervisory authority in the pre-devolution era. It was established in 1957 under the Presidential Order No.5. One of the main functions of the Authority was to undertake town expansion schemes and to accord approvals to building plans in its housing schemes. In 1961, building regulations for various schemes were formulated which were finally enforced.

The functions of Building Control were repeatedly shifted to and from KDA and Karachi Municipal Corporation (KMC), in different periods as given below:

- In 1950, Karachi Improvement Trust (KIT) was created, to approve "Housing Schemes" and to formulate "Town expansion schemes".
- In 1957, KDA was established through the merger of KIT, Karachi Joint Water Board, and Rehabilitation Department of the Government of Pakistan, Architect Control Department of KMC was added to oversee the building activity in the city.
- In 1962, the Architect Control Department for the Municipal Area was transferred to KMC.
- In 1974, Building Control; for some KDA Schemes such as North Nazimabad, scheme-2, and F.B. Area was handed over to KMC.
- In 1979, Karachi Building Control Authority was created under Sindh Building Control Ordinance 1979 and both KDA and KMC area were brought under the jurisdiction of KBCA.
- In October 1991, the KBCA was again bifurcated into two factions i.e. KBCA (KDA) and KBCA (KMC).

- In April 1996, the KBCA (KDA) and KBCA (KMC) were re-unified. Director General, KDA was notified as its Chief Executive, BBCA has its jurisdiction over entire Karachi Division excluding Cantonment Area and SITE.

Before the promulgation of Sindh Building Control Ordinance (SBCO) in 1979, the functions relating to building & town planning activities in Karachi were assigned to different agencies, in different times, in the absence of the rules & regulations to regulate the sale of units by the builders/developers to the general public, many incidents of fraudulent bookings by the fake companies were reported in the 70s. The crises increased further due to shortage of required numbers of technical professionals in the agencies.

2) Karachi Building Control Authority (KBCA)

In 1979, Karachi Building Control Authority (KBCA) was created under Sindh Building Control Ordinance 1979 and both KDA and KMC were brought under the jurisdiction of KBCA.

In pre-independence days, the Municipal Corporation had the sole responsibility of regulating the building an activity in municipal limits of Karachi. The Bombay Town Planning Act 1915 and Cantonment Board Act 1924 provided legal basis for exercising building control functions. Presently, the KBCA is a sole regulatory and supervisory body whose prime function is to ensure that the approval of building plan and NOCs are in conformity with the existing Building & Town Planning Regulations (Karachi Building & Town Planning Regulations 2002). The quality, soundness and implementation of approved design/specifications are the sole responsibility of the concerned professionals licensed by KBCA under Karachi Budding Control Licensing Regulations 1982.

(3) Administration of Spatial Planning and Development

1) Master Plan Group of Offices (MPGO)

MPGO was established as a CDGK functional division and basically comprised of the following three departments of the defunct KDA:

- Master Plan & Environmental Control; Department
- Directorate of Planning & Urban Design
- Design Bureau

The major functions of MPGO are:

- Formulation of Integrated Development Plan for Karachi
- Monitor the implementation/execution of Development Plan
- Undertake studies on urban development issues
- Provide technical advice to sub-sector agencies in planning matters
- Liaison with Federal and Provincial Governments on matters concerning the envelopment of Karachi
- Approval of private sector plans of Societies and Builders in Scheme-33
- Approval of special development permits, sub-division and amalgamation of plots, etc.
- Scrutiny of layout plans of housing Schemes within KDA Schemes and outside KDA Schemes
- Conversion of land use as per Building & Town Planning Regulations
- NOC (No Objection Certificate) for Petrol Pumps/CNG Stations according to Building & Town Planning Regulations
- Render technical advice to Karachi Building Control Authority in planning matters
- Town planning Control of PECHS and KCHSU
- Undertake ground level survey within 3/4th mile radius of Quaid's Mazar

2) Previous Master Plan Studies for Karachi

As mentioned earlier that the distribution and development of public land which does take place is not guided by development policies and strategies (or spatial planning). Since 1923 five master plans were formulated for Karachi including MRVP (Swedish Consultants) Master Plan of Karachi (1950-1952) and one prepared in 1986 by a UNCHS (United Nations Centre for Human Settlements) team. However, none of them was backed with legal cover and, therefore, they were never formally adopted, resulting in an urban sprawl and a wide spread of kachi abadis/slums and gross deficiencies of required infrastructure/utilities which have been constraining the potential and opportunities of Karachi. There was no long-term vision of medium term development framework for Karachi, no structure plan or master plan in place to guide city growth nor was there sector master plan in place to guide investment prioritization and sequencing in the key infrastructure development. It should, however, be noted that present Karachi Circular Railways along a bigger circle was conceived in the MRVP Plan and UNCHS/UNDP Plan suggested improvements of KCR with a grade separated metro, road infrastructure and road transport improvement program.

3) Karachi Strategic Development Plan (KSDP) - 2020

In 2007, the CDGK has formulated the Karachi Strategic Development Plan 2020 (KSDP-2020) under Tameer-e-Karachi Program to set out a strategic framework and overall development direction and future pattern of the city over the next 13 years. The spatial coverage of the KSDP-2020 extends over the whole City District of Karachi, consisting of 18 administrative towns, 6 cantonments, and the Federal and Provincial governments land holding agencies. The towns are territorially further sub-divided into 178 Union Councils. The area lying north of the Hub Dam, being part of the Kirthar National Park was excluded from the plan area.

The KSDP- 2020 sets out the following objectives:

- a) Finding out Karachi's advantages and potential which could be driving force for future development;
- b) Promotion of a holistic vision which can integrate various development activities towards sustainable growth;
- c) Identifying key issues in social, economic, environment and urban infrastructure sectors, which constrain the desired development of the city, since the solution of the issues is a pre-requisite to realize the vision;
- d) Setting out strategic framework against the backdrop of current conditions and formulating strategy for its achievement;
- e) Framing out the development plan components or action program, and
- f) Putting in place an effective collaborative institutional arrangement having participation of all stakeholders and citizen's participation, for successful delivery of KSDP-2020

4) Implementation of KSDP-2020

The fragmented authority among eighteen institutions and the CDGK will hinder the formal coordination of planning and development activities between these institutions and implementation of the Strategic Development Plan. To overcome this, a number of strategies are recommended including:

1. Establish CDGK as the apex planning institution with legal authority for planning and development controls over all land and buildings within the City District under jurisdiction of all other land owning agencies. This will require amendments in the relevant Acts/Laws at the federal level;
2. After approval of the plan by the City District Council, the KSDP-2020 will be a binding

document for all the stakeholders to follow in their plans, and

3. To ensure uniform standards, practices and procedures, development activities in conformity with laws and regulations being practiced by the CDGK to be mandatory for all agencies throughout Karachi City District irrespective of their jurisdiction boundaries.

3.4.3 Urban Transport and Mass Transit

(1) Administrative Structure

In the post devolution period, the CDGK became responsible for Urban Transport. The subject of mass transit was also transferred from the Provincial government to CDGK. Under the current set up of CDGK, responsibilities for major roads transport and traffic management is shared between three departments of CDGK: Work & Services, Transport & Communications and Karachi Mass Transit Cell. There is no mass transit system in Karachi except KCR which is out of commission for several years. Therefore, the population of the City District relies almost entirely on the road network for urban transportation.

1) Transport & Communication Department (TCD)

TCD basically comprised of functional divisions ensuring traffic control, engineering measures, road safety, and enforcement education and parking management TCD is responsible to perform the following functions:

- Planning and design of road network components conducting traffic surveys, preparation and implementation of traffic management schemes, covering geometric design and addressing air pollution controls measures.
- Management of offices of District Regional Transportation Authority, Karachi funding under the Motor Vehicle Ordinance 1965 and Motor Vehicles Rules 1969. Its priority functions include public transport routes classification. Issuance of road permits to public service vehicles and goods vehicles beside other responsibilities.
- Installation Management, Operation Maintenance of traffic signals in the jurisdiction of capital CDGK.
- Management and operation of inter-lash intra-city bus terminals in the city.
- Provision of traffic control devices including traffic signs, road marking and other control measures.
- Identification of accident black spots and implementation of counter measures including pedestrian bridges etc. in coordination with Works & Services Department, CDGK.
- Impart and safety education and public awareness program.

Divisions under TCD are:

- Traffic Control & Operation,
- Public Transport Management & Operation,
- Road Safety Education,
- Parking Management & Control and
- Policy, Planning design & Mass Transit.

Note: The functions, performance record and capacity of the sections Mass Transit and Urban Rail under the Division of Policy, Planning, Design and Mass Transit need to be analyzed further.

2) Work & Service Department

Work & Service is engaged in construction, repairs and maintenance of road works and associated public works such as flyover/bridges, underpasses, electrical and mechanical works, environmental works, drainage works. It also engages in the works on behalf of

TCD, KW&SB, Health, Dam and Weirs Works.

Note: Summary of Environment Impact Assessment Report of Corridor-IV (Shahrah-e-Faisal) was prepared by this Work & Service Department

3) Karachi Mass Transit Cell (KMTC)

The Karachi Mass Transit Cell (KMTC) was established under KDA in February 1987 with the responsibilities to carry out Karachi Mass Transit Study as part of the Karachi Special Development Program besides extending technical assistance to other departments on the Urban Transport system Development and other Transport infrastructure improvement programs in the City. In 1994, National Mass Transit Authority (NMTA) was established in Islamabad and the KMTP was formally transferred from Government of Sindh to Government of Pakistan (GOP).

Consequent upon transfer of Mass Transit Program, the Karachi Mass Transit Cell was placed under the administrative counter of the P&D Department, GOS in February 1995 and then in Transport Department, GOS in July 1997 with budgetary support to be provided by Karachi Building Control Authority (defunct KDA)

In pursuance of SLGO-2001, the cell was devolved in City District Government Karachi on December 14, 2002 to continue its functions and duties vid GOS notification No. SO(T-II)/TD/1-46/242, dated 14.12.2002.

The major functions of KMTC are listed below:

- Prepare master plan for the development, construction, operation and maintenance of appropriate mass transit based on bus and rail service.
- Seek advice and assistance for preparation and execution of any transport related plan/program and project
- Advice/ assist Government on matters relating to transport policy, transit schemes and transit ways
- Work out details including up-dating the design, configuration and cost of the mass transit master plan and take all necessary measures for its effective and economical implementation.
- Plan and implement various transport routes structures / alignments and may take such steps as may be necessary or useful in the construction or re-construction repair, maintenance and operation of the transport or transit system.
- Arrange for provision of adequate Transport facilities for all segments of the population.
- Coordinate, management, control and develop public transport, procure plans, machinery, instruments, equipment and materials required for its use.
- Seek and obtain advice and assistance from government or any agency within or outside the province for the preparation and execution of any plan, program or project, connected with its functions and purposes.
- Case studies, surveys, experiments and technical researches to be made or contribute towards the cost of any such studies, surveys, experiments or technical researches made by any other agency.
- Determine a building line along –with the roads and transits ways, between which it shall not be lawful without the consent of the department to construct or maintain any structure or make any excavation.
- Perform any other function, supplemental, incidental or consequential concerning the department.
- Frame work and implantation schemes for all or any of the following matters.
 - a) Construction, expansion, operation ad development of the transport network

including the mass transit system, and allied/ancillary works.

- b) Carry out research and development in the field of transportation.
- c) Undertake training of the department employees and others related personnel for capacity building and strengthening of the Institution.
- d) Create general awareness of the public through seminar, workshop, media conference and other publicity measures.

4) Sindh Public-Private Partnership Unit (PPP Unit)

The Sindh PPP Unit was established by the GOS within its Finance Department to promote and facilitate the development of Public-Private Partnerships in the Province, assist an Agency in preparing and executing mega projects which could afford the cost of projects structuring and due-diligence, and act as a catalyst for Public-Private Partnerships.

To achieve the above mentioned objectives the Unit shall:

- Assist the Board in formulating, implementing the PPP Policy and provide technical support to the Board and act as its secretariat;
- Develop operating guidelines, procedures and model documents for projects;
- Develop technical and human resources to support PPP initiatives at the Agencies;
- Provide technical support and advice to the Agencies throughout the PPP process;
- Evaluate and prioritize projects proposals submitted by the Agencies;
- Evaluate the type and amount of government support sought for a project;
- Review the bid evaluation report submitted by an Agency;
- Prepare and regularly update a pipeline of projects;
- Oversee project implementation and issue semi-annual review and annual consolidated reports on the PPP projects in the Province, and
- Perform any other functions and duties which may be assigned to it by the Board.

3.4.4 Institutional Structures Proposed by the Previous Studies on Karachi Mass Transit Systems

(1) KCR and Its Revitalization

Present KCR was conceived in the First Master Plan of Karachi prepared by MRVP- Swedish Consultants in 1952. It was constructed with a smaller radius and opened to traffic in two phases: Drigh Road to Wazir Mansion in 1964, extended in 1970 to Karachi City Station. It has 14 stations, 30 level crossings of which 8 have been grade separated and 30 km of route length. It has 5 major and 44 minor bridges. It received patronage till mid eighties. 24 trains operated on KCR loop while 80 trains operated on the main line between Karachi and Landhi. These trains carried over six million KCR commuters per annum and Pakistan railways earned Rs. 5.5 million per annum. The fare being Rs. 3/person per trip of the entire KCR loop (30 Km).

1990-1991 Pre-feasibility study of KCR by Japanese Railways Technical Service (JARTS) recommended re-vitalization of KCR followed by a study commissioned by Government of Sindh for viable implementation plan for KCR revitalization (2001-2002). July 2003 Federal Ministry of Railways presented revival plan to Governor of Sindh. Plan was agreed in principle. Experts Committee formed for formulating of proposals.

- December 2003 Meeting held chaired by the Governor Singh and the recommendations of the Experts Committee were approved. Steering Committee and KCR Board of Directors constituted.
- January 2004 Chief Secretary, Government of Sindh notified the composition of Steering Committee and KCR Board of directors. The summary of KCR project approved by the Governor Sindh and Federal Minister for Railway: sent to Cabinet Division, which was furnished to Planning Division.

- May 2004 DDWP approved PC-II of the Project mounting to Rs. 16.83 million. Funds not allocated as yet.
- October 2004 The Prime Minister constituted a task Force, headed by the Minister of State for Railways representing the Federal Government, the Sindh Transport Minister, representing the Government of Sindh and Executive District Officer (EDO), representing CDGK.
- 19-22 October 2004 Meeting of Task Force was held in Karachi
- 19 November 2004 Meeting of Task Force was held in Islamabad / Rawalpindi and finalized the report of the Task Force.
- 8 March, 2005 Prime minister Opens KCR
- March 2006 The Feasibility Study on Revival of Karachi Circular Railway (KCR) in the Islamic Republic of Pakistan, Japan External Trade Organization
- May 2009 Final Report, Special Assistance for Project Formation (SAPROF) for Karachi Circular Railway Project in the Islamic Republic of Pakistan was submitted by Japan International Cooperation Agency (JICA)

1) Establishment of Karachi Urban Transport Corporation (KUTC):

In 2004, Chief Secretary, GOS notified the composition of KCR Board of Directors and the summary of KCR project approved by the Governor Sindh and Federal Minister of Railways. DDWP approved PC-II of the Project amounting to Rs. 16.83 million. A corporation (KUTC) was set up on the pattern of Rail Mass Transit Hong Kong and DMRC (Delhi Metro Rail Corporation).

The equity share of KUTC is held by Ministry of Railways (MOR) for 60%, GOS for 25% and CDGK for 15%. Total capital Rs. 10,000 million of which Rs.5,462 million is the value of asset transferred from MOR to KUTC by land and existing assets of Pakistan Railway. MOR will invest only Rs. 100 million. The cash investment of KUTC is therefore only Rs.4, 100 million, of which Rs.2, 500 million from GOS and Rs.1, 500 million and Rs.100million from MOR. At the time of incorporation of KUTC funding arrangements included Municipal Bonds and/or Asset Backed Securities of KUTC, which includes Government of Pakistan (GOP) through MOR, GOS and CDGK in addition to Government of Pakistan (GOP) financing from PSDP, bilateral funding from donor countries and project financing on BOT basis.

(2) Karachi Mass Transit Studies (KMTS) 1987-1990

In 1982, Justice Ajmal Mian Commission Report recommended rail based mass transit system of Karachi on the lines of RTC (1974-78) followed by Masud-uz-Zaman Commission Report which recommended early implementation of Mass Transit System.

In response to these recommendations, international consultants were appointed in 1987 under KSDP/World Bank Funding, specifically to determine technical and economic feasibility for providing such a Mass Transit System. They carried out a detailed traffic and engineering survey, projecting the traffic requirements up to 2000 and 2010 following international standards procedures during 1987 and 1990, when they submitted their final report. This study was monitored by a Technical Committee and a Steering Committee appointed by the GOS besides regular appraisal by the World Bank experts. These committees included representatives from GOS, Government of Pakistan (GOP), KMC, Private Sector and the World Bank.

The final report submitted by the World Bank consultants in August 1990 recommended 87 kms network of partly elevated Transit-ways, and allied facilities to serve the entire city's major travel demand corridors, which would be augmented by bus/Para transit feeder systems thus providing origin to destination fast, and efficient public transport service, almost up to the door steps, which will be affordable by the average city commuters. However, the network can be further improved in future as and when so required. These transit-ways were so designed, as to

serve initially as exclusively fast bus-ways, which could be easily convertible as high capacity light rail without any disruption to service, as and when the travel requirements justify such a measures, or initially (to be LRT) on some corridor if suitable BOT offers are received.

1) Proposal for the Establishment of Karachi Metropolitan Transport Authority (KMTA)

KMTS recommended the creation of an autonomous Karachi Metropolitan Transport Authority (KMTA) with a governing body for setting transport policy, and implementing the Mass Transit Program. The report proposed some immediate policy, institutional and legal procedural improvements including measures and action plans as follows:

- Extend RTA's power
- Changes in the regulation of public transport operations in joint venture with private sector
- Enforcement of transit way rules
- Land acquisition power
- Joint development of stations with the private sector,
- Revenue generation + earmarking vehicle taxation for transit way development
- Franchising at stations, supplementary licensing for transit ways

3.4.5 Implementation of Mass Transit Development

(1) Issues and Problems

This subsection enumerates the main issues and problems encountered during previous attempt to implement the KMT.

1) Policy and Strategy

In implementing mass transit development plans Government of Pakistan (GOP) deployed a PPP modalities and initiated a PPP/BOT process immediate after the submission of the Final Report of KMTS in 1990 seeking the expression of interest from various international concerns. No serious response.

The second attempt was made in 1994, in which BOT bids were invited for three projects: Corridor-1, Corridor-2 and revitalization of KCR (the main line as part of the mass transit plan). This covers over 70 % of the KMT Master Plan. Again, no credible bid received.

The third attempt: a fresh bid was again invited for Corridor-1 by National Mass Transit Authority (NMTA), a defunct implementation agency of Federal Government set up for light rail transit to Karachi, offering special concessions, in line with those approved for "power generation projects". Financial Close was postponed from time to time mainly due to the inability of Government of Pakistan (GOP) to provide its loan and equity share and to the significant modification in financing structure by replacing the loan and equity share of Government of Pakistan (GOP)/ Government of Sind (GOS) with equivalent in Pakistan rupees by Rs/\$ swap proposed in 1999. The KLRT project was eventually abandoned in year 2000 by the Government of Pakistan (GOP).

Fourth Attempt: In the post devolution period, CDGK became responsible for Urban Transport and the subject of Mass Transit was also transferred from the Provincial Government. The CDGK in its efforts to implement the Mass Transit Systems took over the concession process in March 2003.

The efforts which have been carried out by KMTC after Fourth-attempt are described in detail in Section 2.2.2 (2).

2) Absence of Policy Framework

Policy framework contains, among other, a policy for: (i) pre-qualification procedures, (ii)

legal authority to grant concession (iii) tariff policy (iv) government guarantee policy and (v) operational and management policy, (vi) financial and contractual arrangements, (vii) BOT or PPP tender procedures and (viii) evaluation criteria. These policies will form a part of the Government's legal and regulatory framework for BOT and PPP. A policy is not legally binding (unlike statute) but once announced by the Government, such policy is usually not amended and inspires a high level of confidence.

Recently, two important Laws have been promulgated, which will eventually improve the issue mentioned herein.

3) Absence of Proper Tender Documents:

First attempt for BOT tender was made prematurely without a set of key information for bidders, i.e. engineering, design and specifications of the project. Second attempt was made unsuccessful for Corridor-1 and Corridor-2. No BOT offer was received for KCR Revitalization because there was no engineering and design of the project. The third attempt: a fresh bid was again invited for Corridor-1 by National Mass Transit Authority (NMTA), offering special concessions, in line with those approved for power generation projects. For fourth attempt two proposals were received but both proposals were found non responsive to the TOR: The former submitted a BOT bid without a bid bond and the later proposing credit financing. If there were proper tender documents with a clear policy and regulatory framework BOT process might have had a chance of success. Tender document usually covers:

- Invitation to Pre-qualify
- Prequalification application and forms
- Request for Proposal
- Concession Agreement

4) Lack of Authority to Grant Concession

There were multiple agencies to negotiate and grant Concession during the fourth attempt. While CDGK was started tender process for Corridor-1 Governor of Sindh signed a MOU for Corridor-2 with a Chinese firm. The Deputy Chairman, Planning Commission joined in the tender process and took over control at the end. It is difficult for private sector investors to battle with a three-headed dragon and particularly when each head has its own will and vested interest. Authority to grant Concession must be clearly stated in the policy. Recently, two important Laws have been promulgated, which will eventually improve the issue mentioned herein.

5) Absence of Regulatory Framework

A BOT or PPP law was required to regulate the private sector investments and set a sustainable and consistent rules and regulations the private sector participation in infrastructure development.

Recently, in 2010 the Sindh Public-Private Partnership Act has been promulgated. The current regulation already covers most of the items found in similar sets of regulations established by other governments, including Japan, India, Singapore, Philippines and Hong Kong. However, it needs to explore these items at a deeper level, especially in areas not covered, or not developed in detail by the PPP Law of 2010, such as permit procedures/standards, asset ownership, auditing, no jurisdiction of international courts, detailed pre-qualification requirements, detailed evaluation criteria.

In addition, real estate development of station surroundings and underground land usage should be facilitated by the appropriate laws and regulations. Also, the KMTA's subsidy structure should be covered by some form of regulation. For example, government construction subsidies should not be decided case-by-case and operational subsidies should be assessed and some form of regulatory covered considered. As it could take

considerable time to develop the appropriate laws and regulations, it is important to start examining requirements from E/S phase.

MRT system-specific regulations appropriate for urban railway systems are different from those for long-distance railway. Therefore, existing regulations must be further developed to cover the MRT system's higher operational requirements. These include managing a high-density operating system and ensuring underground security, safety, and punctuality.

6) Lack of Understanding of “Trade Off”

Trade-off between the potential advantages (Risk sharing, additional investment resources, improved efficiency) and drawbacks (lengthy and costly negotiations, higher price from greater return sought by private investors) has been the recurring theme in the gathering at international and regional level sponsored by international organizations on PPP/BOT. On balance, however, it appears that experience to date does not provide a reliable basis for evaluating this trade-off, but it appears to show that the approach would offer a decisive net advantage once the process for developing these projects is improved. BOT schemes are, in essence, the vehicle for the implementation of infrastructure by the private sector.

For the selection of BOT projects there should be viability due diligence of each prospective BOT projects including financial and commercial viability analysis. The due diligence must be carried out as if CDGK or a sponsor of the Concession is an investor. Even the project is financially viable - there is no guarantee for finding investors but the project is commercially viable - there is better chance to find investors. In addition, in order to induce the private sector participation in the project the some degree of government assumption of risks and financial support will be necessary. The government support will help the investor's financial position but the real benefits from the government financial commitments will be the political will of the government to the lenders who are insecure about the project political viability beside the financial and technical insecurity.

7) Lack of Government Risk Assumption

The main risks facing the private sector involvement in a BOT project include pre-construction, construction, traffic and revenue, currency, force majeure, political, and financial. These risks must all be addressed in a manner satisfactory to debts and equity investors before they will commit to project funding. The traffic and revenue risks are perhaps the greatest risks faced by the urban transport start up projects and these are defined as risks associated with insufficient revenue and tariff too low to generate expected revenues. Treatment of traffic and revenue risks ranges from full private sector assumption to the government assumption of these risks resulting in the “Minimum Revenue Guarantee”. Forms of government minimum traffic volume or revenue guarantee differ from county to country and are dependent on the concession policy and process concession environment, physical and market characteristics, economic and political context, local capital markets of the country. Recently, two important Laws have been promulgated, which will eventually improve the issue mentioned herein.

3.4.6 Findings and Recommendations

(1) Core Requirements for an Effective Institutional Structure

Considering that a large part of the investment in the Karachi mass transit systems will come from private sector and that the projects will be implemented through PPP modalities, there is a need for an effective implementation agency and this may call for the transformation of an existing CDGK entity into a business entity or otherwise create a new business entity independent of the public administration. Having learned the past performance of the Government of Pakistan (GOP), GOS and CDGK in the PPP transactions and reviewed the

existing institutional, governance and legal structure of the CDGK it has become clear that institutional reform at local government level and legal and regulatory reforms at federal level are required in order to implement successfully mass transit systems in Karachi.

As mentioned earlier in this report major reasons for the failure in tapping private sector capital to Pakistan, in general, and to transport infrastructure development, in particular, have been:

- Poorly developed domestic capital market.
- Lack of access to long-term debt, domestic and international.
- Absence of cohesive government policies.
- Absence of a credible legal and regulatory framework
- Absence of a credible institutional and administrative framework.
- Absence of a clear government commitment to conclude the PPP deals in a reasonable time.
- Inherent risks in investment in railways, particularly, mass transit systems.
- Lack of experience in PPP projects in both public and private sectors.

Some of these problems are beyond the control of GOS and CDGK. For instance, to remedy the problems of the existing legal and regulatory framework Government of Pakistan (GOP) must take initiative.

1) Vertical Decentralization of Authority to Grant Concession

Attracting private sector investment and to optimize its financial, socio-economic and political advantages is an important, simultaneously, complex task which is the responsibility of government. Such a task dictates creation of a dedicated organization in government with skills necessary for management of all the phases in development and implementation of PPP projects. The authority to grant and govern the concession can be decentralized vertically or horizontally and the level of decentralization is a policy decision on the part of a government:

- Authority to grant concession is transferred to local governments - Vertical decentralization
- Authority to grant concession to respective sector departments, i.e. transport, water, electricity, etc. - Horizontal decentralization

It is possible to have an institutional framework which is vertically centralized but horizontally decentralized. For example, in the case of New Zealand the Central Government has the key responsibility for concessions but sectoral departments have the lead (horizontal decentralization). Brazil's case some functions related to concession are vertically decentralized, while at the center a single unit keeps tab on all concessions. One of the most observed international good practices may be the Philippines BOT Center which was established under the concepts of combination of the vertical centralization and horizontal decentralization. The recent establishment of the Sindh PPP Unit will eventually improve the issue mentioned herein.

2) Institutional Reform at Local Government

It is usual for governments to work out an ad hoc arrangement whereby certain set of public servants, previously engaged in the same sector are simply asked to take over and manage the process associated with private sector participation (PSP). The civil servants managing the process are generally unaware of the actual conditions of impacts of such substitutions of public financing with private capital under project financing scheme. There is a lack of experience in identifying, evaluating and marketing commercially viable projects, a lack of understanding of complexities of PPP, inadequate knowledge of risk allocations, limited liability to assess the value and impact of concessions being sought and offered or requested by the private sector; and limited capacity to negotiate PPPs for transport infrastructure projects. Additionally, a PPP program in mass transit systems requires multi-sectorial coordination within the government itself. And governments

across the globe are not very well known for such intra-governmental coordination. In the field of regulation, there is lack of experience in performing regulatory functions. Also project managers in the public sector are underpinned in comparison with their private-sector counterparts, and public agencies have difficulty in attracting and keeping the best and brightest. The situation is further aggravated by insufficient resources being made available to public bodies responsible for performing the assigned tasks.

Analytical skills in structural finance, preparation and evaluation of feasibility studies and legal drafting are required in an institution facilitating PPP transactions - business transaction skills. Transformation of a CDGK entity to a business entity staffed with highly qualified staff with such analytical skill and risk assessment is needed to strengthen an in-house capacity of project preparation, procurement, and contract management/implementation and marketing. The interface between the government and the private sector is one of the important keys to succeed of private infrastructure arrangements. The Government has to perform numerous tasks when planning, designing, and implementing and regulation/monitoring concessions. The success of a concession depends not only on the details of contractual agreement but also the implementation of the project to be financed by private sector. After the financial closure PPP projects are placed in implementation mode. CDGK's role is monitoring the implementation and ensuring the compliance with the Concession agreement, including the cost estimates and time schedule. Cost and quality control is the Concessionaire's prime concern as it has to resume the risks of cost overrun and maintenance cost. Intra-departmental coordination within CDGK are required in the implementation and operation stages, however, during the construction phase there is no need to involve the construction or operations divisions of CDGK. Reason being: the "mechanistic" or bureaucratic organizational structure is not suited to deal with private sector participation.

3) Institutional Capacity Building

An effective implementation body for the Karachi Mass Transit Development needs the following attributes:

- The administrative authority to require organization to comply with its requirements.
- Implementation Level: The necessary professional skills to implement the PPP projects. Project financing requires special skills and experience not usually found in public service, such as financial, accounting, legal, marketing and communication skills, as well as the experience to utilize these skills in the context of business transaction. For this reasons a unit staffed by civil servants is unlikely to be effective, not least because it will be constrained civil service pay scale.
- Resource Requirement: Adequate resources to implement the project. PPP process is a resource intensive process, which requires both a substantive core team, as well as access to considerable quantities of external consultancy. Government frequently underestimates costs and inputs needed and they often need access to external resources in order to finance the program.
- Appropriate delegation of decision-making: Decision-making must be delegated, as far as possible, to those who have the greatest competence to take the decisions in question. A high degree of professionalism is required in every part of institutional structure in order to ensure that complex matters are handled effectively and decision taken quickly and the appropriate individuals. This means that executive body will take the large number of implementation decisions that are needed in the course of a transaction; the supervising Board takes decisions on key issues.

4) Establishment of an Autonomous Karachi Mass Transit Authority (KMTA): An Alternative Approach

As an alternative creation of a new business entity in the form of autonomous mass transit authority will be considered and the Institutional, organizational and legal structure of the entity will be studied in detail in case the proposed institutional reform is not realistic and feasible, politically or financially.

The key objective of the creation of a new entity is to:

- Secure a long-term investment from public and private sector.
- Leverage local and central government funds, external assistance as well as private funds, support private investment and to create a conducive environment to utilize the efficiencies, innovativeness, flexibility and speed of the private sector to provide better infrastructure and service at an optimal cost.
- Setting up a transparent, consistent, efficient administrative mechanism to create level playing field for all participants and protect interest of all stakeholders
- To prepare a projects list to be offered for PPP and take them forward with assistance of the highly qualified PPP Unit through a transparent selection process.
- Putting in place an effective and efficient institutional mechanism for speedy clearance of the projects.
- To provide the required viability gap funding (VGF) where the essential projects are intrinsically unviable.

In case ODA financial assistance is made to the Karachi mass transit development the new MTA will function as the implementation agency and funds will be dispersed to MTA through EAD in the following manners:

1. Implementation Agency (MTA) submits PC-1 to PDWP through Provincial Planning and Development. Department
2. PDWP endorses and recommends to Planning Commission
3. Planning Commission appraises & evaluates and recommends to CDWP
4. CDWP recommends to ECNEC
5. ECNEC's decision sent to EAD
6. EAD disperses the funds to the Implementation Agency

3.5 Environmental Situation

The status of air pollution is serious problem in Karachi city. One of the primary sources of air pollution is the transport sector. With in this sector, the use of the operation of defective vehicles, use of poor quality fuel, and increase in the number of vehicles beyond the capacity of roads, especially center of the city, contributes significantly to the deteriorating air quality.

Noise pollution from vehicles is also serious problem in Karachi city, especially in residential areas. Major contributors to the noise pollution are use of vehicle horns, removal of silencers on rickshaws and motorcycles, high volumes of traffic especially heavy vehicle and poorly maintained motor engines.

The concentration of Air pollution, NO_x, CO and PM₁₀, and Noise pollution levels along road sides and at intersections in Karachi city exceed the limits recommended by National Environmental Quality Standard (NEQS) of Pakistan. Current measurement result of Air pollution and Noise pollution levels is shown Appendix 5.4.

The Vehicular Emission Control Program (VECOP) was carried out in Karachi city in collaboration between Traffic Police and Government of Sindh to make drivers and owners their vehicles environmental friendly. In this program, traffic police would check and monitor the smoke emitting and noisy vehicles at the busy location. According to the result of this monitoring, approximately 30% of checked vehicles were found emitting smoke and noise above the limits prescribed by NEQS. Vehicular Emission Monitoring result is shown Table 3-5-1.

Table 3-5-1 Vehicular Emission Monitoring & Awareness Activity in Karachi

Year	Month	Number of Diesel vehicle Examined (A)			Number of Petrol/CNG/LPG Vehicles Examined (B)			Total Vehicles Examined (A) + (B)		
		Ok	Fail	Sub Total	Ok	Fail	Sub Total	Ok	Fail	Grand Total
2010	Jan/Feb	167	262	429	272	210	482	439	472	911
	March	134	164	298	152	73	225	286	237	523
	April	519	353	872	774	233	1,007	1293	586	1,879
	May	475	219	694	554	165	719	1029	384	1413
	June	80	108	188	103	8	111	183	116	299
	July	163	195	358	208	28	236	371	223	594
	Aug/Sep	66	48	114	409	18	427	475	66	541
	September	305	140	445	288	67	355	593	207	800
	October	271	127	398	358	45	403	629	172	801
	November	367	176	543	329	44	373	696	220	916
	December	157	77	234	188	27	215	345	104	449
2011	January	106	124	230	253	26	279	359	150	509
	February	83	53	136	67	8	75	150	61	211
Total		2,893	2,046	4,939	3,955	952	4,907	6,848	2,998	9,846

Note : Ok/Fail mean the test result of whether an emitting smoke and noise from a vehicle exceed the limits as prescribed by National Environmental Quality Standard (NEQS)

Source: Government of Sind, Environment and Alternative Energy Department web-site

3.6 Problem Identification of the Transport System in Karachi

3.6.1 Low Capacity of Bus Service

Most mega-cities in developing countries suffer from a large number of small buses (minibus) which cause serious congestion in the center of these cities. Usually, introduction of a mass transit system can be justified from the huge demand in public transport in these cities.

Karachi is an exception. The number of bus fleets is decreasing while the traffic demand is increasing with rapid population growth, city expansion, and economic growth. Rapid increase in private cars can not explain the reason because car is still expensive in Pakistan and there still remain huge population who can not afford to buy a private car. Note that the number of private cars is also large in major mega-cities in developing countries where a large number of buses are operated.

There are several reasons.

- The number of minibuses and coaches are restricted while introduction of standard size buses has failed.
- Bus service might not be a profitable business in Karachi due to the diesel price increase and politically regulated fare.
- It is allegedly said that transport mafia controls the public transport supply to ensure the profit.
- Bus fleets are often burnt by riot due to social unstable conditions.

3.6.2 Improper Bus Route

The majority of the bus services concentrate on radial directions except the major circular route such as Rashid Minhas Road. Bus routes are designed to provide the service between major origin and destination through high demand routes, and the preferable routes for bus operators are busy while the bus service along non popular routes is poor. There is no hierarchy of bus network, or trunk and feeder system. From this, passengers need to transfer their buses to reach their destination. Since there is no fare integration, passengers need to pay the fare for every transfer.

3.6.3 Poor Road Network

Road network in Karachi has been significantly improved in recent years by construction of flyovers and underpasses. From this, traffic capacity problem is small at present. However, there are some network problems relating urban structure. For example, the access to and from Korangi industrial area is inconvenient because there are few access routes over Malir River. Traffic to and from Clifton area concentrates several intersections on Shah Faisal Road, which cause traffic congestion in the center of the city. Since the drainage system of road system is poor, even at recently developed underpasses, flood is a big problem in monsoon season.

3.6.4 Traffic Congestion

Traffic congestion is one of the serious problems especially in the center of the city. A lot of traffic signals are installed at intersections in the down town area compared to the suburban area. However, traffic is controlled by traffic police in peak hours because of the problems of the signalized intersections.

3.6.5 Demand-Supply Gap of Parking Space

The capacity of public parking is very small compared to the demand in roadside parking. Double parking and illegal parking are common in CBD, which causes serious traffic

congestion. Traffic congestion due to the parking problem is observed along the major roads which do not have frontage roads. CDGK opened a multi level parking building in Saddar but it is not popular due to the location.

3.6.6 Lack of Proper Traffic Enforcement

In Karachi, passenger riding on bus roof top is very popular and observed everywhere although it is prohibited. Double parking and other illegal parking are overlooked without proper enforcement. Since the violations occur due to lack of enough transport services, it is difficult to regulate illegal activities about traffic rules. Corruption of traffic police is one of the reasons.

3.6.7 Complex Institutional and Organizational Structure

Transport sector of Karachi faces a typical administrative problem between a strong mega city and its state government. The complex relation between CDGK and the Government of Sindh was one of the reasons of the failure of the BRT project by ADB.

3.6.8 Absence of Proper Authority of Mass Transit System

Karachi Mass Transit Cell (KMTC) is the responsible agency of the mass transit development and has been engaged in biddings of Priority Corridors and Shaheed Benazir Bhutto CNG Bus Project. However, KMTC has not been given enough authority over project financing, contract for operation and maintenance, control and enforcement over operators, and other essential powers for the implementation mass transit system.

3.6.9 Low Capacity of Power Supply

The revitalization project of Karachi Circular Railway faces typical problems of mass transit system in Karachi: resettlement problems and power supply problem. Under the present situation in power sector in Pakistan, the stability of power supply for electrified railway system needs to be cautiously addressed..

3.6.10 Structure of Problems

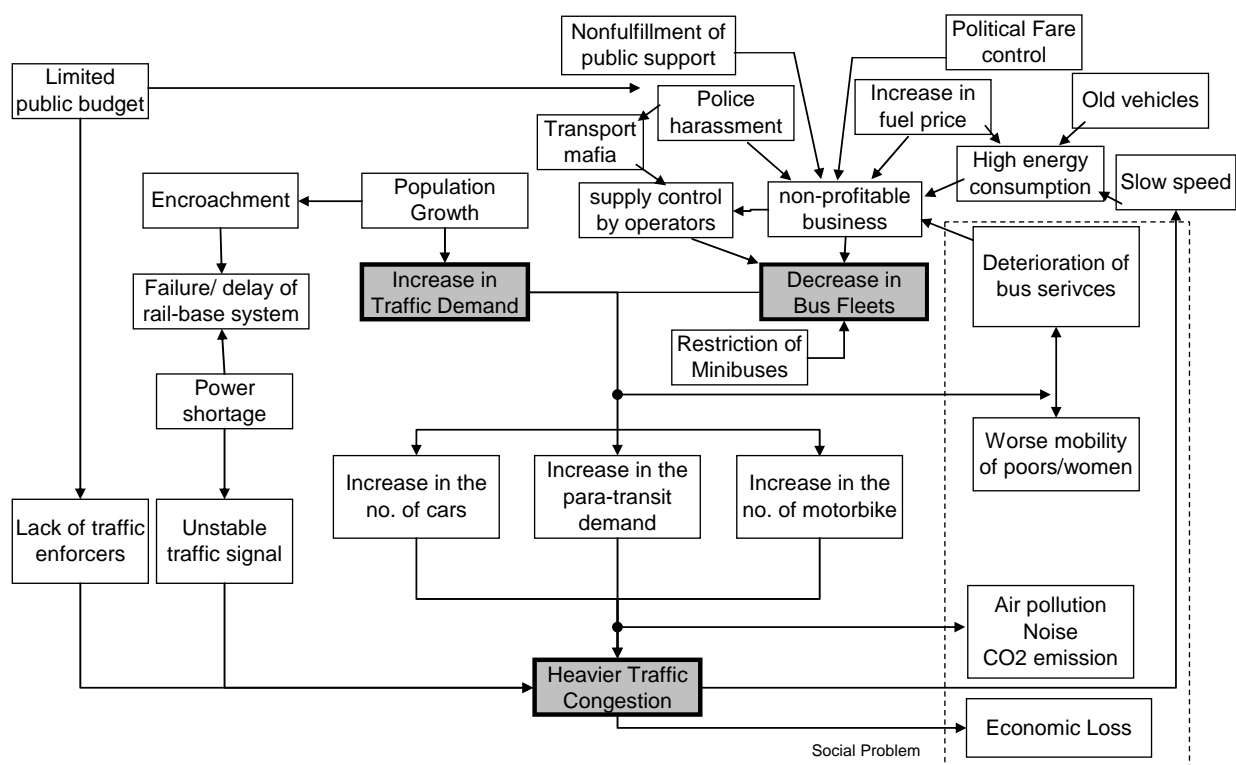
The problems in transport sector are complex and related to each other. The figure below shows the structure of problems observed by the JICA Study Team.

The limited budget of public sector is one of the major reasons of the urban transport problems. Bus operators can not get enough support from the Government. Sometimes they face police harassment which makes them to rely on transport mafia. The bus fare is controlled by the Government at low level, while bus operating cost is increasing due to increase in fuel price and poor fuel efficiency of decrepit vehicles. These factors make the bus operation to be non-profitable business, which results in the decrease in the number of bus fleets. The government restriction on new minibuses is also an important factor for the decrease in buses.

On the other hand, traffic demand continues to increase according to the population growth in Karachi. The population growth brings about encroachment which threatens the transport sector development. It also increases the demand in power sector, which causes power shortage and results in the unstable condition of traffic signal.

The large gap between demand and supply causes the demand shift from buses to rickshaws and Suzuki pickups, and the increase in the number of private cars and motorbikes.

From this, traffic congestion becomes heavy in Karachi, which brings about environmental problems and a large scale of economic loss. The traffic congestion causes low fuel efficiency which is again the cause of poor public transport system in Karachi.



Source: JICA Study Team

Figure 3-6-1 Problem Structure of Transport Sector in Karachi

Chapter 4 Planning Frameworks

4.1 Introduction

In this chapter, various basic future indices are estimated, as fundamental factors, both for urban transport planning and for future traffic demand forecasts.

These future indices consist of major three (3) items such as “Socio-economic frames”, “Future land use” and “Financial framework”.

4.1.1 Socio-economic frameworks

Population, labour force, growth rate of GRDP, car/motorcycle ownership, school enrollment, etc are forecasted as the fundamental factors for future traffic demands estimation. At first, these variables of Karachi were estimated as the control totals and further major factors be broke down into traffic zone level for traffic demand modeling.

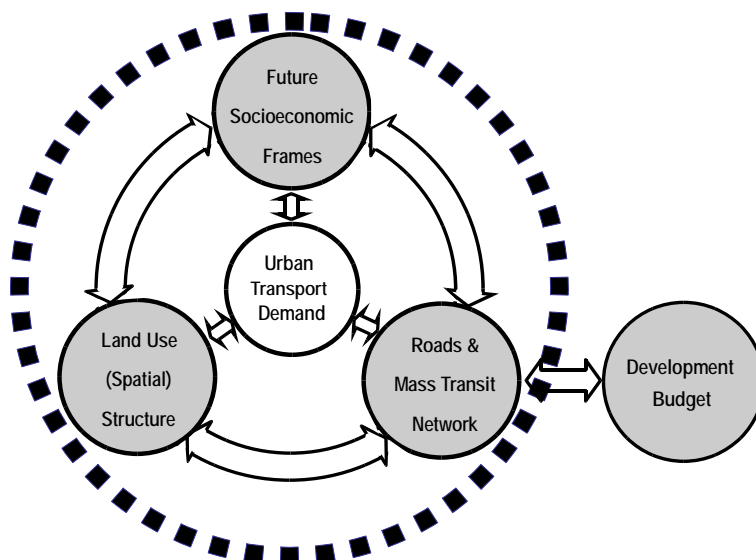
4.1.2 Future land use

Future land use conceptual plan is prepared in order to plan basic transport networks both for roads and mass transit system to cope with future urban development & economic activities. Moreover, detailed population distribution by traffic zone is also estimated for the purpose of traffic demand analysis, both of traffic generation and attraction.

4.1.3 Financial framework

The budget constraints for development in urban transport sector in Karachi were estimated based on the past trends in the expenditures in the transport sector by CDGK, GOS, and GOP.

In addition to the above three, including traffic demands that are analyzed in other chapter. Four items consist of major planning frameworks for urban transport plan as shown in Figure 4-1-1.

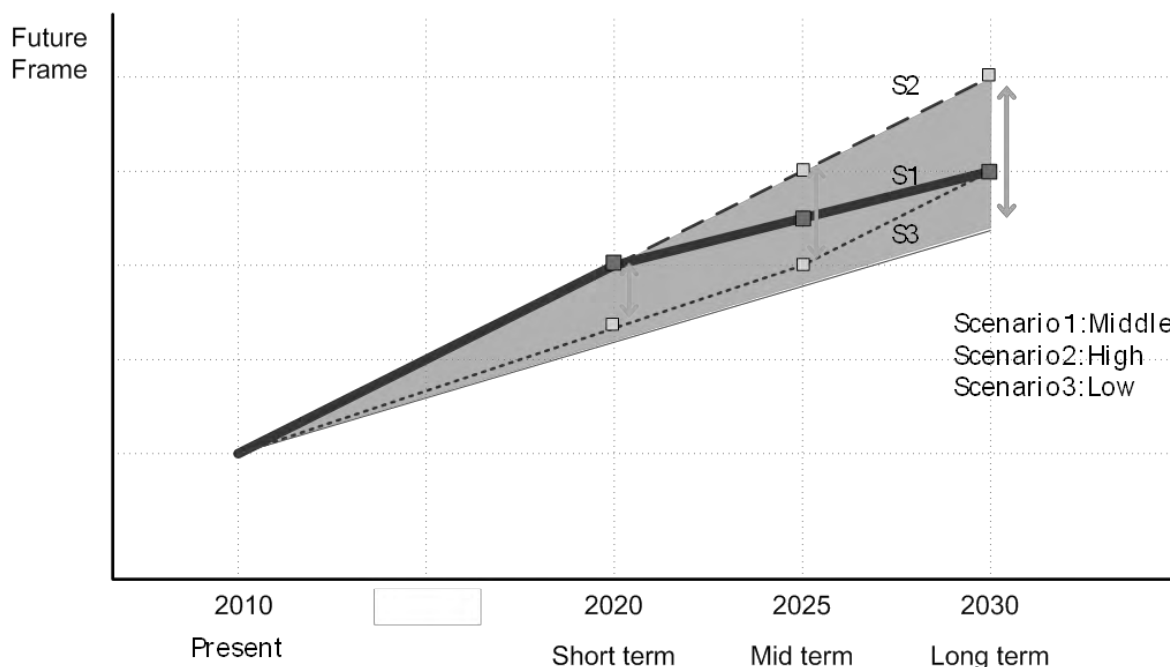


Source: Prepared by the JICA Study Team

Figure 4-1-1 Planning Frameworks

Based on the year 2010 as present, main target years of 2020 and 2030 are set for short-term and long-term plans, and moreover year 2025 is also estimated as supplemental medium-term, if necessary.

Most of socio-economic frames are estimated both by “Town/Cantonment” and by “Traffic zone” in order to analyze various traffic demands both at present and in the future.



Source: Prepared by the JICA Study Team

Figure 4-1-2 Target Years for Planning

4.2 Socio-economic Framework

4.2.1 Total Population in Karachi

Population in Karachi City until 2020 was estimated in KSDP 2020. The Average Annual Growth Rate (AAGR) after 2005 decreases by 0.5% every five years in the estimation by KSDP 2020. The AAGR until 2030 was assumed by the following three patterns (Refer to Table 4-2-1 and Figure 4-2-1).

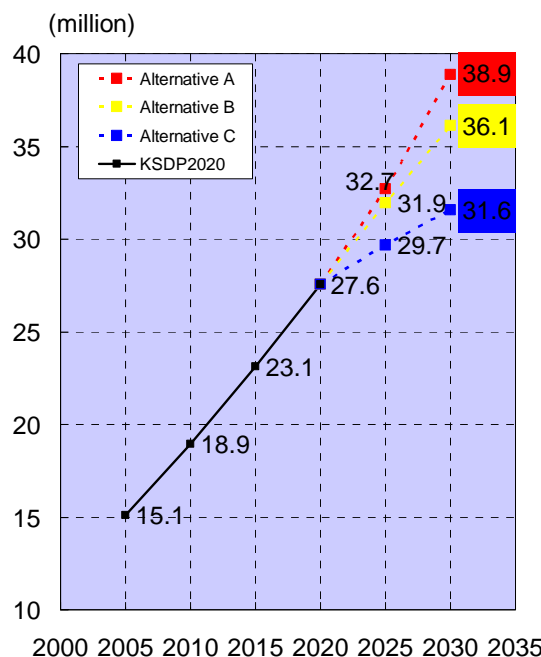
- Alternative A: AAGR (3.5%) until 2020 continues after 2020.
- Alternative B: The trend until 2020 continues and AAGR decreases by 0.5% every five years.
- Alternative C: AAGR indicates a half of Alternative B.

The relation between the population accumulation and AAGR of other populated cities all over the world was plotted in Figure 4-2-2 to examine which pattern Karachi City took among those alternatives A to C, and it was compared with the tendency after 2005 of Karachi City (Refer to Figure 4-2-2). Until 2020, the population of Karachi City is estimated to move by the highest growth rate all over the world. And after 2020, only alternative C is located within the range of growth in other cities. The other A and B are the unexampled growth rates in any other cities. Therefore, the Alternative C is taken for the growth rate of Karachi population after 2020 in this study.

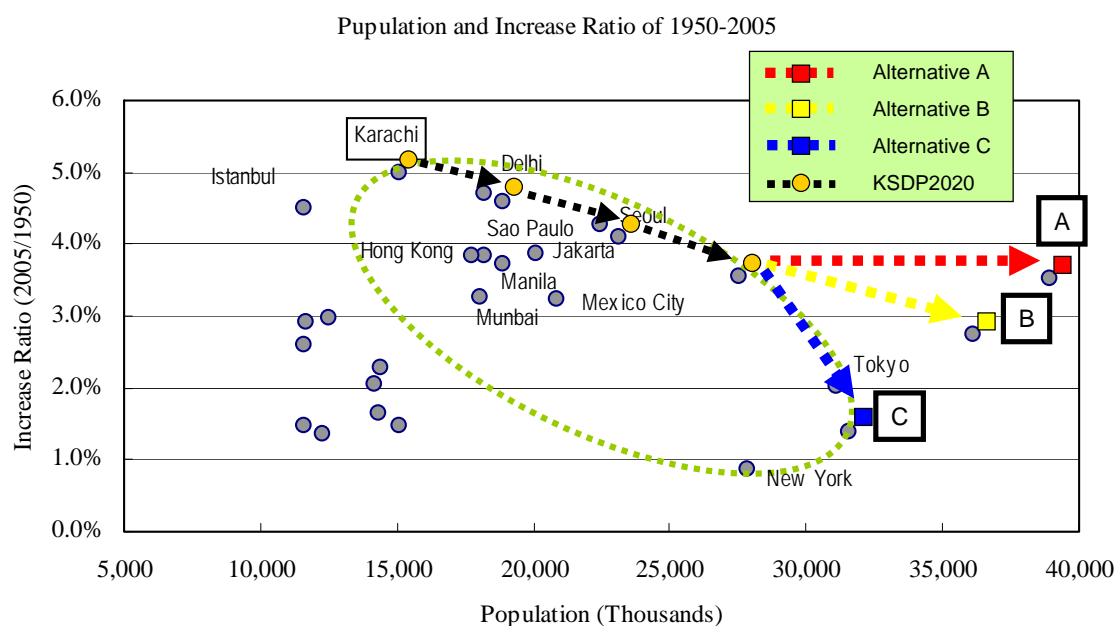
Table 4-2-1 Annual Average Growth Rate (AAGR)

Year	Alternative A	Alternative B	Alternative C
	Rate in 2020 continues	Trend of KSDP2020	Half rate of Alternative B
2005	5.0%		
2010	4.5%		
2015	4.0%		
2020	3.5%		
2025	3.5%	3.0%	1.5%
2030	3.5%	2.5%	1.25%

Source: JICA Study Team/ KSDP 2020



Source: JICA Study Team

Figure 4-2-1 Estimation of Future Population after 2020

Source: Tableaux de l'Économie Française

Figure 4-2-2 Population and Growth Ratio of Other Cities in the World**Comment by KMTC**

The result of this projection was explained in several meetings during the study period such as an expert meeting on 27th October, 2012, 2nd Technical Committees, and 2nd Joint Steering Committees (see Appendix-1). The JICA Study Team considers the projection is proper for the purpose of the transportation planning, but KMTC made a comment on the projection as:

Population projections that have been carried out in the study seem to be unrealistic in case of Karachi. The reason being a latest report published by 'National Sustainable Development

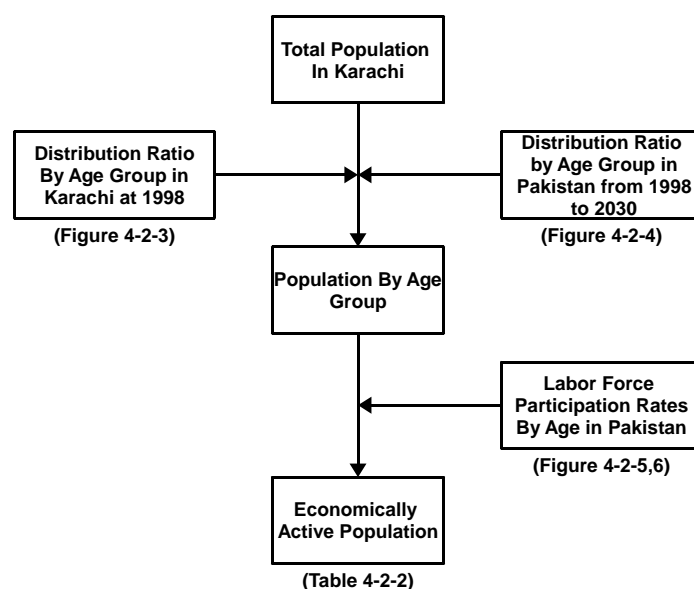
Strategy on the topic of 'Pathway to a sustainable Pakistan – May 2012' suggests that almost 60% of the population of Pakistan is below 30 years. This leads to the fact that all these people would get married in near future and would give birth to a new generation and hence the population would be significantly increased. Now comparing the trend of population increase in Karachi with Japan is unrealistic as the major chunk of population of Japan is above 60% and hence there are more chances of the fact that the increase would get stagnant by the year 2030, however in case of Karachi this approach could be unrealistic.

Note that the JICA Study Team applied the same projection as KSDP 2020, which was the official document of CDGK, after the review of the projection. Therefore, the projections in KSDP 2020 and this study are the same up to 2020. Figure 4-2-1 shows that the population projection after 2020 is not underestimate. Regarding population of the young generation, Figure 4-2-3 shows that the population of the age group 0-5 years old is smaller than the group of 6-10 years old.

4.2.2 Economically Active Population

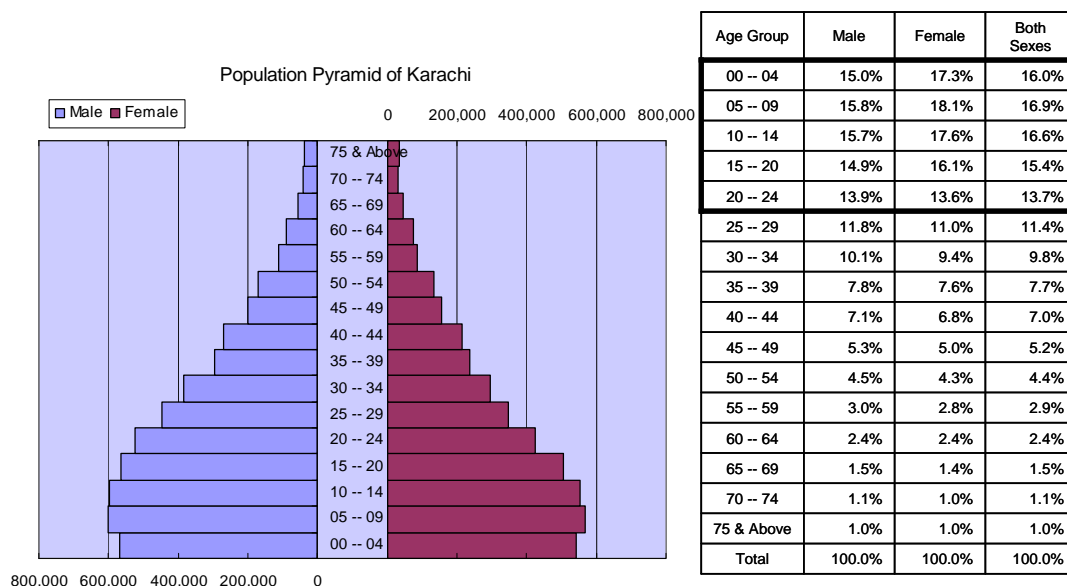
As shown in the figure below, the economically active population that becomes the base of employment is estimated by using such three factors as total population, distribution ratio by age group and labour force participation rate by age.

- Step 1: The population distribution ratio by age group until 2030 is estimated based on the both ratios of Karachi City at 1998 (Refer to Figure 4-2-3) and of Pakistan from 1998 to 2030 (Refer to Figure 4-2-4).
- Step 2: The population by age group of Karachi City in the future is calculated by multiplying Karachi future population by distribution ratio by age group estimated in Step 1.
- Step 3: The number of employment in the future is calculated by multiplying this population by age group from Step 2 by labour force participation rate by age as shown in Figure 4-2-5



(1) Distribution ratio by age group in Karachi at 1998

According to the 1998 population census, about 80% of the overall population consisted of age groups at less than 25, and it was found that Karachi was remarkably a low-aged city.

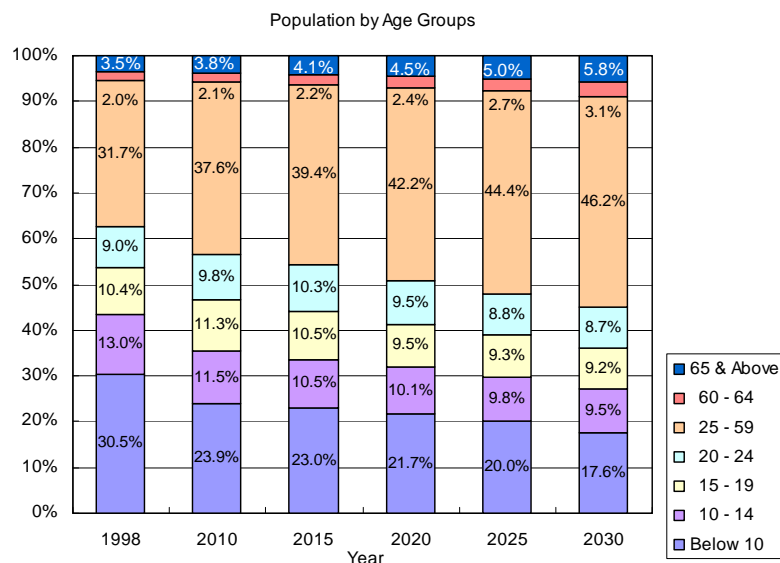


Source: 1998 CENSUS

Figure 4-2-3 Population Pyramid of Karachi

(2) Composition by age group in Pakistan from 1998 to 2030

Figure 4-2-4 shows the projection of the composition of population by age group in Pakistan from 1998 to 2030. This is the estimation by Pakistan Statistics Bureau. The population of age group of ten years old or less was projected to decrease, while the population of age group of 25 to 59 years old was projected to increase. That means that potential employment will increase in the future.

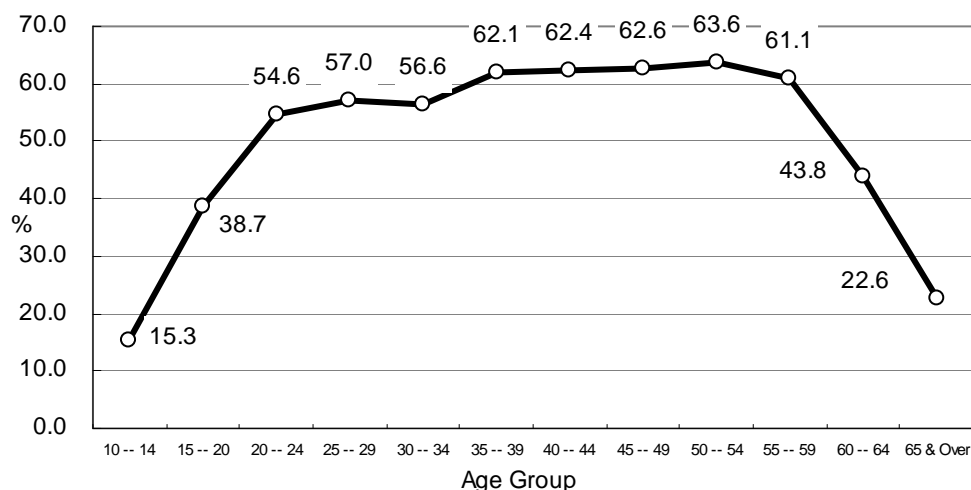


Source: Planning & Development Division, June 2010

Figure 4-2-4 Population by Age Groups in Pakistan

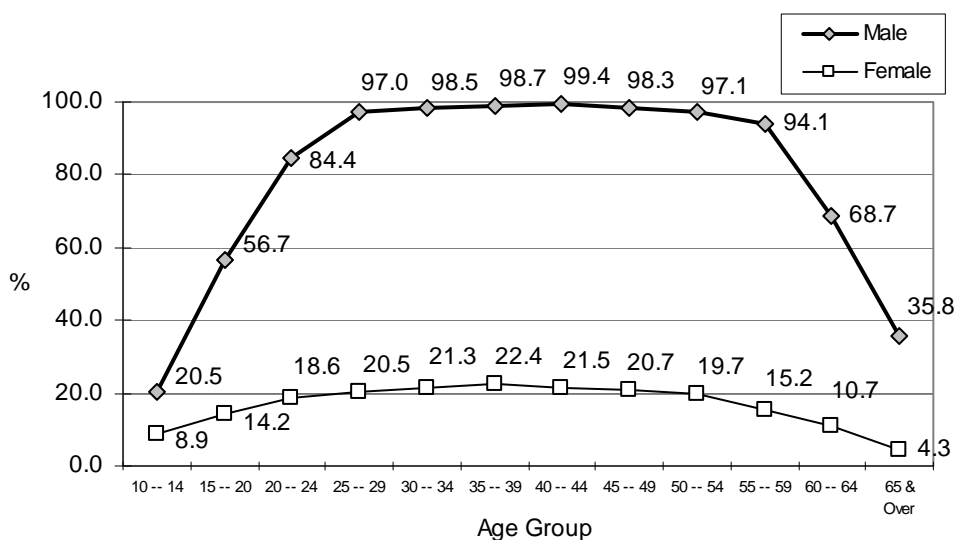
(3) Labour force participation rates

The labour force ratio (labour force / population) exceeds 50% in the age group of 20-59 years old as shown in Figure 4-2-5. The labour participation rate of the woman is rather smaller than that of the man as shown in Figure 4-2-6. If the women's participation in society advances in the future, the number of employees will rapidly increase, and it becomes one of the factors of the increase in traffic demand.



Source: Labour Force Survey 2008-2009

Figure 4-2-5 Labour Force Participation Rates (Both Sexes)



Source: Labour Force Survey 2008-2009

Figure 4-2-6 Labour Force Participation Rates by Age and Sex

(4) Economically active population

Table 4-2-2 shows the result of the estimation of economically active population in Karachi. The labour force was estimated to increase from about 7.4 million in 2010 to about 13.7 million in 2030, and the participation ratio was estimated to increase from 39.2% to 43.3%.

Table 4-2-2 Projection of Economically Active Population in Karachi

Year	Age Group								Econ. Active/ Population
	Below 10	10-14	15-19	20-24	25-59	60-64	65 & Above	Total	
2010	3,604,834	2,051,982	2,347,764	2,088,955	7,986,094	332,754	517,617	18,930,000	39.2%
	-	314,770	907,650	1,141,410	4,791,440	145,810	116,930	7,418,010	
2015	4,215,702	2,267,930	2,637,632	2,682,719	10,212,368	428,333	676,316	23,130,000	40.2%
	-	349,280	1,019,710	1,465,840	6,123,210	187,700	152,780	9,299,000	
2020	4,738,921	2,623,810	2,837,998	2,945,092	12,958,406	562,245	883,528	27,550,000	41.1%
	-	402,490	1,097,170	1,609,200	7,775,150	246,380	199,590	11,330,000	
2025	4,687,829	2,732,171	2,991,008	2,904,729	14,638,682	661,473	1,064,109	29,680,000	42.1%
	-	419,110	1,156,320	1,587,140	8,801,240	289,860	240,380	12,494,000	
2030	4,367,447	2,809,826	3,115,242	3,054,159	16,156,499	794,081	1,282,747	31,580,000	43.3%
	-	431,030	1,204,350	1,668,790	9,747,400	347,970	289,770	13,689,000	

Note: Upper = Population, Lower = Labour Force Participation

Source: Estimated by JICA Study Team

Table 4-2-3 shows the comparison between the estimation and the result of KMP 2020. The participation rate in the estimation increases every year, while its rate in KMP 2020 decreases every year. The participation rate should increase considering the economic growth in the future. Therefore, the JICA Study Team's estimation is more appropriate than that of KMP 2020.

Moreover, it was assumed that the number of employments is equivalent between the working place base and the residence base in this study.

Table 4-2-3 Comparison between KMP2020 and JICA Study Team

Result of Both Studies

Year	KMP2020		JICA Study Team
	Trend Employment	Predicted Employment	
2010	7,469,683	9,018,102	7,418,010
2015	8,342,307	10,326,734	9,299,000
2020	9,408,335	11,576,369	11,330,000
2025	-	-	12,494,000
2030	-	-	13,689,000

Participation Rate of Both Estimations

Year	Population	KMP2020		JICA Study Team
		Trend Employment	Predicted Employment	
2010	18,930,000	39.5%	47.6%	39.2%
2015	23,130,000	36.1%	44.6%	40.2%
2020	27,550,000	34.2%	42.0%	41.1%
2030	31,580,000	-	-	43.3%

Note: KMP 2020 = Karachi Master Plan -2020, Transport Sector Report

Source: KMP 2020, Estimation in KTIP

4.2.3 Growth of GRDP in Karachi

As there are no sufficient data on Gross Regional Domestic Products of Karachi, but Pakistan GDP, only growth rate tendency was estimated for the demand forecast.

Table 4-2-4 shows annual growth rates of GDP of Pakistan in the last 10 years. They fluctuate widely from -3.7% to 15.5% by sector.

In accordance to discussions with chief economist of Planning & Development, Government of Sindh, it is concluded that Pakistan GDP growth rate and Karachi GRDP growth rate might be considered as same based on the following reasons:

- About 99% of Pakistan agriculture activities are outside of Karachi,
- More than 70% of small and medium industries are located outside of Karachi,
- More than 70% of service industries are operating in Karachi,
- Both agriculture and manufacturing contribute 25% and service sector 50% to total GDP.

Average annual growth rates of GDP were calculated using the time series data from 2000-01 to 2009-10 for the following two scenarios.

- Simple average of 10 years,
- 8 years' average excluding both maximum and minimum data.

The average growth rate of (A) was calculated as 2.5% while that of (B) was calculated as 4.7%.

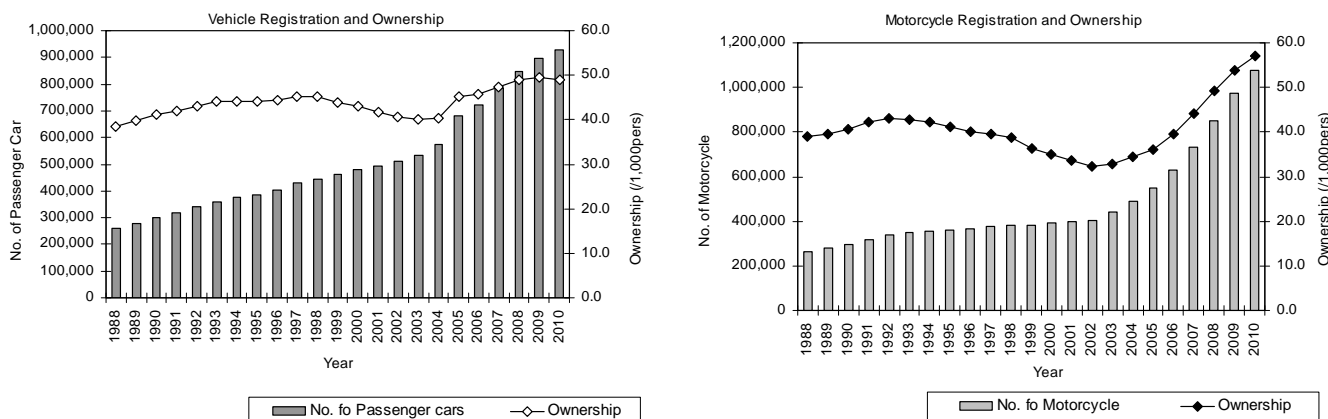
Table 4-2-4 Trends of GDP Growth(%), Pakistan

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09R	2009-10P	Average (10 years)	Average (8 years)
Gross Domestic Product	2.0	3.0	4.7	7.5	9.0	5.8	6.8	3.7	1.2	4.1	2.5	4.7
- Agriculture	-2.2	0.1	4.1	2.4	6.5	6.3	4.1	1.0	4.0	2.0	1.5	2.2
- Manufacturing	9.3	4.5	6.9	14.0	15.5	8.7	8.3	4.8	-3.7	5.2	3.9	7.7
- Commodity Producing Sector	0.8	1.4	4.3	9.2	9.5	5.1	6.6	1.3	0.8	3.6	2.2	4.0
- Service Sector	3.1	4.8	5.2	5.9	8.5	6.5	7.0	6.0	1.6	4.6	2.8	5.4
Source: Economic Survey 2009-10												

4.2.4 Car Ownership

(1) Car ownership of Karachi in last 20 years

Figure 4-2-7 shows the car ownership in Karachi from 1988 to 2010 (left chart: passenger cars, right chart: motorcycle). After 2003, car ownership in Karachi demonstrates an upward trend. Especially the growth rate of motorcycle is remarkably high.



Source: Prepared by the JICA Study Team based on data from Excise and Taxation Department, CDGK

Figure 4-2-7 Car Ownership in Karachi from 1988 to 2010

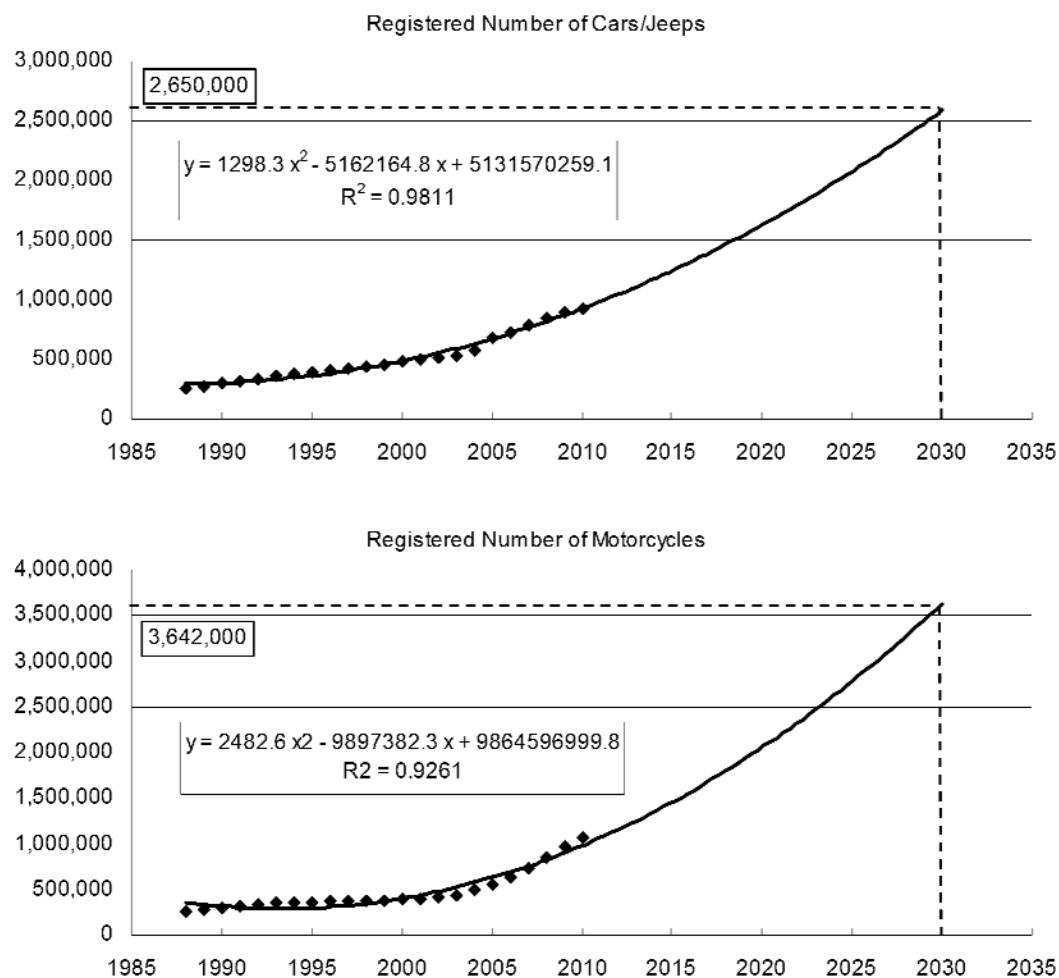
(2) Estimation of Number of Vehicles

The registered numbers of private cars and motorcycles in the future were forecasted based on the linear regression method with the actual number from 1988 to 2010. The registered numbers of private cars and motorcycles in 2030 were estimated at 2.65 million and 3.642 million, respectively as shown in Table 4-2-5. The registered number of cars and motorcycles per 1,000 people in 2030 were estimated at 83.9 and 115.3, respectively, which would be 1.71 and 2.02 times the number in 2010.

Table 4-2-5 Future Car / Motorcycle Ownership

	Car		Motorcycle	
	Registered Number	Ownership (veh./1,000 population)	Registered Number	Ownership (veh./1,000 population)
2010	939,000	49.7	896,000	47.4
2020	1,665,000	60.0	2,021,000	72.8
2025	2,125,000	71.6	2,769,000	93.3
2030	2,650,000	83.9	3,642,000	115.3

Source: JICA Study Team Estimation



Source: Estimated by the JICA Study Team

Figure 4-2-8 Registered Number of Vehicles and Motorcycles

4.2.5 Number of Students

The number of schools and students of public primary and secondary schools were 3,593 schools and 575,950 enrollments in 2009-10 as shown in Table 4-2-6. Those of private schools were 3,822 schools and 963,258 enrollments in 2000 as shown in Table 4-2-7. The latest data of private schools after 2000 was not available. Although the data of private schools is older, it can be said that the number of schools and enrollments of private sector are larger than the public sector. The number of enrollments in 2010 was estimated at 1,593,700 in primary schools and at 679,400 in secondary school, respectively, assuming the annual growth rates of 5.8% and 5.2%, respectively as shown in Table 4-2-8.

Table 4-2-6 Number of School and Enrollment by SEMIS (2009-10)

No.	Town	No. of Schools			Enrollment		
		Primary	Secondary	Higher	Primary	Secondary	Higher
1	Baldia	89	18	0	13,292	4,063	0
2	Bin Qasim	160	38	1	16,111	5,407	505
3	Gadap	409	66	4	39,157	6,711	2,256
4	Gulberg	98	38	4	12,853	6,783	1,724
5	Gulshan	88	32	1	13,528	7,041	618
6	Jamshed	172	76	5	24,699	16,835	1,736
7	Keamari	155	36	0	18,736	5,459	0
8	Korangi	107	43	2	27,141	19,167	1,005
9	Landhi	161	41	2	22,243	11,622	1,356
10	Liaquatabad	153	81	4	26,523	17,898	3,026
11	Lyari	209	49	1	25,466	12,146	444
12	Malir	148	53	0	21,257	15,528	0
13	New Karachi	174	48	0	31,697	20,229	0
14	North Nazimabad	86	33	1	13,056	5,355	1,752
15	Orangi	139	28	2	22,176	9,343	1,279
16	Saddar	193	76	4	21,586	10,338	809
17	Sha Faisal	99	38	1	12,925	10,769	810
18	SITE	123	36	2	20,042	8,768	600
	TOTAL	2,763	830	34	382,488	193,462	17,920

Source: Sindh Educational Bureau

Table 4-2-7 Private Educational Institutions and Enrollment (2000)

No. of Schools			Enrollment		
Primary	Secondary	Total	Primary	Secondary	Total
1,419	2,403	3,822	676,589	286,669	963,258

Source: Year Book 2009, Federal Bureau of Statistics

Table 4-2-8 Number of Students in Karachi

	Public School		Private School		Total	
	Primary	Secondary	Primary	Secondary	Primary	Secondary
2000			676,589	286,669		
2009	382,488	193,462				
2010	404,672	203,522	1,188,999	475,925	1,593,672	679,447
Remarks	5.8%/year	5.2%/year	5.8%/year	5.2%/year		

Source: Estimation of JICA Study Team

Table 4-2-9 shows the estimation of the number of enrollments in 2010 based on the statistics data and the available information.

It was estimated that the number of enrollments was 2,545,000 in 2010, which was 38% of the school age population. The percentages were 86.0% in primary schools, 31.3% in secondary schools, 18.3% in tertiary schools, and 5.8% in universities.

Although the percentage of enrollments to the school age population is low for all stages, it will increase in the future. The future percentage of enrollments to the school age population in each stage of education was estimated as shown in Table 4-2-10. For example, the percentage will improve from 31.3% in 2010 to 80.0% in 2030. For university, it will double from 6.5% to 13.0%. School age population was calculated by the total population of the city and the percentage of school age.

The number of enrollments in 2030 was estimated by multiplying the school age population and the percentage of enrollments.

Table 4-2-9 Estimation of Enrollments in 2010

	Percentage of School Age	No. of School Age	Percentage of Enrollments	Enrollments
Primary	9.8%	1,854,100	86.0%	1,593,700
Secondary	11.5%	2,172,400	31.3%	679,400
Tertiary	5.0%	940,000	18.3%	172,500
University	8.1%	1,526,000	6.5%	99,200
Total	35.4%	6,691,100	38.0%	2,544,800

Source: Estimation of JICA Study Team

Table 4-2-10 Estimation of Enrollments in 2030

	Percentage of School Age	No. of School Age	Percentage of Enrollments	Enrollments
Primary	7.9%	2,482,400	100.0%	2,482,400
Secondary	9.3%	2,934,800	80.0%	2,347,840
Tertiary	3.9%	1,247,300	50.0%	623,650
University	7.8%	2,457,900	13.0%	319,527
Total	28.9%	9,122,400	63.3%	5,773,417

Source: Estimation of JICA Study Team

4.3 Land Use Plan

4.3.1 Basic Concept for Future Land Use

(1) Schematic urban structures

Karachi faces rapid population growth with an annual increase rate of 4.2% in the last five years, and the present population (2010) was estimated at 18.9 million. The population will be 27.5 million in 2020 and 31.6 million in 2030. This will bring about the expansion of the city size. There are two alternatives of the urbanization pattern to cope with the above-mentioned very strong urban growth pressures.

One is so called natural “urban sprawl” pattern.

Arterial roads, especially in radial directions from the old city center towards every hinterland except for Arabian Sea, are rather well developed in Karachi, such as RCD Highway, Chaudry Faisal Ellahi Road, University Road, Shahra-e-Faisal & National Highway, and Korangi Road.

Therefore, its urban growth is easy to follow the natural spread and sprawl pattern along these arterial roads. The historical urban growths clearly indicate this pattern since the independence, and urbanized area already expanded within 10 to 15km radius area.

Judging from the efficiency of urban activity, especially in urban traffic movements, this urban structure causes a variety of disadvantages and results in serious stagnation of urban activities in case of large scale metropolitan area.

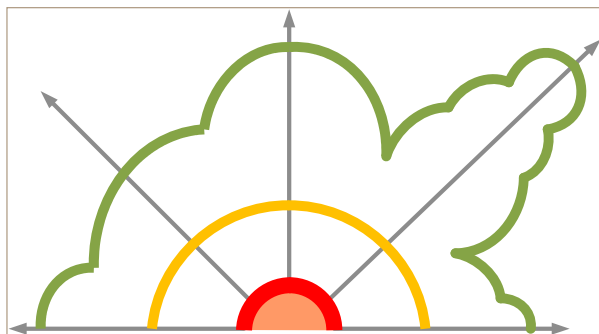
As historical urbanization in Karachi basically succeeds such a pattern, it is not so easy to divert its tendency drastically both in future.

However, it is necessary to aim at better development pattern in order to cope with a huge amount of increasing population in future, keeping proper urban economic activities.

In order to avoid such disadvantages caused by free sprawl development without proper planning, another alternative development pattern will be recommended following the existing urban structure of Karachi; that is, “*Multi-Satellite City Cores Development*” pattern. For this development pattern, it is inevitable to strengthen the circumferential transport network together with radial corridors and also to create the satellite urban cores for dispersal of various urban functions that were located within the old CBD area.

A schematic diagram is illustrated in Figure 4-3-1.

Natural Sprawl Development without Proper Planning



Source: JICA Study Team

Multi-Satellite City Cores Development

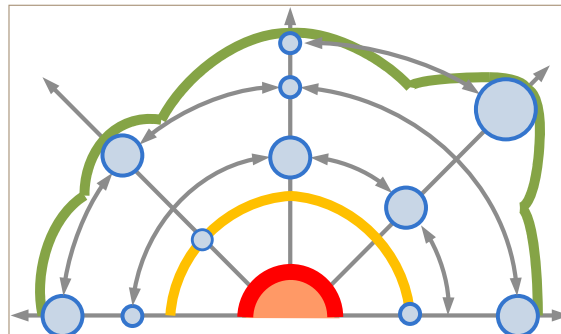
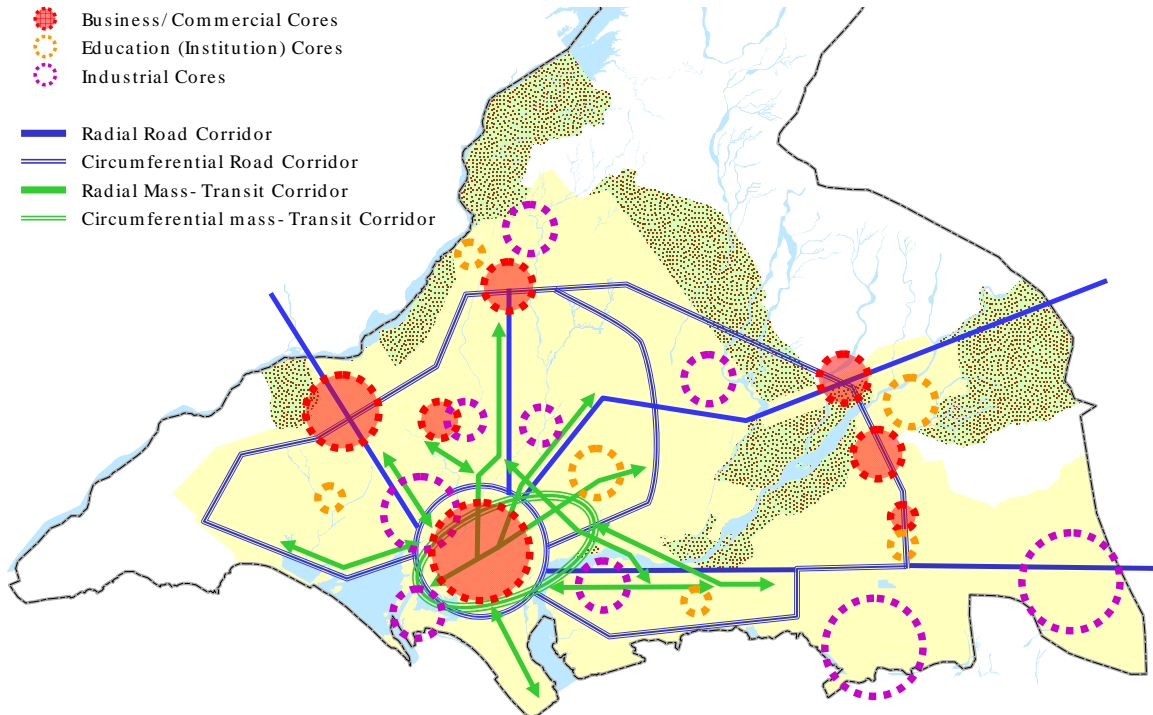


Figure 4-3-1 Schematic Urban Structures

(2) Future urban structure of Karachi

The future urban structure was formulated based on the “Multi-Satellite City Cores Development” pattern as shown in Figure 4-3-3. This will be a basic guideline of future urban development of Karachi. The urban transport network including roads and mass transit systems was examined in accordance with this development guideline.



Source: Prepared by the JICA Study Team

Figure 4-3-2 Future Urban Structure, Karachi (2030)

4.3.2 Future Land Use Planning

In accordance with the future socio-economic framework examined in the previous section, the future land use plan for 2030 was formulated as one of most important urban transport planning frameworks.

As the fundamental future land use plan for the year 2020 was established and legally approved in KSDP 2020, basic plan and planning directions of the land use plan in 2030 followed KSDP 2020 in line with its concept. Therefore, the land use plan in this study completely follows for 2020, and some additional examinations are considered for the year 2030.

Considering the results of various discussions with some experts of urban planning in Karachi, such as urban planners, urban consultants, EDO (T&C), NGO on urban planning, senior research economist, Prof. NED University, EDO (works), etc., following planning directions were applied.

- To follow KSDP 2020 policies,
- Prevention of new expansions outside of KSDP 2020 urbanization boundary in principle,
- High density development in Inner-city and Core areas,
- Densification and infilling within KSDP 2020 urbanization boundary.