

CHAPTER 6: HARDWARE OPPORTUNITIES

The formation of transport corridors, and the hardware (infrastructure) projects contained therein, is discussed in this chapter. The underlying planning horizon extends through year 2027. The paralleling humanware and software projects are presented in subsequent Chapters 7 and 8, respectively.

The MiNTS Hardware Component

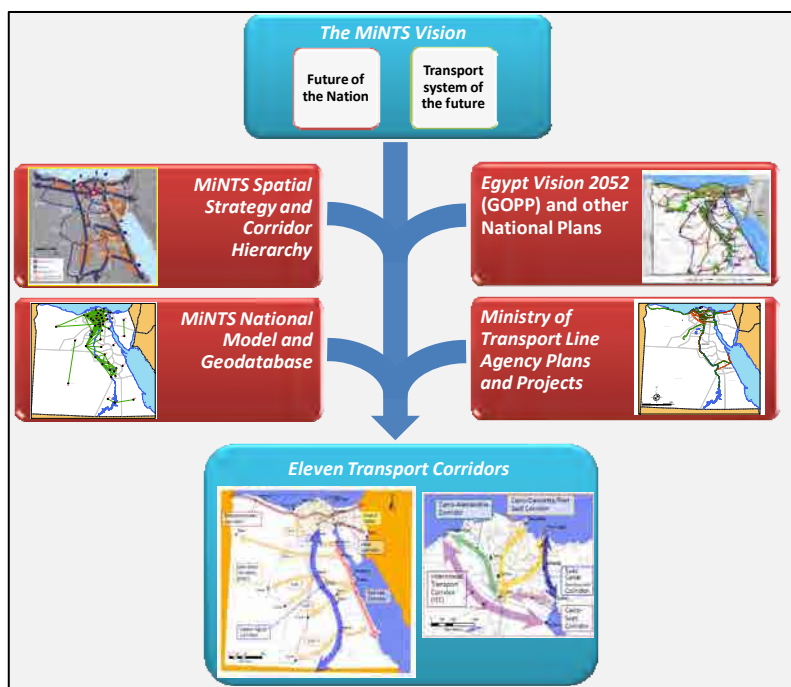
A total of 92 hardware (infrastructure) projects have been nominated. Background information is contained in *Technical Reports 1 through 4* describing the road, rail, inland waterway and maritime sectors, respectively. Prioritization of hardware (infrastructure), humanware and software projects is further discussed in Chapter 9 of this volume. The hardware projects include, in summary:

Road	Expressway	15 projects includes a) new construction (3), b) widening/improvement (2) and c) upgrade arterial to expressway (10)
	Arterial Road	33 projects including a) new construction (19) and b) widening (14)
	Main Grade Separations	Two bridges and one tunnel
Railway	High Speed Railway	Alexandria – Cairo and Cairo – Aswan
	New Railway Link and Double/Triple Tracking	Eight new railway links and five double/triple tracking projects
	Others	Includes improvement of track, signal and station for cargo
Inland Waterway Transport	Ports	Port enhancement/development in Upper Egypt and Cairo region
	Waterway	Improvement via dredging to enhance safety and navigability; also prevent sedimentation build-up in major fairways.
	Locks	Lock expansion and improvement of operation to enhance capacity
Maritime	Container/multi-purpose Terminals	New construction at Alexandria and Dekheila ports; development of port terminal management
	Channel and Basin	Countermeasure for sedimentation in Damietta Port
Logistics	6 October Value Added Logistics (VAL) Center and nationwide logistics center development	
Passenger Terminal	Inter-modal passenger terminals, nationwide	

6.1 CORRIDOR AND PROJECT FORMATION

The preferred transport scenario, as discussed in the previous chapter, represents the underlying consideration that guides the formation of transport corridors and, ultimately, evolution of the Master Plan. The formation of the corridors was finalized in close consultation with representatives of the Steering Committee and Ministry of Transport. Broader inputs were obtained via the conduct of a public workshop and seminar. The schematic activity flow is noted in Figure 6.1.1.

The underlying rationale is formed by the MiNTS vision, that is, a balanced transport system with a dynamic linkage to the national developmental fabric. Important contributors are the MiNTS spatial structure, which encompasses the entire country-wide transport network. This is defined with a view to interconnecting key urban centers and/or economic activity concentrations; that is, a hierarchy of connections between national centers, regional centers and gateway centers.



Source: JICA Study Team

Figure 6.1.1 Defining the Transport Corridors

These may also be seen as agglomerations of various activities, and thus regarded as transport nodes which either generate or attract freight and passenger demands, serve as important distribution centers for hinterland activities or provide international linkages. A

Table 6.1.1 The MiNTS Corridors

Corridor Designations	
1	Mediterranean Corridor
2	Intermodal Transport Corridor (ITC)
3	Cairo-Alexandria Corridor
4	Cairo-Damietta/Port Said Corridor
5	Cairo-Suez Corridor
6	Sinai Corridor
7	Suez Canal Development Corridor
8	Inland Delta Corridors
9	Red Sea Corridor
10	Upper Egypt Corridor
11	East-West Corridors

Source: JICA Study Team

variety of developmental plans espoused by various Ministries and entities was considered to include, among others, the GOPP, Ministry of Agriculture, Ministry of Industry and Ministry of Tourism. The current (2007/08 - 2012/13) and pending (2012/13 - 2017/18) national Five-year Plans were scrutinized, as were on-going transformation efforts such as the *ENR Strategic 10 Year Plan* as well as NICHE/RIRT efforts in the inland waterway sector.

Detailed consultations were carried out at various junctures of the process within the Ministry of Transport, including all line agencies, to ensure that on-going and planned projects are integrated with the corridor formation process. The MiNTS national transport model, and correlated

geodatabase, were used to quantify the various relationships in that future transport demand is directly derived from parameters associated with the future socio-economic framework.

The resultant eleven corridors (Table 6.1.1 and Figure 6.1.2) are expected to predominately, but not exclusively, contain grouped components of (hardware) projects. The most significant corridors are:

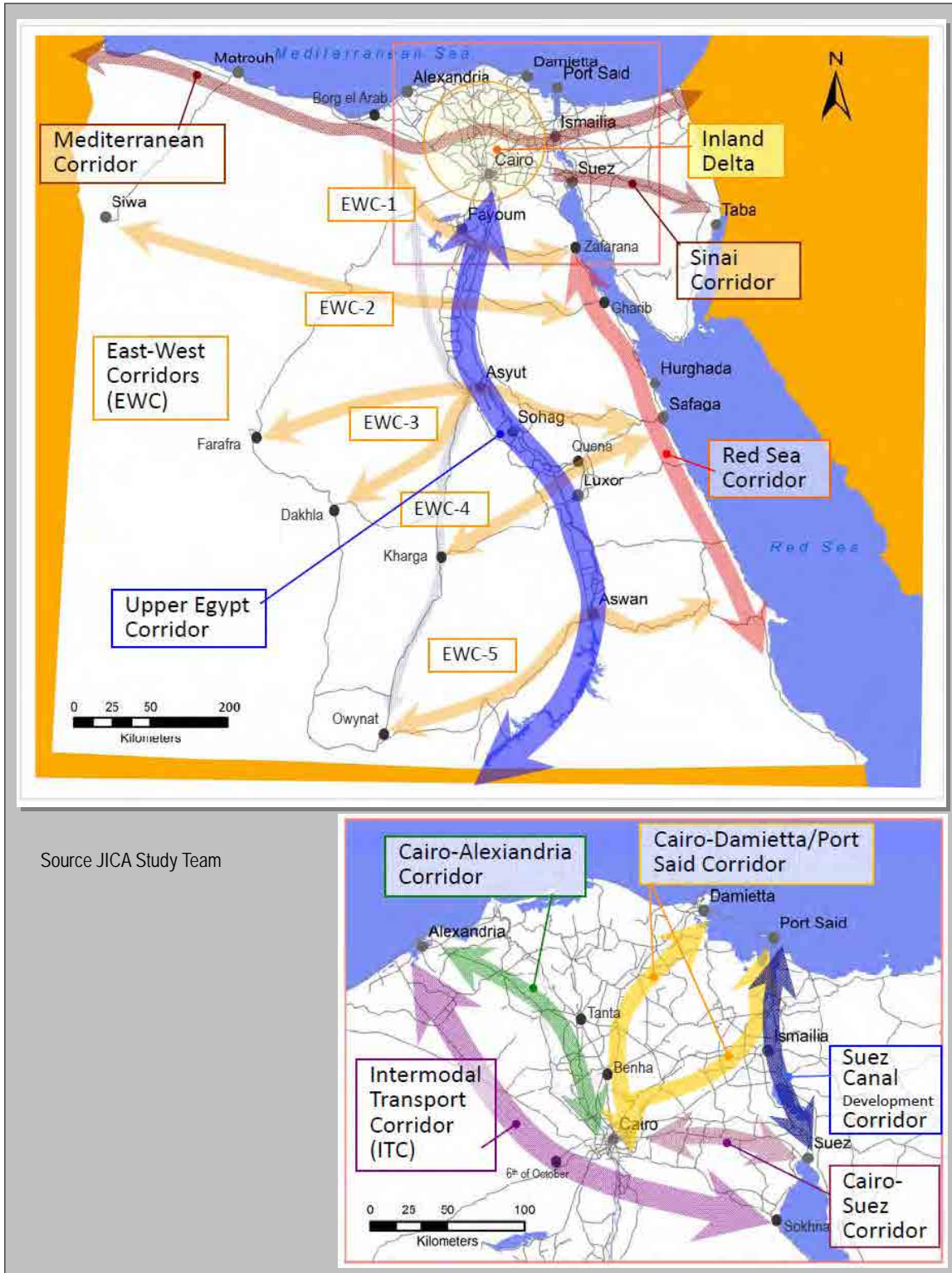


Figure 6.1.2 Year 2027 MiNTS Transport Corridors

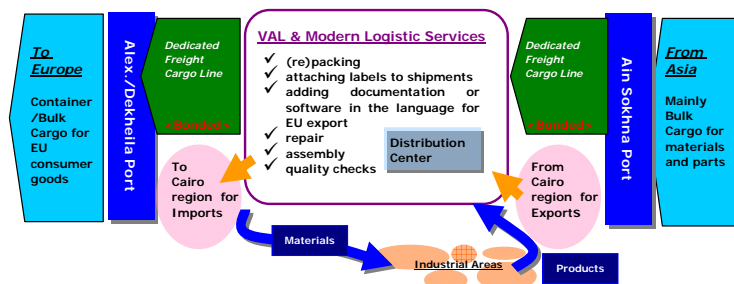
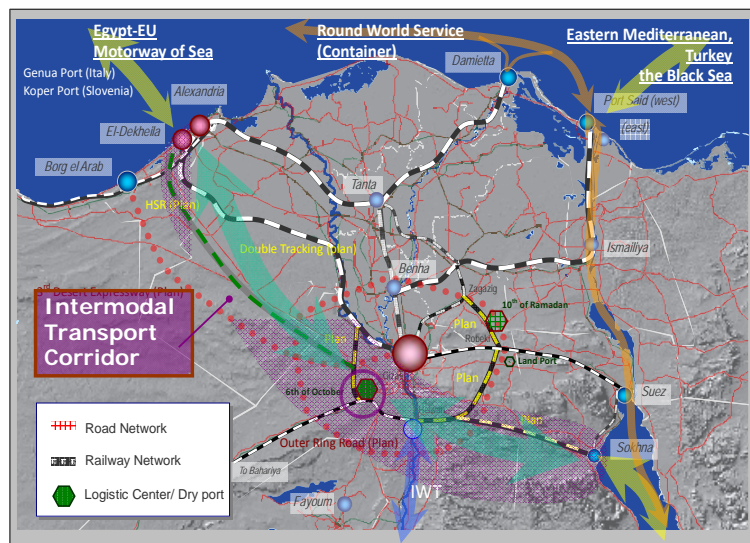
- The Mediterranean Corridor linking Libya with Palestine via Marsa Matrouh, El Alamein, Greater Cairo (Northern segment of Cairo Outer Ring Road), Ismalia, and the Suez Canal-North Sinai Area.
- The Intermodal Transport Corridor linking the 6th of October Value Added Center with both the Alexandria-area seaports and Sokhna port. The corridor is expected to focus on the logistics of efficient freight flow.
- The Red Sea Corridor parallels the Red Sea/Gulf of Suez between approximately Zafarana and Bernees, with a potential for strengthening the current linkage with Sudan. Key intermediate points are Gharib, Hurghada and Safaga.
- The Upper Egypt Corridor paralleling the Nile River between Greater Cairo and Aswan, with a potential extension to create a new gateway to Sudan (Khartoum).

Four additional corridors service east-west axes within Central and Upper Egypt. These connect Siwa and Gharib; Farafra/Dakhla and Safaga (via Asyut); Kharga and Safaga (via Luxor/Quena), as well as Owynat and Bernees (via Aswan). All corridors are designed to provide system continuity, linkage between intermediate settlements, and distribution potential among all corridors.

6.2 A FOCUS ON LOGISTICS: THE INTERMODAL TRANSPORT CORRIDOR

One important corridor for sustainable freight transport is the proposed Intermodal Transport Corridor (ITC), linking the 6th of October Value Added Center with both the Alexandria-area seaports and Sokhna port. The ITC is seen as also directly linking with the EU "motorway of the sea" connecting Alexandria, Genoa and Koper ports.

The ITC will focus in the first instance on container traffic between Egypt and Europe, with destination/origin in Egypt or transiting Egypt. But the corridor will also and gradually concentrate on traffic from Asia, in particular China, destined for the European markets where the Egyptian transport sector will provide in-country value added services. The added value of the ITC corridor is the provision of contract logistics services, a segment of the transport sector at



In 6th of October and various area within the Cairo greater region with good transport linkage

Source: JICA Study Team

Figure 6.1.3 Concept of Intermodal Transport Corridor

present hardly or not available in Egypt. Along the ITC, specialized logistics service providers will offer cost-efficient and customer-tailored logistics solutions for products originating from Asia and destined for the European markets that meet the specific needs of European clients.

It is emphasized that Port Said and the Damietta Ports will continue to play their important roles for round world container shipping service and windows for trading to Eastern Mediterranean, Turkey and the Black Sea.

6.3 CANDIDATE HARDWARE PROJECTS

Each hardware project was, in the first instance, evaluated using, among other techniques, the MNAM and MiNTS geodatabase. This provided a series of quantitative parameters such as

- locations and alignments for road/railway/inland waterway transport/port projects, to include length and area.
- Operational considerations and capacity for carrying cargo and passengers, that is, number of lanes and speed limitation for roads, average speed and operational speeds for railway and inland waterway transport and capacity for lock operation.
- Costs using unit cost estimated for capital works and maintenance.

Underlying details are found in the previously-referenced *Technical Reports 1 through 4*. Both quantitative and qualitative parameters subsequently formed the basis for project prioritization (Chapter 9).

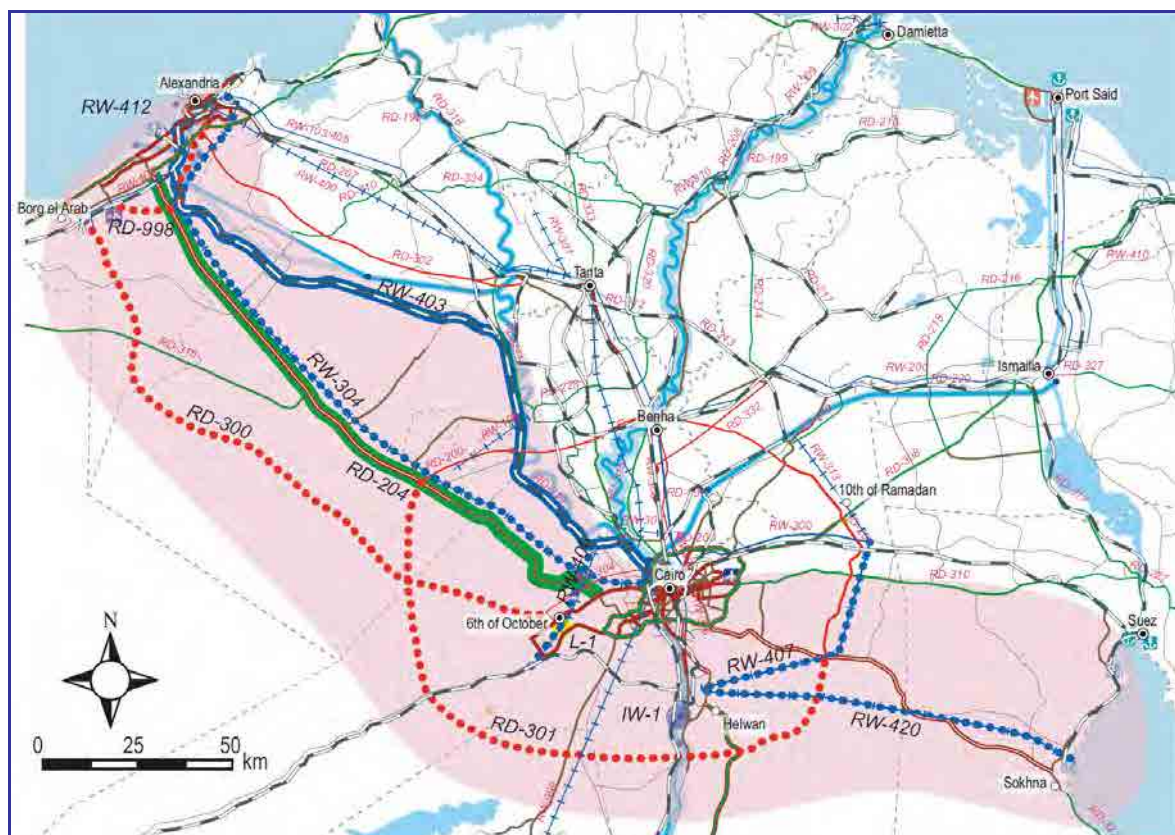
The Study Team identified 92 hardware projects within the 11 MiNTS corridors. These are presented as a series of eight annexes to this chapter. In addition, two nationwide projects encompass upgrading of passenger intermodal and freight logistics centers are nominated.

Nation Wide

ID	NAME	PROJECT OUTLINE
P-1	Passenger Intermodal Facilities	50 locations nationwide
L-2	Logistics Centers including improvement of Station Facilities for Freight Services (4 stations)	Logistics Centers 50 locations nationwide and Good intermodal connection & facilities, railway layout/arrangement, warehouse and station office at Cairo-Damietta (Mansura, Damietta), Cairo-Ismailia-Port said (Tel el Kebir, Port Said)

Note: P: Passenger Services, L: Logistics

Annex 1: Intermodal Transport Corridor



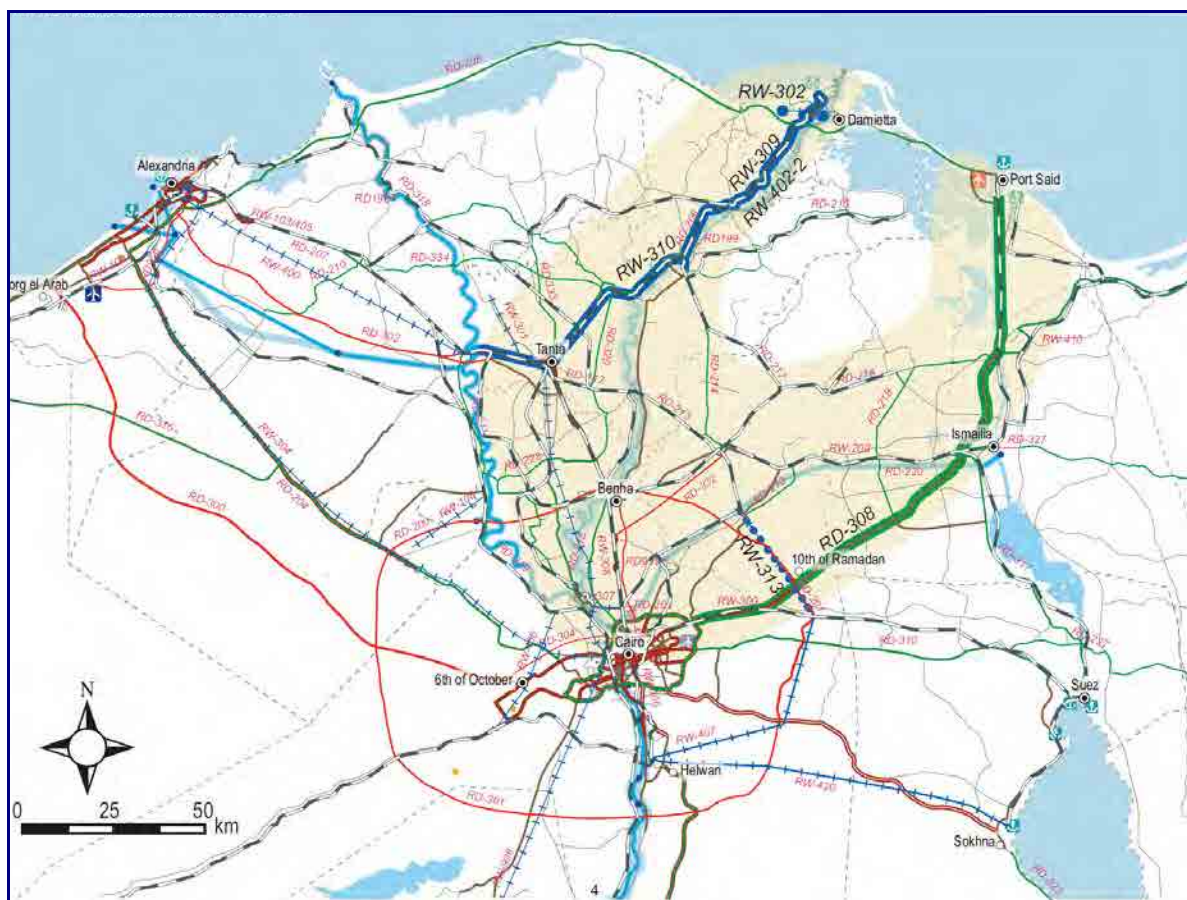
Corridor Project Listing

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-300	3rd Cairo Alex Expressway	connects from Cairo to Borg el Arab in desert area by 6-lanes, 120km/h [New Expressway]	2,608
RD-204	Cairo Alexandria Desert Expressway (Upgrade to 8-lanes)	Committed project is 6-lanes. upgraded to 8-lanes [Upgrade of Expressway]	1,775
RD-301	3rd Stage Regional Ring Road (Southern Part of Expressway)	forms southern part of Outer Ring Road, 6-lanes, 100km/h [New Expressway]	3,026
RD-998	Alexandria Bypass	forms urban ring road connects the Cairo-Alex desert expressway, 4-lanes, 80km/h [New Art. Road]	1,650
RW-403	Double Tracking of Bypass Line for Cairo - New Alexandria	for freight line (diesel) with local passenger	4,125
RW-406	Railway Link for 6th of October City	connects from RW-403 and Baharia line via L-1 [New Rail Line]	2,400
RW-407	Railway Link between Robeki to Helwan	forms a part of south ring railway route [New Rail Line]	2,100
RW-412	Improvement of Station Facilities for Freight Services (2stations)	Good intermodal connection & facilities, railway layout/arrangement, warehouse and station office at Qabbary and other station	1,025
RW-420	Railway Link between Sokhna Port to Helwan	New freight railway line for direct link from Sokhna port to 6th of October [New Rail Line]	3,750
RW-304	High Speed Railway for Cairo - Alexandria [High/Higher speed Alt-1]	connects to Alex. to Cairo (6th of October, Smart city) along Cairo - Alex. dessert road, directly, max.speed 250kph technology, [New HSR]	22,080

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
L-1	VAL (Value Added Logistics) Center at 6 th of October City	New VAL/ Distribution Center	1,000
IW-1	IWT port for ITC	connects to south ring railway route around Helwan, Tebbin port improvement, includes waterway, navigation and lock operation improvement.	1,000
IW-5	Waterway Improvement on Cairo - Alexandria	aims to dredging for safe navigability preventing from sedimentation (width 40m x dredging depth 1.5m x203km).	500
PT-1	Establishment of a Multi Purpose Terminal (Containers and General Cargo) at Alexandria Port	to ensure the capacity of future container demand for Alex. and Dekheila, 1) The development of the berths area (55,56,57,58,59,60), 2) Dredging the berths to reach a depth of 14 m instead of 5,6,9,10m, 3) Using the soil resulting from the dredging operations in the establishment of the terminal's yards, 4) The lengths of the berths are expected to reach 1,630m, 5) The area = approx. 290 thousand m2, (proposed by previous JICA study in 1990)	1,500
PT-2	Development of Management and Operation for Multi Purpose Terminal in El Dekheila Port	to ensure future cargo demand in 2027 as an essential port for the window of Intermodal Transport Corridor to connect to railway and road with smooth and well organized, located between berth 91 and 92, A maritime dock composed of 2 berths with total length up to 800m and a depth not less than 14-15m, Storing yards, warehouses and administrative buildings over an area up to 262.370 thousand m2, Water surface of about 162 thousand m2, Breakwater project is under construction.	700
PT-3	Dekheira Port: New Container Terminal	to ensure future cargo demand in 2027 as a window of Intermodal Transport Corridor, to access to railway and road with smooth and well organized connection, Breakwater construction project is under implementation	1,500

Note: RD: Road, RW: Railway, L: Logistics, IW: Inland Waterway Transport, PT, Sea Port

Annex 2: Cairo-Damietta/Port Said Corridor

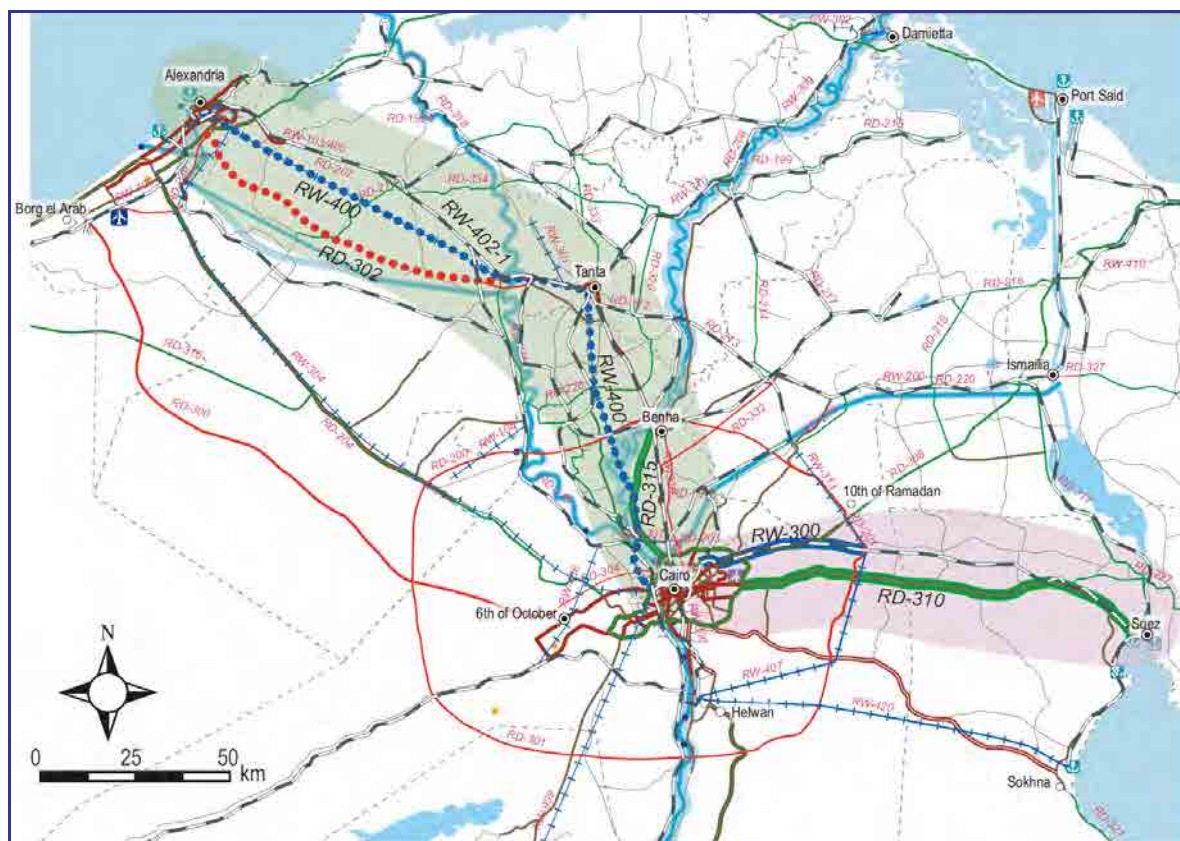


Corridor Project Listing

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-308	Cairo Ismailia Port Said Road (Expressway)	connects from ring road to Port Said, 6-lanes, 100km/h [Upgrade to Expressway]	3,125
RW-313	Railway Link for 10th of Ramadhan City	connects between Tel el Kebir to Robeki through Logistics Center [New Rail Line]	2,295
RW-302	Single Tracking for Kafr El-Batikh - New Damietta City	Damietta City only [New Rail Line]	105
RW-309	Double Tracking for Mansoura - Damietta	connects to Damietta [Double Tracking]	625
RW-310	Improvement of Signaling System for Increase of Freight Trains	connects for Tanta - Mansoura - Damietta [Signal Improvement]	875
RW-402-2	Improvement of Tracks	1)Track renewal, 2) New track maintenance machines, Damietta, Port Said line	922
IW-6	Waterway Improvement on Cairo - Damietta	aims to dredging for safe navigability preventing from sedimentation (width 40m x dredging depth 2m x200km).	600
PT-4	Damietta Port; Study on Sedimentation problem	detailed study (10mil.LE) is required to find suitable solution to sedimentation problem. Note that Damietta port authority used about 75mil.LE for annual maintenance for dredging.	1,000
PT-5	Port Said East: Logistic Center	exist the plan by 1st Stage in 2008, for bonded area and distribution center for import/export cargo	1,500

Note: RD: Road, RW: Railway, IW: Inland Waterway Transport, PT, Sea Port

Annex 3: Cairo-Alexandria Corridor and Cairo-Suez Corridor



Project Listing: Cairo-Alexandria Corridor

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-302	Cairo Alex Agriculture Bypass Kafr El Zayat - Alexandria	bypass road for Tanta to Alex. in south side of agricultural road in 6-lanes [New Art. Road]	1,759
RD-315	Shubra elkhema - Banha Agriculture Road (Expressway)	bypass road for Cairo to Benha in west side, 6-lanes, 100km/h [Upgrade to Expressway]	2,500
RW-400	High Speed Railway for Cairo - Alexandria via Tanta [High/Higher speed Alt-2]	Alternative route of Italian proposal [RW-304 Alt-1], max. speed 250kph technology <only for confirming demands compared with RW-304> [New HSR]	36,000
RW-402-1	Improvement of Tracks	1)Track renewal, 2)New track maintenance machines, Cairo - Tanta - Alex.	627

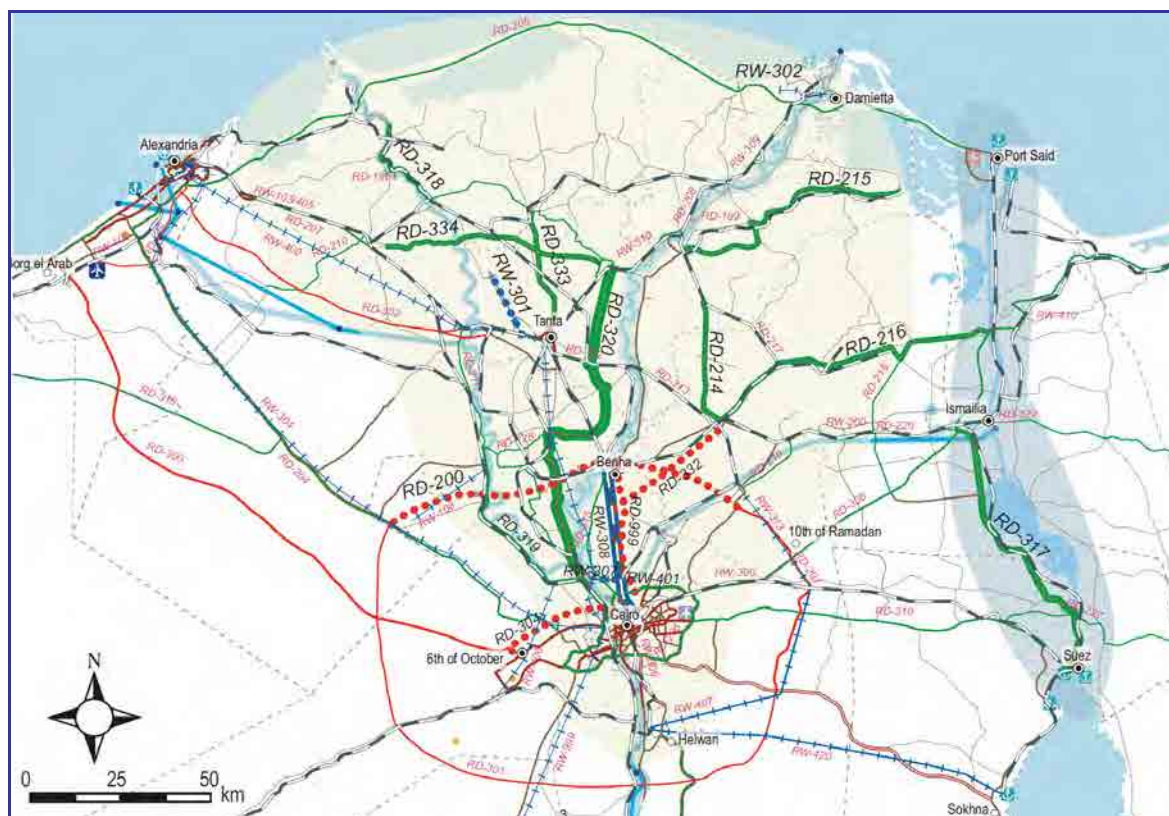
Note: RD: Road, RW: Railway

Project Listing: Cairo-Suez Corridor

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-310	Cairo -Suez Road (Expressway)	connects form ring road to Suez, 6-lanes, 100km/h [Upgrade to Expressway]	2,500
RW-300	Double Tracking for Ain Shams - Robeki	from Cairo - Robekki along Cairo - Suez line [Double Tracking]	625

Note: RD: Road, RW: Railway

Annex 4: Inland Delta and Suez Canal Development Corridor



Project Listing: Inland Delta Corridors

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-999	Cairo - Tanta Bypass	bypass road for Cairo to Tanta in east side, 4-lanes, 80km/h [New Art. Road]	2,500
RD-332	Zakaziq - Toukh	bypass road for Benha to Zagazik in south side, 4-lanes, 80km/h [New Art. Road]	420
RD-304	Rod El Farag Road	connects from Cairo city to 6th of October, 6-lanes, 80km/h [New Art. Road]	1,455
RD-333	Tanta - Kafr El Sheikh	forms regional road for north bound from Tanta, 4-lanes, 80km/h [Widening]	238
RD-334	Al Mahalla - Kafr El Sheikh - Damanhour	connects regional road located on the north side of Tanta, 4-lanes, 80km/h [Widening]	452
RD-318	Desouq Fowa Metobas Road	located along Nile river right side near Alex., 4-lanes, 80km/h [Widening]	250
RD-319	Imbaba Qalyub Tawfekia Road	located along Nile river left side from Cairo, 4-lanes, 80km/h [Widening]	625
RD-320	El-Qanater El-Bagour Shebin El-Koum Tanta Mahalla Matboul Road	In parallel to Cairo - Tanta agricultural road, 4-lanes, 80km/h [Widening]	688
RD-200	Belbeis-Banha-El Bagour-El Khatatba Regional Ring Road	forms Northern part of Outer Ring Road, also the role of Mediterranean Corridor, 6-lanes, 100km/h [New Expressway]	4,375
RD-214	Zaqaziq Sinbellaween Road	under GARBLT 5 year plan (2007-2012), 4-lanes, 80km/h [Widening]	550
RD-215	Mansoura Talha Dekernes Mataria Road	under GARBLT 5 year plan (2007-2012), 4-lanes, 80km/h [Widening]	900
RD-216	Qantara Salheya Faqous Abu Kbeir Hehya Zaqaziq Road	under GARBLT 5 year plan (2007-2012), 4-lanes, 80km/h [Widening]	650

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RW-301	Single Tracking for Basion City	not in main line between Cairo - Alex. [New Rail Line]	300
RW-307	Double Tracking for Qalyoub - El Qnater	not in main line between Cairo - Alex. [Double Tracking]	125
RW-308	Triple Tracking for Qalyoub - Benha	connects Cairo - Qalyoub with triple tracks [Triple Tracking]	500
RW-401	Improvement of Track Arrangement for Cairo - Qalyub	Cairo and Qalyub Station: Rearrangement of track lines, Qalyub Station: Construction of elevated railway, [Track Improvement]	900

Note: RD: Road, RW: Railway

Project Listing: Suez Canal Development Corridor

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-317	Ismailia Suez Road (Expressway)	connects from Suez to Ismailia at west side of Suez canal, 6-lanes, 100km/h, connects to RD-308 (upgrade to Expressway from Ismailia to Port Said) [Upgrade to Expressway] Note: Railway projects related this corridor are RW-200 (west side, signal improvement (on-going) and RW-410 (east side, railway rehabilitation)	1,001

Note: RD: Road

Annex 5: Mediterranean Corridor and Sinai Corridor



Project Listing: Mediterranean Corridor

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-323	Wadi Alnatroum Saloum Road	connects to Libya, in parallel to RD-307 in desert area, 4-lanes, 80km/h [New Art. Road]	3,599
RD-307	Alexandria-Saloum Road	connects to Libya along coastline, 4-lanes, 100km/h [Upgrade to Expressway]	4,104
RD-309	Qantara-Rafah Road	connects to Rafah along coast line, 6-lane, 100kmh [Upgrade to Expressway]	2,147
RD-316	Alamein Road	forms shortcut route from Cairo-Alex. Desert Road to Western Mediterranean Coast Roads, 4-lanes, 80km/h [Upgrade of Art. Road]	855
RW-312	Single Tracking for Bir El Abd - Rafah	connects to Rafah along coast line [New Rail Line]	1,200
RW-410	Rehabilitation of Tracks for El-Kab - Bir El Abd	connects to Suez bridge, Port Said East and RW-312 [Track Improvement]	2,000

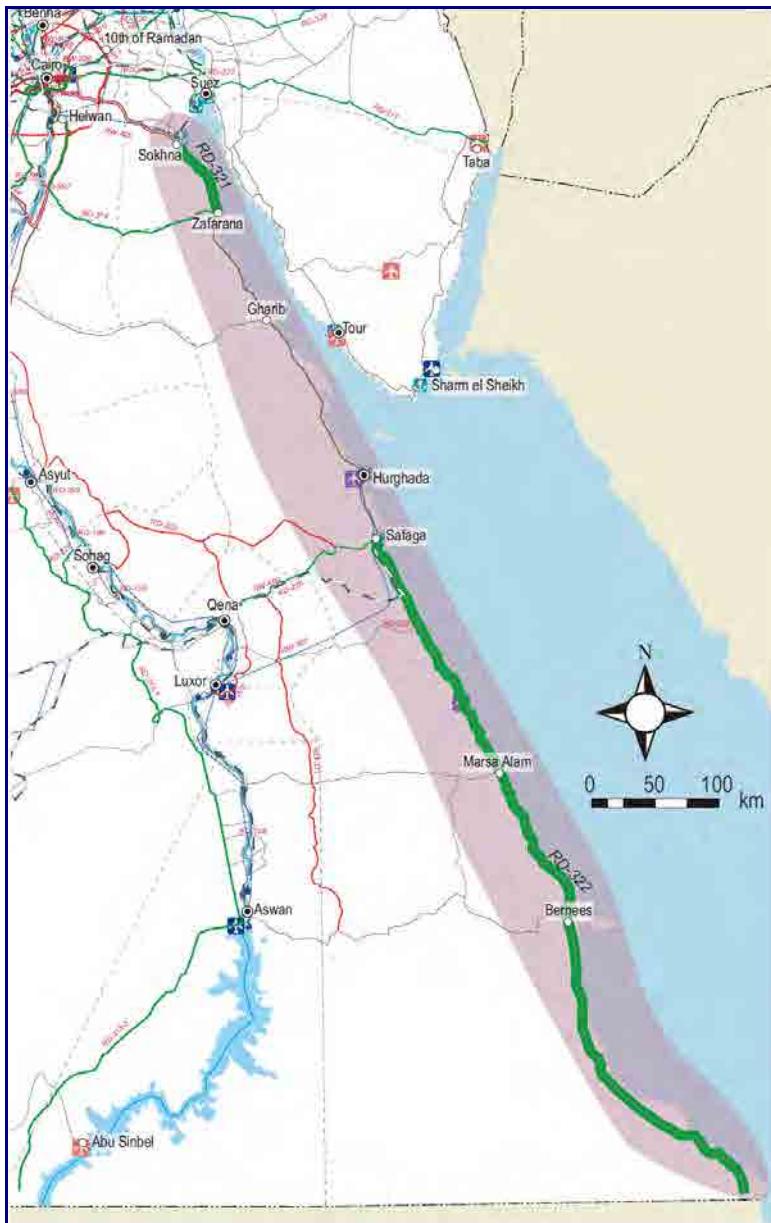
Note: RD: Road, RW: Railway

Project Listing: Sinai Corridor

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-311	Suez Ras elnakab Road (Expressway)	connects from Suez to Taba border, 4-lanes, 100km/h [Upgrade to Expressway]	2,276
RD-327	Suez Canal Tunnel Ismailia	New tunnel at Suez Canal to connect RD-328, 4-lanes, 80km/h [New Tunnel]	1,163
RD-328	Alawga Ismailia Road	connects from Ismailia to Alawaga border, 4-lanes, 80km/h [Widening]	1,342

Note: RD: Road

Annex 6: Red Sea Corridor

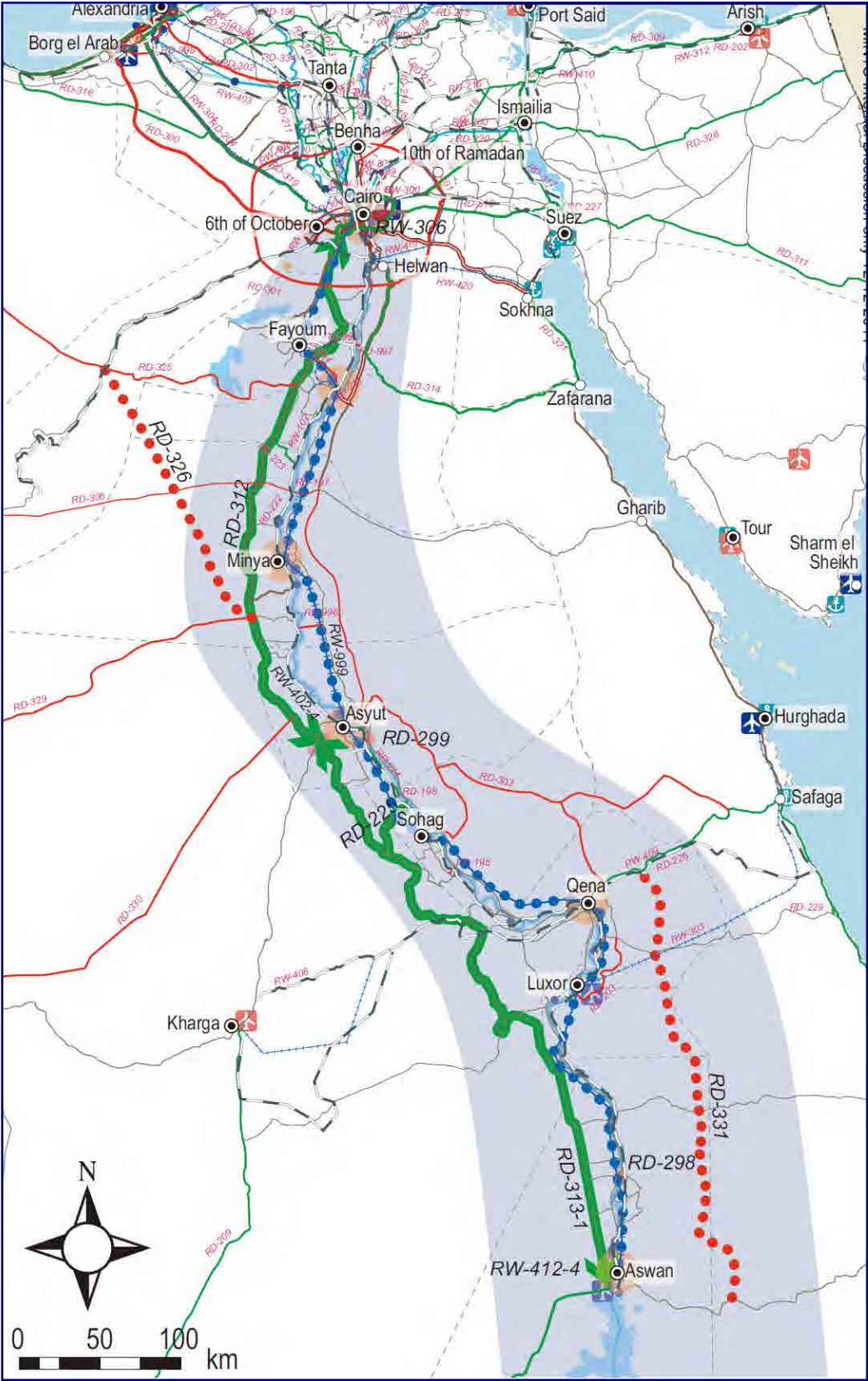


Project Listing: Red Sea Corridor

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-321	El Ain El Sokhna - Zafarana Road	Northern side of Red Sea coastline, 4-lanes, 80km/h [Widening]	341
RD-322	Safaga Baranis Halayeb Road	Southern side of Red Sea coastline, 4-lanes, 80km/h [Widening]	3,281

Note: RD: Road

Annex 7: Upper Egypt Corridor

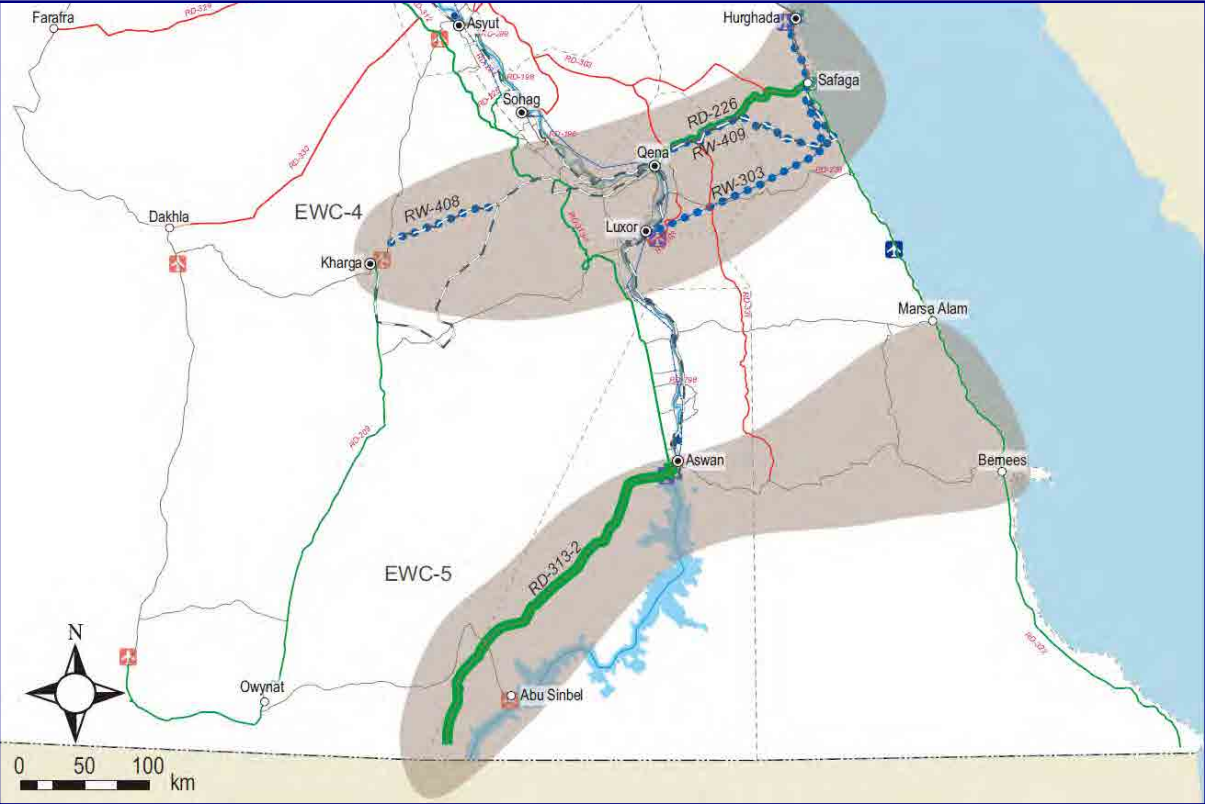
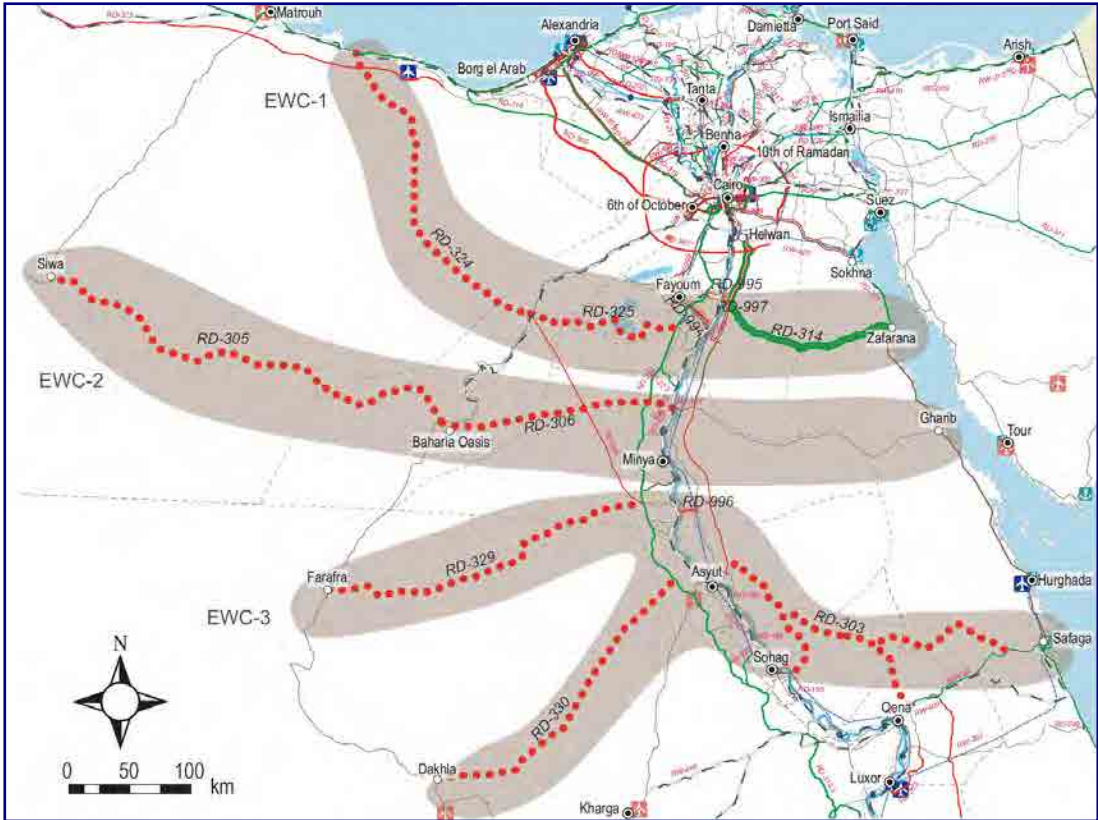


Project Listing: Upper Egypt Corridor

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-326	Albetrol Malwa Road	forms shortcut route from Borg el Arab to Asyut, 4-lanes, 80km/h [New Art. Road]	1,600
RD-331	Qena Aswan Nile East Bank Road	runs to the east side of Nile river in desert, 4-lanes, 80km/h [New Art. Road]	2,844
RD-312	Cairo - Asyut Desert Western Road (Expressway)	runs to the west side of Nile river in desert, 6-lanes, 100km/h [Upgrade to Expressway]	3,702
RD-313-1	Asyut Aswan Abu simble Desert Western Road (Expressway) Asyut to Aswan	connects from RW-312 in desert, 6-lanes, 100km/h [Upgrade to Expressway]	4,634
RD-225	El-Belina - Tahta Road	connects from RD-312 to west agricultural road, under GARBLT 5 year plan (2007-2012), 4-lanes, 80km/h [Widening]	250
RD-298	Kalabsha Bridge (Koum Ombo) (Aswan)	connects to both side of Nile river [New Bridge]	625
RD-299	Abo Tig Bridge and Selim Coast (Asyut)	connects to both side of Nile river [New Bridge]	344
RW-999	(High) Speed Railway for Cairo - Aswan [Electrificated]	New line for passenger railway (200kph) stopping at only major cities [New HSR]	139,500
RW-306	Development of Railway Bridge for Lemon - Abbasiya - Tora	runs in southern area of grater Cairo region [Track Improvement]	125
RW-402-4	Improvement of Tracks	1) Track renewal, 2) New track maintenance machines on Cairo - Aswan	2,139
RW-412-4	Improvement of Station Facilities for Freight Services (6 stations)	Good intermodal connection & facilities, railway layout/arrangement, warehouse and station office at stations of Imbaba, Beni Suef, Minya, Asyut, Qena and Aswan	2,813
IW-2	IWT port improvement for Upper Egypt	connects roads/ railway smoothly, Asyut and Quena ports port improvement, includes waterway, navigation and lock operation improvement.	1,000
IW-3	Lock Expansion with Comprehensive Lock Operation Improvement	upgrades the present capacity of Asyut Barrage Lock by expansion and improves operation of other locks.	290
IW-4	Waterway Improvement on Cairo - Asyut	aims to dredging for safe navigability preventing from sedimentation (width 40m x dredging depth 2m x200km).	650

Note: RD: Road, RW: Railway, L: Logistics, IW: Inland Waterway Transport

Annex 8: East-West Corridors



Project Listing: East-West Corridor 1

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-324	Eldaba Albetrol Road	connects from Fayoum to Mediterranean sea, 4-lanes, 80km/h [New Art. Road]	2,492
RD-325	ALbetrol Beni Mazar Road	connects RD-324 to Fayoum, 4-lanes, 80km/h [New Art. Road]	1,189
RD-994	Fayoum-Beni Suef Bypass	connects from Fayoum to Nile east side, 4-lanes, 80km/h [New Art. Road]	220
RD-995	Wasta Bridge Connection	connects from Fayoum to Nile east side, 2-lanes, 80km/h [New Art. Road]	114
RD-997	Helwan-Beni Suef Bridge	connects from Fayoum to Nile east side, 4-lanes, 80km/h [New Bridge]	306
RD-314	Zafarana Elkoraymat Road (Expressway)	creates expressway connection from Fayoum, Helwan to Red Sea (Zafarana), 6-lanes, 100km/h [Upgrade to Expressway]	2,264

Project Listing: East-West Corridor 2

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-305	Bahriya Siwa Road	connects from Siwa to Nile river for west section, 2-lanes, 80km/h [New Art. Road]	2,324
RD-306	Bahriya Minya Road	connects from Siwa to Nile river for east section, 2-lanes, 80km/h [New Art. Road]	1,295

Project Listing: East-West Corridor 3

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-996	Minya Bridge	cross the Nile river [New Bridge]	388
RD-303	Upper Egypt East Desert Red Sea Road	connects from Asyut to Red Sea (Safaga), 4-lanes, 80km/h [New Art. Road]	5,009
RD-329	Farafra Malwa Road	connects from Farafra to Nile river, 4-lanes, 80km/h [New Art. Road]	2,675
RD-330	El-Dakhla Assyuit Road	connects from Dakhla to Nile river, 4-lanes, 80km/h [New Art. Road]	2,504

Project Listing: East-West Corridor 4

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-226	Oena - Safaga Road	connects from Oena to Safaga for under GARBLT 5 year plan (2007-2012), 4-lanes, 80km/h [Widening]	750
RW-303	Single Tracking for Luxor - Hurghada [Electrified]	for tourists from Hurghada to Luxor to save travel time, max.150kph, [New Rail Line]	5,400
RW-409	Rehabilitation of Tracks for Oena - Safaga	for local passenger and cargo traffic connected to red sea and Quena and Luxor. [Rehabilitation]	2,375
RW-408	Rehabilitation of Tracks for Oena - Kharga	for passenger, even the paralleled cargo line from Kharga to Oena are existed [Track Improvement]	2,875

Project Listing: East-West Corridor 5

ID	NAME	PROJECT OUTLINE	PROJECT COST (mil. LE)
RD-313-2	Asyut Aswan Abu simble Desert Western Road (Expressway) South part from Aswan	connects from Aswan to Abou Sembel, RW-313-1 in desert, 6-lanes, 100km/h [Upgrade to Expressway]	3,073

Note: RD: Road, RW: Railway

CHAPTER 7: HUMANWARE OPPORTUNITIES

The concept of "Humanware" is the third cornerstone of the MiNTS planning process in addition to "Hardware" and the "Software". As such, humanware includes the aspects related to institutions, legalization and capacity building. A key consideration in this regard is the provision of capable human resources.

The MiNTS Humanware Packages

Five packages of humanware projects have been included in the prioritization program detailed in Chapter 9 of this volume. The humanware packages include:

HW-1	A new role for the Ministry of Transport	Strengthening MOT's responsibility across all transport modes to achieve integrated multimodal transport system and logistics. Achieve enhance coordination mechanism with other key Ministries. Further detail is found in <i>Technical Report 7, Organizational and Functional Aspects of the Transport Sector</i>
HW-2	Modern road traffic management and control systems	Proposes a wider responsibility for GARBLT across all road sub sectors. Training targets GARBLT officers who have current or future responsibilities in traffic management, safety control, operations as well as Intelligent Transportation Systems. Further detail is found in <i>Technical Report 1, Road Sector</i> .
HW-3	Road Management and Maintenance	Targets GARBLT officers with responsibility for managing and maintaining road assets. Improved road network management training ensures best performance and value-for-money are obtained from the road network, while concurrently offering quality facilities to road users. Further detail is found in <i>Technical Report 1, Road Sector</i> .
HW-4	The ENR Transformation Program	This project targets an extension of current support to ENR officers capacity development for proper operation and marketing for passenger and freight transport. Further technical detail is found in <i>Technical Report 2, Rail Sector</i> .
HW-5	The RTA Transformation Program	This project targets support to RTA officers capacity development, especially RTA management and operation capacities and strengthening of marketing and logistics knowledge and skill, including utilization of database. Support for, and extension of, on-going NICHE program. Further technical detail is found in <i>Technical Report 3, Inland Waterway Transport Sector</i> .

The Study Team emphasizes the importance of implementing the recommendations of this chapter to attain the full potential of the Master Plan. In this context, the case of the year 2001 CREATS (Cairo Regional Area Transportation Study) is cited where the establishment of key institutional entities were recommended. Unfortunately, little, if any, progress has been achieved in this arena. The lack of humanware enhancements would certainly be seen as part and parcel of current congestion deficiencies within the

Cairo metropolitan area. Costs associated with this congestion have recently been estimated to fall between 13 and 14 billion LE per annum¹. While MiNTS is national, not urban, in scope, similar omens exist.

7.1 OVERALL ISSUES

Transportation activities in Egypt are not the responsibility of one ministry. Needless to say, the Ministry of Transport is the main player but other organizations also have a role in the overall transportation activity.

7.1.1 A Fragmented Transport Sector

The fragmentation of the transport activities inhibits integrated planning and results in distorted priorities. Table 7.1.1 shows a summary of the various governmental entities and the main activities of each.

7.1.2 The Need for Enhanced Transport Planning Capabilities

Transportation planning is a complicated process which includes different hierarchies; vision, policy and strategy, different elements; hardware, software and humanware in addition to different building blocks; governance, society, economy and environment. The transport planner should have through knowledge of all these layers of disciplines. At the same time transport planning cannot be done by a single person or a small group, but requires the effort of multi-discipline team. The current master plan study is a good example where a team of 30 specialists has worked to prepare the plan. At present, there is no organization (or group of organizations) that can provide short term, medium term or long term transportation planning in Egypt.

The Transport Planning Authority (TPA) is the authority in charge of transport planning in Egypt and its capacity should be upgraded to meet this challenge. The Study Team will hand-over the computerized MNAM model and a comprehensive geodatabase to the Ministry of Transport. The JICA study team has arranged training for a number of persons from TPA. However the model and the data base are just tools for the required continuous planning process. In its current condition, TPA will have difficulty in continuing the work of the Master Plan team. TPA lacks capable staff and physical computer hardware. It currently has insufficient office space and even that is in a poor environment. As examples, the library of TPA contains no references about modern transport issues, TPA has no membership in any international periodical in the transport field and there is even not enough space to hold a meeting with reasonable number of attendees. The Study Team was obliged to arrange office space outside TPA which definitely has negative effects on communication with the counterpart team. **An upgrading program of TPA that covers capacity building, financial capabilities is of top priority including the establishment of proper premises** (refer also Software Program SW-1, Egypt Transport Center, Chapter 8 of this volume).

Moreover the Study Team envisages the enhancement of the capabilities of the TPA to cover all transport related activities including aviation, tourism and the Suez Canal. Since the core problem is finance, one solution is to allocate a certain percent of the budget of all transport related organizations (public and private) for research and development and the collected amount to be channeled to the budget of TPA. Qualified personnel should be recruited for the key posts of TPA. Foreign advisors can be requested from donor countries to restructure TPA. Such restructure may introduce new departments such as multimodal integration department, logistics department, transport modeling department and transport demand management department.

¹ *Cairo Traffic Congestion Study*, The World Bank, 2010

Table 7.1.1 Main Organizations Related to the Transport Sector and Functional Arrangements

Ministry	Organization	Main Responsibilities
Ministry of Transport (MoT)	Transport Planning Authority (TPA)	<ul style="list-style-type: none"> - Preparation and maintenance of transport data base. - Transportation planning and studies. - Dissipation of knowledge and information.
	Egypt National Railway (ENR)	<ul style="list-style-type: none"> - Planning, construction, management, operation and maintenance of the railway network.
	General Authority for Roads, Bridges and Land Transport (GARBLT)	<ul style="list-style-type: none"> - Planning, construction, management and maintenance of the national road network. - Regulation of the land transport operators.
	River Transport Authority (RTA)	<ul style="list-style-type: none"> - Planning, construction and management of the facilities of the river transport. - Regulation of river transport operators.
	Maritime Transport Sector (MTS)	<ul style="list-style-type: none"> - Supervision and coordination of bodies and entities related to the maritime transport.
	Egyptian Authority for Maritime Safety (EAFMS)	<ul style="list-style-type: none"> - Regulation and managing of maritime navigation in accordance to the international conventions and regulations. - Operation of 18 manned and unmanned lighthouses along the Egyptian coasts.
	Four Regional Port Authorities	<ul style="list-style-type: none"> - Planning and development, maintenance of port facilities, port traffic control and berth allocation. - Landlord status for concession agreements with operators.
	National Authority for Tunnels (NAT)	<ul style="list-style-type: none"> - Planning, contracting and overall supervision of Metro lines and tunneling projects.
	General Authority for land Ports and Dry Ports (GALDP)	<ul style="list-style-type: none"> - Planning, contracting and supervision of land ports and dry ports.
	Holding Company for Roads, Bridges and Land Transport (HCRBLT)	<ul style="list-style-type: none"> - Construction of roads and bridges through its affiliated four contracting public sector companies.
	Egypt National Institute for Transport (ENIT)	<ul style="list-style-type: none"> - Training, qualification and accreditation of MOT personnel. - Post graduate institute for education and research in transport related fields. - Consulting work for MOT organizations. - Dissipation of information to MOT organizations. - Overall approval of land use plans.
	Higher Council for Planning and Urban Development	<ul style="list-style-type: none"> - Technical Secretariat for the Higher Council. - Preparation of national and regional land use plans.
	General Organization for Physical Planning (GOPP)	<ul style="list-style-type: none"> - Implementation of development plans including transportation projects considered to be vital for the development plans. After completion, these projects are handed over to MOT
Ministry of Housing, Utilities and Urban Development (MHUUD)	Central Agency for Development	

Table 7.1.1 Main Organizations Related to the Transport Sector and Functional Arrangements (Continued)

Ministry	Organization	Main Responsibilities
Suez Canal Authority		<ul style="list-style-type: none"> - Construction works related to the Suez Canal. - Operation and maintenance of the Suez Canal. - Ownership and overall management of the affiliated companies & facilities. - Issue of vehicle operation license. - Issue of driving license. - Enforcement of traffic law. - Security of ports facilities - Security of Transportation facilities.
Ministry of Interior	Traffic Department	
	Directorate of Ports Security	
	General Department of Transportation Police	
Ministry of Civil Aviation	Immigration Department	<ul style="list-style-type: none"> - Issue of passports, passport control at ports and immigration related matters. - All issues related to the development, management, operation and maintenance of civil aviation utilities.
Ministry of Tourism		<ul style="list-style-type: none"> - All tourism related activities.
Ministry of Water Resources and Irrigation		<ul style="list-style-type: none"> - Control of water level in the Nile River and other navigational canals which affects river transport activities.
Ministry of Petroleum	Petroleum Companies	<ul style="list-style-type: none"> - Transportation of petroleum product through pipelines. - Budget allocation for transport entities and transport projects.
Ministry of Economic Development		<ul style="list-style-type: none"> - All activities related to environment protection.
Ministry of State for Environmental Affairs	Egyptian Environmental Affairs Agency	
Ministry of Investment	Holding Company for Maritime and Land Transport (22 affiliated companies in transport related activities)	<ul style="list-style-type: none"> - Establishment of subsidiaries solely or jointly in the fields of Maritime transport, land transport and related activities.
Ministry of Local Administration	The Governorates	<ul style="list-style-type: none"> - Construction and maintenance of local roads. - Construction, operation and management of bass and shared taxi terminals - Licensing of cooperatives and/or private buss companies - Establishment of truck cooperatives - Licensing of ferries for crossing the River Nile and other Canals

Source: JICA Study Team.

So far, most of the national and modal transport planning has been conducted by foreign consultants through aid programs. This state is not sustainable due to two main reasons. The first is the progressing World economic crisis which will certainly diminish the availability of international aid. The second reason is that with the forecasted economic development, Egypt may cross over the threshold of eligibility for international aid program. Considering that capacity building for planning will need time, enhancing the TPA planning capabilities should be treated as high priority

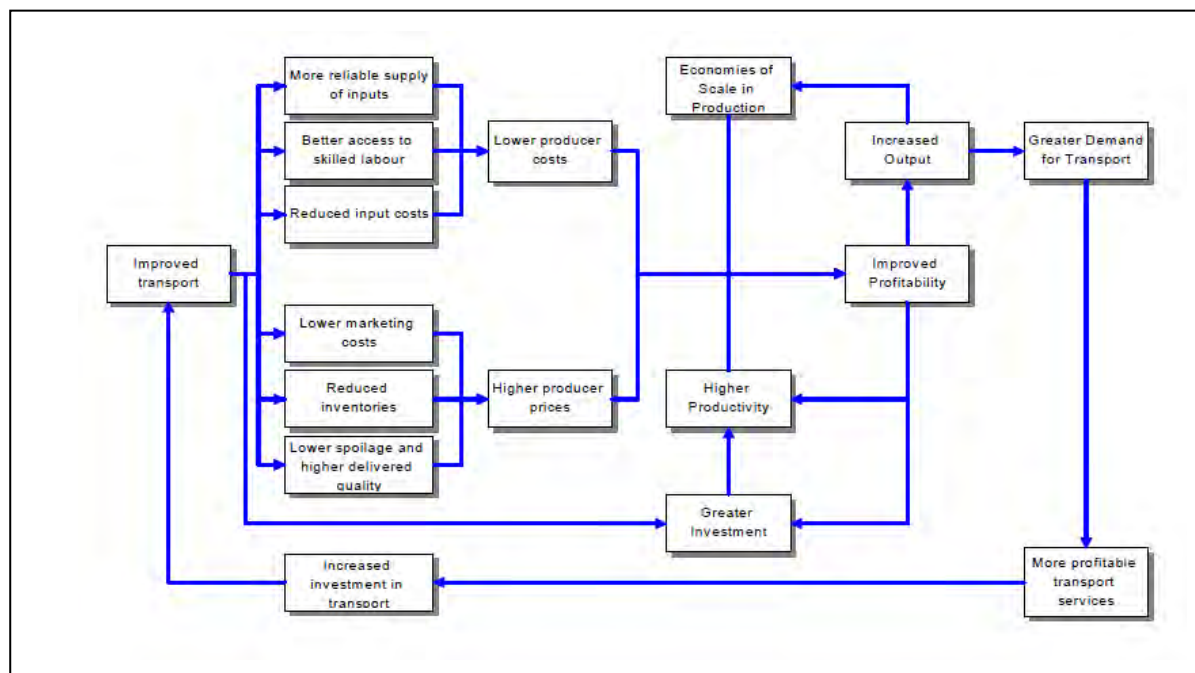
7.1.3 Lack of Coordination Mechanism with other Governmental Organizations and Stakeholders

The relationship between governmental organizations in Egypt is formal by nature. Communication between organizations in the same ministry is always done through official letters and communication between organizations in different ministries is mostly done through the ministers themselves. As such, communication is a very time consuming process especially when such communications takes the form of exchanging several official letters for the same subject. Standing committees between different ministries do not exist. In the cases where the head of one organization is a member of the board of directors of other organization, he tries to avoid conflicting arguments and the board of directors ends up as a rubberstamp board the desires of the chairman. To improve the situation, the Study Team has **two suggestions; the first is to have standing committees with members having enough delegation of authority to make final decisions, the second is to formulate a homepage for each organization with access only to authorized persons.** The decisions taken by each committee and/or board of directors should be published in that homepage. This will oblige the committees and/or the boards of directors to take matters seriously.

A prominent example for the lack of coordination is the formation of the "Higher Council for Planning and Urban Development" in which the Minister of Transport is not a member and the Ministry of Transport is only represented at the sub-committee of infrastructure, one of the six sub-committees formed under the said Higher Council. This means that there is an under estimation of the effect of transport on economic development and likewise in the reverse the impact of economic development on transport. In reality sound transportation system is the determining factor in the success or failure of economic development schemes. Figure 7.1.1 shows a diagrammatic presentation of such impacts.

As can be seen from the figure, there exists a very strong relationship between economic development and transportation improvement. To bridge this gap, the Study Team put forward two recommendations. The first is to **include the Minister of Transport into the Higher Council for Planning and Urban Development.** The second is to have a **standing committee between TPA and the General Organization for Physical Planning (GOPP)** of the Ministry of Housing, Utilities and Urban Development and/or have representatives from each of the two organizations on the board of directors of both organizations.

In view of the intermodal aspects between air transport and ground transport of both passengers and cargo, there should be a strong relationship between the Ministry of Transport and the Ministry of Civil Aviation. Good intermodal facilities at international airports have become standard activity for the comfort and efficiency of passenger transport. Most of these airports have railway (or metro) links to connect the airport to downtown. Logistic systems that integrate air and ground transport have become the norm of the transport activities which could include what is called "acceleration in motion" where sea transported cargo is transferred to air transport in the middle of the trip to meet short term changes in demand. To insure maximum coordination, many developed countries, including Japan, have both ground transport and air transport under one ministry.



Source: JICA Study Team

Figure 7.1.1 Schematic Relationship between Transport and Economic Development

Efficient and safe tourism transportation is a key factor in tourism development. Due to several accidents of tourist buses, the Ministry of Tourism is currently constructing a large scale drivers training facility in Helwan, Cairo Governorate and is improving road signs at touristic sites. Such activities should be coordinated between the Ministry of Tourism and the Ministry of Transport to attain maximum benefits from the available resources of both ministries.

The Ministry of Interior is in charge of issuance of driving license, vehicle operation license, enforcement of traffic law and regulation and the security aspects of the transportation facilities. It is imperative to have strong relationship between the Ministry of Transport and the Ministry of Interior for attaining safety targets and enforcement of maximum axle load regulation on trucks.

7.1.4 Shortage of Competent Officials

There is a **National Problem** in maintaining competent staff. The Ministry of Transport suffers from severe shortage of competent officials. MOT situation is not unique; rather it is a common case in all Egyptian ministries. The main reason is the government policy of keeping the salary of government employees very low compared with the available salary in the private sector and/or the salary for working abroad in other Arab countries. Faced with ever increasing inflation rate and other unforeseen expenses such as education expenses of children, medical treatment expenses, etc. the government employee cannot make ends meet. Under such circumstance most of the competent officials who retain their governmental post try to find other source of income by having second job as consultant in private firm or, as often happens working in jobs that are completely irrelevant to their main profession such driving a taxi or working as clerks in retail shops. In addition to exhausting his/her energy, such official loses his motivation to actively engage in his official duties. He/she also finds the process of continuous learning an unaffordable luxury beyond his limited time and limited income.

The result is that the government official becomes a burden or a liability for his organization instead of being reliable staff member. This situation is clearly seen in many crowded governmental offices but with very little output if any. When it happens, by chance, that there is some hard working individual, his superiors flood him with work and he becomes the main pillar of the office. In many cases such hard working individual is indispensable to the extent that his superiors do not select him for the obligatory management training courses required for promotion to management levels nor select him for training abroad when the chance is available. Instead, the superiors select other candidate whose absence will have little effect on the output of the office. In many cases, the promotion to the management level goes to the person who attended the training course although he has no practical experience. The hard working individual ends up with more frustration. The main reason for retaining the official post is its stability because government officials cannot be fired and to receive the retirement pension and other benefits such as cheaper medical care (albeit of inferior quality) for himself and his family. In summary, the government is paying unreasonably low salaries and in return receives little or no output.

In addition to the low salary, there is no fair system for work evaluation and competition. Promotion procedures are not based on productivity or efficiency but depend on the relationship with superiors and the degree of outside pressure on them. In many cases political considerations play decisive role in promotion particularly for top positions.

The **temporary solution** of hiring outside advisors is **not a long term** solution. Due to the lack of competent officials, the successive ministers and the heads of the governmental organization, recognize that it is impossible to deliver the responsibilities of their ministries and/or organization with the available staff under their authority. They believe that there is no other way, but to employ advisors from outside of the Ministry and/or organization. The available pool of advisors is very limited to the academia, or the retired army officers or the private sector. These advisors are hired on temporary basis at a very high monthly salary that may exceed the salary of the most senior undersecretary by huge margin. In some countries, such as the USA, the new administration brings along its men to the main posts of the administration. The main difference is that those new comers in the USA administration find a huge chest of studies and programs that are prepared by the permanent officials and related think tanks and consulting firms. These studies are usually based on sound facts and rationale that the new administration ends up implementing their recommendation. At the end, this ensures continuity and sustainable performance. In Egypt, the case is different because the previous group of advisors and consultants leave no such programs and studies. The new team finds that they have to start from scratch. Since most of the new advisors come from outside the Ministry, their knowledge about the official procedures is limited. It takes them a great deal of time and effort to grasp the main issues while dealing with the pressing daily problems.

Decision making in Egypt is very centralized and those at the top have to deal with many problems that can be easily delegated if there exist written rules and manuals. Changes in laws are frequent and great number of laws is modified by the people's assembly. The modifications are issued as a separate ruling which contains the modified articles only. Such modifications may occur several times for the same law. Most of the Egyptian laws contain exception clauses that give the related Minister a room for exceptions. Such exceptions may be exploited to make some benefits for pressure groups. The jungle of laws, modifications and exceptions means that it is extremely difficult for temporary employed advisors to follow the right course of action.

Since there are no rules for the selection of advisors, the Minister or the head of the organization asks his acquaintances (or some time the political hierarchy) to nominate the candidates for the advisors. This means that these advisors come from different sources with different background and school of thoughts. This makes harmonized team work difficult or even impossible. Most of the advisors are selected on

personal basis not on ability to deliver some particular output. A prominent example is the almost exclusive selection of retired navy officers for all the higher posts of maritime transport. To insure team work culture, the Study Team strongly recommends the selection of top managers from career employees with proven abilities or by open competition between competent candidates.

Since some assignments need the formation of task forces, the employment of some advisors, with special know-how, as members of the task force may be necessary, but this should be the exception and not the rule. In the current situation employment of the advisors has no limited time and is not, in general, limited to a particular assignment.

As it is well known in management science, advisors are staff with limited responsibility, while line officials have full responsibility. This means that the low paid, permanent, career officials have more responsibility than the staff member who is coming from outside the organization with higher salary. The result is frustration and unmotivated work conditions for the permanent employees.

From the above discussion, it is clear that the employment of advisors as a substitute for permanent officials **cannot be a sustainable solution**. All possible measures should be addressed to ensure sustainable capacity building in the Ministry of Transport and affiliated organizations. The Study Team recognizes the difficulties that face any effort for improvement, in particular, changing the whole payment structure of the government. But fortunately, there are successful examples in the Ministry of Civil Aviation where almost all the previously governmental entities have been transformed to holding companies where the salary structure is more flexible and thus helps to attract competent employees.

7.1.5 The Lack of Human Resource Development Programs

Training and continuous learning is very important to have competent officials. New employees should have initial training that introduces them to the tasks of the organization they are going to join. Japanese organizations and private firms take training of new comers very seriously. Top management officials take part in that training. This approach convinces the new comers that they are an important addition to the organization which motivates them right from the beginning. In addition to this objective, the top management assesses the abilities of the new comers and takes notice of potential leaders. Later on, they use this information to put these potential leaders to rigorous tests and monitor their performance. The Study Team noticed that the training of new comers in Egypt is not taken seriously if exists at all. The Ministry of Transport does has an institute for the primarily purpose of training, the Egyptian National Institute for Transport (ENIT). Due to the aforementioned salary structure and neglect from the successive ministers, ENIT has become even unable to produce its own directors, in most cases they are recruited from other educational entities on temporary based contracts.

The maritime transport sector has made good relationship with the Arab Academy for Science, Technology and Maritime Transport for providing training to those working in the field of maritime transport. Moreover the Maritime Research and Consultation Center provides technical support and consultation to the different entities of marine transport. The civil aviation sector has the Egyptian Aviation Academy which provides training and certification for those working in the civil aviation field. Each of the Egyptian National Railway, the General Authority for Roads, Bridges and Land Transport and the Inland Waterways Transport Authority has its own technical training centers. These centers have the mandate to train low level operators and, in most cases, they lack modern facilities. **An urgent study should be started to upgrade the capabilities of ENIT and other training centers.** Training of personnel is a time consuming process, but without investing in people (humanware), other investment in the infrastructure (hardware) and programs (software) may prove to be shortcoming.

Top managers are a special breed of officers who, beside their natural leadership qualities, are willing to work under higher levels of pressure. They make the difference between success and failure of their organization or firm and they carry great responsibilities towards society and the nation if they are public servants or towards the shareholders if they are working in a private firm. Making these top managers should be a planned endeavor. In Japan and other developed countries preparing top management officers is the work of specialized "Human Resources Development Department" that dedicates a lot of effort and time for this important task.

The human resources development department prepares tailored programs for every potential candidate and closely follow-up their performance. Such programs include assigning the potential candidate to different departments of the organization and collecting reports about his progress from different sources. The programs may also include dispatching him to foreign countries to learn language and to teach him how to look at the management issues from different viewpoints. In Egypt, human resources affairs departments have the passive role of collecting personnel information from direct superiors only. Those superiors write annual reports on the performance of their subordinates where they give these subordinates the highest degrees to help them get the meager annual salary increase. In the rare cases when a superior gives his subordinate low degrees, he could face official complains from the subordinate. Ultimately the system results in the situation where everyone obtains the highest result in these annual reports and thus diminishes its role as an evaluation tool.

An example is the state of the General Authority for Roads, Bridges and Land Transport where there are 12 district offices across the country, but internally the organization failed to produce a capable person to be its chairman. In between the last six chairmen of GARBLT only one chairman was promoted to the chairman post from within GARBLT. In several cases, the chairman of GARBLT has been appointed from a contracting company which has contracts with GARBLT. Such practice should be avoided because it is a clear case of conflict of interests.

Globally, transportation field is developing very fast and most of new technological and administrative research is in English. If the official does not master English, he will not be able to cope with new ideas and approaches. In Japan they bridge the language gap through massive translation efforts that continuously keep Japanese officials in pace with internationally published papers and articles. Egypt is very close to Europe and there are several international agreements regarding transportation network with the northern coast of the Mediterranean. This means that mastering English is an essential tool especially with the widespread of the internet and the absence of translation efforts.

7.1.6 Fragmentation of Responsibilities between Different Organizations

The General Authority for Roads, Bridges and Land Transport is in charge of national road network which is less than half the total roads of Egypt. The remaining roads are the responsibility of local governorates. This could be justified if the local governorates have their own revenue as in the case of Japan where part of the revenues of some taxes go directly to the local governments. In Egypt, the governorate revenues are limited to some fees for giving operation licenses to workshops, retail outlets, local taxi operation and similar activities. Such revenues are not used, in principle for road construction. The budget for local roads is from the national budget. Moreover, the technical capabilities of the Governorates are very weak. The result is very low standard of the local road network. When the rural road passes through a small city or village, and since it is in most cases, the only paved road in these communities, it becomes the main business street with all types of activities. This state of affairs leads to even lower efficiency of the rural road. It should be noticed that if the local road network is improved, it could attract part of the traffic on the national road network and thus it could alleviate part of the congestion. All the roads in Egypt should be under GARBLT or

GARBLT should have the power to enforce reasonable standards for the construction of rural roads. The governorate should concentrate their resources in providing business street(s) as an alternative of using the rural road for business activities.

7.1.7 Transport Safety and Law Enforcement

Egypt has one of the worst safety records in traffic safety and in transportation safety as well. This has negative impact on tourism and on attracting foreign investment. In addition it constitutes a very high economic loss besides its humanity dimension. The reasons are numerous, at the top of them:

- Ease in the acquirement of driving license;
- Poor vehicle inspection procedures; and
- Weak enforcement of traffic law.

Traffic department of the Ministry of Interior is the organization in charge of these activities. The strengthening of the capabilities of the traffic department of the Ministry should be one of the top priorities for improving transportation in Egypt.

7.2 OPERATOR CONSIDERATIONS

7.2.1 Passenger Transport

Shared taxis have the largest share of passenger transport. Although shared taxis are flexible regarding departure timing and possibility to disembark at any location along the route, they are not efficient with respect to fuel consumption. They increase road congestion and air pollution. They are a major source of accidents. Since shared taxis are operated either by individuals or by small scale companies, it is very difficult to regulate their operation with regard to safety, insurance, etc. Accordingly, railway passenger service should be improved to attract larger share. The establishment of large scale bus companies that provide reliable and safe service should be encouraged. Re-consideration of fuel subsidy and road toll fees can help in improving the distorted modal share.

Bus and taxi terminals are important facilities in the passenger road transport system. The establishment, management and operation of bus and taxi terminals are the responsibility of the Governorates, but some of them are owned and operated by bus companies. Most of these terminals are constructed at the outskirts of the cities due to the availability of land. However, this means that passengers have to use other transport mode from the origin of the trip to the terminal and from the terminal to their destinations or to reach other terminal and/or railway station. This means added cost, more time and less comfort for the passengers. Integrated multimodal terminals should be established close to downtown as far as possible. The connection between these terminals and the road network should be by bus dedicated lanes or by elevated roads. Bus and taxi terminals should be provided with adequate waiting areas, cafeterias, lavatories, mosques and other services for the comfort of the passengers. To make the optimum of land use, these terminals should be multi-story buildings where shopping centers can be added to improve the economics of these facilities (refer also hardware project P-1, passenger intermodal facilities, chapter 6).

There is **little regulation**. At present regulating passengers road transport is one of the activities of GARBLT. In effect, the role of GARBLT is very limited and thus the activity is almost non-regulated resulting in various problems. Recognizing the short comings of the present situation, the Prime Minister issued

decree No. 141/2005 establishing the "Organization for Regulating Passengers Land Transport" as an independent entity under the Ministry of Transport in charge of regulating all aspects of passengers land transport. However, after the assignment of the chairman of this new organization, it was found that there are some conflicts between its responsibilities and the responsibilities of other entities as stated by previous presidential decrees. Accordingly, the regulating organization was discarded.

The Study Team strongly **recommends the re-establishment of this regulatory organization** with new law that abolishes the existing conflicts and gives it all required power to regulate the passengers land transport.

7.2.2 Freight Transport

The largest share of cargo transport is by private small scale truck owners. This has the following disadvantages:

- Lower efficiency due to the lack of scale effect and difficulty to consolidate cargo.
- Between 70% and 80% of the return trips are without load due to lack of an information system.
- There is no insurance neither on trucks nor on loads.
- No guarantee for timing of pick up or delivery.
- Primitive loading and unloading that could harm the cargo especially when it is perishable such as fruits or vegetables or electronic components, etc.
- Liability to loose competition to international companies which deliver better service to its customers.
- Small operators tend to make maximum use of their fleet which results in old fleet and unreliable service. Also, small operators cannot afford to have their own maintenance workshops.
- Small operators cannot afford the use of modern technological advances such as Electronic Data Exchange (EDI), Vehicle Tracking System (VTS), computers, etc.
- Small operators cannot afford to have their own warehouses and thus cannot integrate transport with storage.
- Small operators cannot operate line haul transport of cargo between two dry ports or logistic centers and thus cannot provide integrated logistic service.

The Study Team recommends the establishment of a freight transport regulating organization under the Ministry of Transport to formulate the required rules and regulations and to enforce their implementation (refer also hardware project L-1, improvement of logistics center, Chapter 6 this volume).

7.2.3 The Need for Large Scale Transport Companies

Establishing large scale transport companies for the transport of passengers and freight is the only feasible way for improving the situation. The negative effects on small scale operators can be alleviated by giving

them priority to work in the large companies and the large companies can acquire their vehicles in exchange of shares in the capital of the newly established transport companies.

The Holding Company for Maritime and Land Transport (HCMLT) is the most appropriate organization to expand its transportation activities of passengers and freight. HCMLT can establish new joint companies with private sector for this business.

In general, the governments should encourage the establishment of large private sector or joint companies for the transport of freight and/or passengers. This encouragement could include, but not limited to:

- Taxes exemptions and/or reductions for the companies that reach certain volume of transport per annum. Since large scale companies has rather higher cost of overhead expenses, insurance costs, maintenance cost, etc. it will be difficult for them to compete with small scale operators who are not loaded with such expenses. Instead, the gain will be more efficient transport system that will improve the economy as a whole and thus compensate for the tax exemptions and/or reduction.
- Lower land price for the construction of depots, workshops, warehouses, etc.
- Preference interest rates on loans for the finance of their fleets and other facilities.
- Encourage the establishment of multi-modal transfer facilities at major railway passenger stations and railway or river cargo depots.

7.2.4 Truck Axle Load

The lack of enforcement of the maximum allowable axel load of trucks is one of the major problems in Egypt. Currently, GARBLT charges fines on the trucks with axel load more than the allowable using stationary weighing stations on major roads. Directing the truck to the weighing station is the responsibility of traffic police. Since traffic police officers are not available all the time, many overweight trucks pass without penalty. The exceeding axel load expedites the deterioration of the pavement resulting in higher maintenance cost in addition to its effect on increasing the stoppage distance of the truck at the time of brake application. This in turn could be the cause of serious accidents.

To rectify this situation, the following counter measures may be implemented.

- The fine amount should be calculated so as to be more than the operator's expected profit from the excess load. The fine amount should be increased with time to compensate for the inflation effect.
- The shipper of the added weight should be fined in addition to the fine imposed on the operator. This could prevent the excess load from the origin.
- A black list that prohibits all governmental bodies from making transactions with the shipper and/or the operator for a certain period of time should be compiled and distributed to all governmental bodies.
- All public entities such as ports, public storehouses, governmental bodies, etc. should prohibit all excessive axel load trucks from entering their premises.

- Application of the new technology of self-weighing trucks and trailers and axel load gauges should start in new trucks.

7.2.5 Logistic Providers Activities

The World Bank International Trade and Transport Department publishes the Logistics Performance Index (LPI) every year since 2007. LPI is the weighted average of the country scores on the six key dimensions of logistics performance, namely:

- Efficiency of the clearance process (i.e. speed, simplicity and predictability of formalities) by border control agencies including customs.
- Quality of trade and transport related infrastructure (e.g. ports, railroads, roads, information technology).
- Ease of arranging competitively priced shipment.
- Competence and quality of logistics services (e.g. transport operators, customs brokers)
- Ability to track and trace consignments, and
- Timeliness of shipments in reaching destination within the scheduled or expected delivery time.

In 2010 report, Egypt ranked 92 of 155 countries covered by the survey, a very low rank indeed considering the location advantage and the existence of the Suez Canal. Egypt has a very good chance to be one of the main logistics hubs of the international trade. Expanding international logistics activities in Egypt will not only help to attract direct foreign investment, but will also create job opportunities for young energetic Egyptians. The question is who will take the initiative to establish a third party logistic provider capable of competition with large international players? Private sector companies, although provide different activities related to logistics, none of them can be considered to have obtained the status of 3LP (Third Party Logistics Provider). Since the Holding Company for Maritime & Land Transport (HCMLT) under the Ministry of Investment has 22 subsidiaries operating in freight transport, container handling, shipping agencies, shipping warehousing and stevedoring, it has the potential to establish a joint venture company as a third party logistic provider. HCMLT may also establish the first integrated logistics center in Egypt. By taking such initiative, HCMLT could pave the way for other private 3LPs.

To improve logistics activities in Egypt, the Study Team **recommends two actions**:

- The establishment of logistics department within TPA.
- The establishment of a higher committee for the development of national logistics. The members of this committee should include representative from all related ministries in addition to representatives of stakeholders from private sector operators.

7.3 A NEW ROLE FOR THE MINISTRY OF TRANSPORT (HUMANWARE PROJECT 1)

7.3.1 Streamlining Responsibilities and Structures

Previous sections in this chapter have clearly identified the core issues of the sector; that is, coordination between related ministries and Ministry-centric line agencies is complex. Approaches to transport planning,

implementation and operations are currently fragmented among a myriad of organizations, entities and Ministries with little evidence of efficient, market-responsive overview guidance or control.

MiNTS has proposed a comprehensive approach using three potential approaches, with implementation choice dependent on a further external consultations.

- **The most comprehensive and far-reaching approach** is restructuring all the core transport related activities to be under one ministry following, in essence, the Japanese model. This means that the Ministry of Transport should be in charge of civil aviation, tourism and the Suez Canal. All national transport related projects planned by the Ministry of Housing, Utilities and Urban Development should be reviewed and implemented by the Ministry of Transport. All public companies operating in the transport sector should be under the Ministry of Transport. The Ministry of Transport should be responsible for the planning, supervision and follow-up of all transport related projects implemented by the local governorates such as local roads, bus and shared taxi terminals as well as ferry crossings across the River Nile and other canals. To implement this recommendation, the role of the Transport Planning Authority should be enhanced to cover the transport planning of all transport modes and transport activities to insure integrated multimodal transport system and to improve logistics activities.
- **A less comprehensive approach is to establish a Higher Council for National Transport.** This higher council should be under the chairmanship of the Prime Minister and its members should include the Minister of Transport, Minister of Civil Aviation, Minister of Tourism, Chairman of the Suez Canal Authority, Minister of Interior, Minister of Environmental Affairs, Minister of Trade and Industry and Minister of Investment. The Transport Planning Authority (after enhancement) should act as the secretariat of this higher council.
- **The least comprehensive approach is to form a "Standing Committee for National Transport"** consisting of senior representatives of the related ministries and authorities. The Transport Planning Authority (after enhancement) should act as the secretariat of this standing committee.

7.3.2 Financing Enhanced Planning Capability

Transportation planning is a complicated process which includes different hierarchies; vision, policy and strategy, different elements; hardware, software and humanware in addition to different building blocks; governance, society, economy and environment. Transport planner should have through knowledge of all these layers of disciplines. In the same time transport planning cannot be done by a single person or a small group, but requires the effort of multi-discipline team. An upgrading program of TPA that covers capacity building is urgently needed. While this need is commonly recognized, financing remains problematic.

MiNTS suggests that one solution to overcome this hurdle is to allocate a given percent of the Ministry budget across all line agencies (plus possibly external participants on a "user pay" principle) to a **research and development fund**. The accrued amount would be channeled to the budget of TPA. Qualified personnel should be recruited for the key posts of TPA. Foreign advisors can be requested from donor countries to restructure TPA. Such restructure may introduce new departments such as multimodal integration department, logistics department, and transport demand management department. Clearly, strong linkage is required with the Egypt Transport Center (refer Software Project 1, Chapter 8 of this volume).

7.3.3 Upgrading Channels of Communication

Coordination and communication among Ministries tends to be formal and "letter oriented". Even among line agencies within Ministries, coordination can be time consuming and a "top heavy" exercise, with little opportunity for quick and concise problem-solving at the technical level. While many options for enhanced coordination exist, MiNTS offers four initiatives in particular:

- There exists a very strong relationship between economic development and transportation improvement. This link has proven particularly valuable during the course of MiNTS in that elements of the *Egypt Vision 2052* document, as well as plans of other governmental entities, underpin aspects of the transport Master Plan. To bridge this gap, an expedient approach would be to form a standing committee between **Ministry of Transport** (likely TPA) and **Ministry of Housing, Utilities and Urban Development** (likely General Organization for Physical Planning (GOPP)). Alternatively, representatives from each of the two organizations could serve on the board of directors of the other.
- In view of the intermodal aspects between air transport and ground transport of both passengers and cargo, there should be a strong relationship between the **Ministry of Transport** and the **Ministry of Civil Aviation**. Good intermodal facilities at major airports are essential for the comfort and efficiency of passenger transport. Logistic systems that integrate air and ground transport have become the norm at global airports.
- Efficient and safe tourism transportation is a key factor in tourism development. The Ministry of Tourism is currently constructing a large scale training facility for tourist bus drivers in Helwan, Cairo Governorate and is improving road signs at touristic sites. Such activities should be coordinated between the **Ministry of Tourism** and the **Ministry of Transport** to attain maximum benefits from the available resources of both ministries.
- The Ministry of Interior is in charge of issuance of driving license, vehicle operation license, enforcement of traffic law and regulation as well as the security aspects of the transportation facilities. It is imperative to have strong relationship between the **Ministry of Transport** and the **Ministry of Interior** for attaining safety targets and enforcement of maximum axle load regulation on trucks. Such enhanced coordination is implicit in the suggested road safety initiative for Egypt (software project SW-4, chapter 8).

7.4 MODERN TRAFFIC MANAGEMENT AND CONTROL SYSTEMS (HUMANWARE PROJECT 2)

The main authority in the Egyptian road sector is the General Authority for Roads, Bridges and Land Transport. Its tasks are, inter alia, to:

- Provide through planning, design and construction, an interurban road network that is safe, efficient and well-managed;
- Implement road safety in all aspects from design to construction and maintenance;
- Maintain the existing network, routine, preventive, rehabilitation, and emergency;
- Partner with private and semi governmental entities in the construction, operation, and maintenance of selected capital roadway projects after conducting the necessary due diligence and feasibility studies; and,

- Inspect, with the assistance of the Ministry of Interior, truck axle loads in order to ensure compliance with the allowed limits.

Other key authorities active in the Egyptian road sector are:

- Ministry of Interior (Traffic Police): Undertaking road side random checks, issuing of vehicle registration certificates, issuing of driving licenses, regulating driving times and rest periods (within the overall labor law, and conducting road worthiness tests.
- Ministry of Transport: Licensing of transport operators and developing the transportation master plan.
- Ministry of Housing, Utilities and Urban Development: Road Planning and construction within / connecting urbanized area and the new urban communities. After constructing the roadways, the right of management and maintenance works change over to GARBLT or Governorates.
- Governorates: planning, construction, management and maintenance of city and town roadways within Governorates under the supervision of the Ministry of Local Development.

The major part of the investment budget for road construction is ultimately paid to contractors to construct new projects or to maintain old ones. This means that improving contractors' performance can have direct benefits to the transportation system as a whole. The Study Team has surveyed some of the construction sites of roads and bridges and has the following observations:

- Construction sites are not organized for optimum performance;
- The level of safety arrangement for the contractors' employee and for vehicles and pedestrians around the construction sites is far below international standards;
- Construction activities are going at leisurely manner with no signs of urgency even in critical bottlenecks. This indicates low productivity of equipment and personnel and longer period of project implementation. In other words, lower efficiency of investment and lower return for the contractor; and,
- The quality of roads and bridges construction is low-grade. This means faster deterioration and shorter life span of the project. This translates in more cost.

The role of GARBLT should be reinforced via several methods:

- Streamline of responsibilities of each department and unit;
- Delegate responsibilities, expand training and involve stakeholders in decision making;
- Promote more and better competition between public and private contractors;
- Improve contracts with consultants and contractors by using FIDIC contracts. This will help the contractors to improve their performance and broaden capabilities;
- Applying performance-based road maintenance management;
- Enforce regulations of heavy vehicle overloading; and,

- Since the governorates do not have their own finance structure, it may be better to manage national and governorate roads by one organization (GARBLT). This will enable the application of more appropriate standards, more optimal spreading of available funding for maintenance and investment, and will make use of the economics of scale. If this is not possible, GARBLT should prepare obligatory guidelines for the design, contracting, construction, supervision and maintenance of the local roads under the jurisdiction of the governorates (refer also software project SW-3, chapter 8).

Reforms in the road sector will create a need for professional staff with technical, financial and managerial skills to effectively pilot and help develop the new institutions. Building and sustaining the requisite capacity for road sector management is achieved by a combination of factors. Solid educational background and basic training in key professional disciplines - engineering, economics, accounting, etc. - are essential building blocks. The institutional work environment and the incentive structure also play a critical role in defining how productively skills are employed and how appropriately skills and experience are rewarded. The proposed training courses are

- Evaluation Module : Economic evaluation of investment and road maintenance strategies on main road networks.
- Tariff and Traffic Module : Interactive learning tool for managers of road maintenance resources which simulates financing options and their impact on road networks;
- Transportation Engineering Module : Benchmarking tool for road network based on vehicle travel speed; and,
- Intelligent Transportation Systems (ITS) Module: using modern computers and communications to make travel smarter, faster, safer and more convenient.

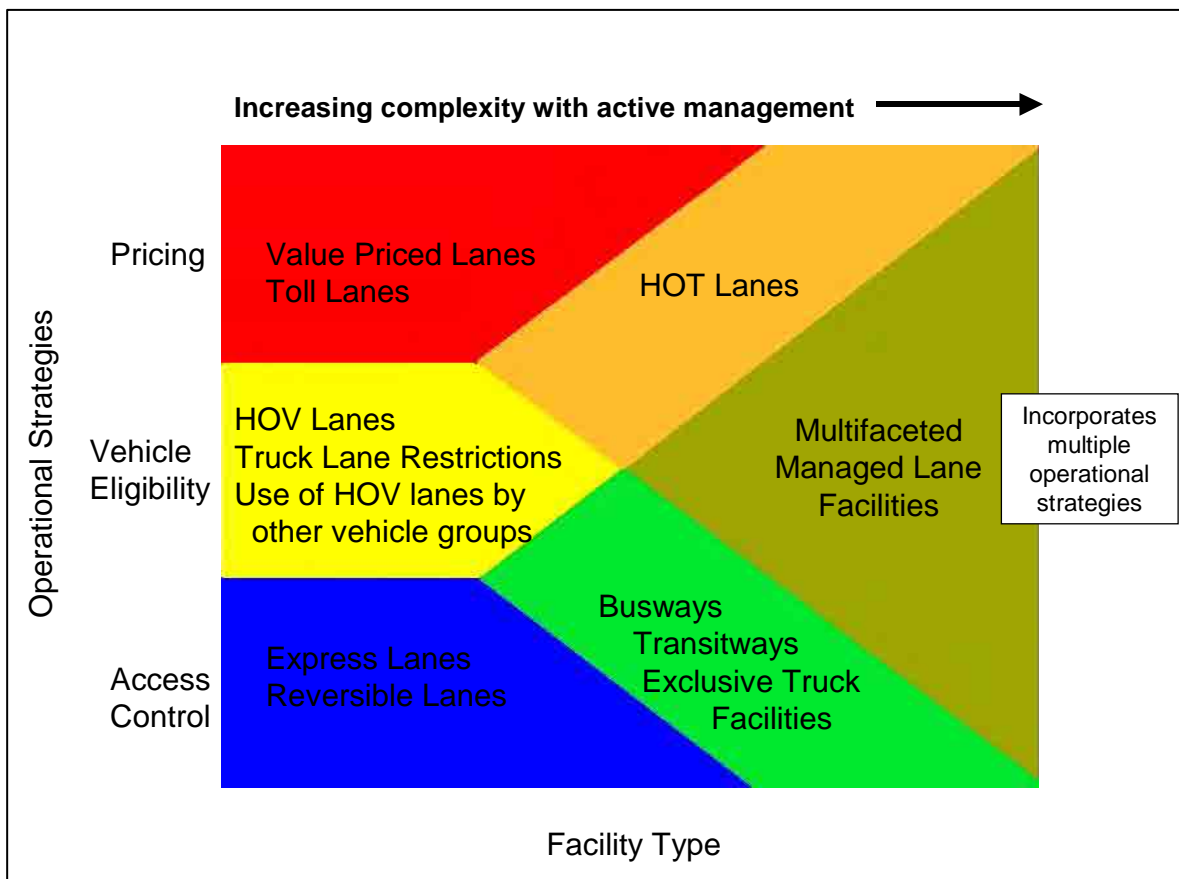
The ITS module is seen as critical in operational terms given a continuing transition of GARBLT responsibilities toward higher order roads featuring sophisticated operational requirements. The benefits of ITS are seen as many fold to include demand responsive applications of signal systems, automated toll collection devices, mobile information systems, public transport priority systems and commercial vehicle pre-clearance checks. The use of priority lanes of expressways are seen as being increasingly relevant to GARBLT (particularly if, as recommended by MiNTS, GARBLT authority be expanded to all roads). Training should be included in techniques such as the potential application of High Occupancy Vehicle (HOV) lanes, High Occupancy Toll (HOT) lanes, and other systems (Figure 7.3.1).

7.5 ROAD MANAGEMENT AND MAINTENANCE (HUMANWARE PROJECT 3)

The primary focus of road network management is to foster development of a road network that is fundamental to national evolution and development. Network management includes the challenge which has been to promote policy reforms aimed at sustaining road networks and preserving road assets. Improved road network management contributes to this objective by ensuring that the best performance and value-for-money are obtained from the road network and the resources invested in it and eventually the best service is offered to the road users.

Road network management is to consist of five functions:

- Planning : to develop a strategic view of road network development and maintenance, targeted performance and resources required;



Source: JICA Study Team based on Federal Highway Administration, USA

Figure 7.3.1 Potential Applications of Lane Management Techniques on Expressways

- Programming : to decide, under budget constraints, on multi-year road works and expenditure programs;
- Preparation : to prepare implementation of the first year tranche of the program defined at the programming stage;
- Operation : to implement the first year trench of the program defined at the programming stage; and,
- Monitoring and Evaluation : to monitor the results and the impact of the program and compare to the strategic objectives defined during planning.

Road maintenance reforms are to be built on three pillars: improved road maintenance financing, improved road maintenance management capacity and improved execution capacity. Formulation should be undertaken to review the legal and institutional framework for road agencies in Egypt. The purpose of the task is:

- to assess the legal and institutional framework under which road agencies operate with a view to identifying some of the common features which may indicate good practice for others to subsequently follow. The task is also to unearth specific approaches taken in some countries which may not as yet have been universally adopted, but which may merit further consideration.

- to assess the performance of road administrations and the impact of the changes in the institutional framework for road maintenance resulting from the creation of road agencies and transport funds (refer software project SW-2, Chapter 8); and
- to provide guidelines to improve performance of road institutions and efficiency of the institutional framework for road maintenance.

7.6 THE ENR TRANSFORMATION PROGRAM (HUMANWARE PROJECT 4)

In 2006 the Minister of Transport approved a plan with the aim of a deep change and transformation of ENR according to international standards. The plan was prepared by Booz Allen Hamilton during 2006-2008. The transformation plan was endorsed by the Egyptian Parliament. The Plan focuses on five strategic priorities:

- Sector framework;
- ENR structure/ new operating model ;
- Asset and infrastructure investment ;
- Revenue optimization; and,
- Safety capabilities upgrade.

The vision of the transformation plan is to the transfer ENR to an efficient rail operator providing safety and quality public services and competitive commercial products on a sustainable financial basis. The above strategic priorities have been transformed into 19 key strategic projects and these projects are currently implemented with assistance from the Italian firm "Ferrovie Italiane". Implementation progress is not the same for each of the strategic priorities.

The Study Team endorses the recommendations of ENR Transformation Plan and urges the Egyptian Government to provide the required finance and the needed qualified human resources that ensure its successful and timely implementation.

Concurrently, to improve safety issues in ENR, the EC has supported a twinning program titled " Assistance to the Egyptian Ministry of Transport for reforming Railway Safety Regulations, Procedures and Practices". The general objective of the twinning program is to upgrade the overall capacity of the Egyptian administration in the railway field by improving the legislative and regulatory framework and strengthening institutional capacity. The program includes the following recommendations in addition to other infrastructure and human resources programs:

- The establishment of the "Railway Safety Regulatory Unit (RSRU)" at the Ministry of Transport as a separate unit from ENR in addition to the establishment of a railway inspectorate within ENR. RSRU has been established and is operative.
- To benefit from European expertise and EU directives by approximating, to the extent feasible, of ENR safety regulations to appropriate standards.

7.7 THE RTA TRANSFORMATION PROGRAM (HUMANWARE PROJECT 5)

The Nile and other existing waterway infrastructure have the potential to be part of a future integrated transportation system in Egypt, but only if the government stimulates sector modernization. Guaranteeing navigability by dredging and expanding the waterways, building barrages and locks and installing navigation systems are only part of the concerted efforts needed to attract private investors.

Infrastructure development is not sufficient to guarantee success. Substantial financial resources can be allocated to building and maintaining infrastructure, but uncoordinated management of the waterways between ministries and the actions of careless and uncontrolled shipping companies could further deteriorate river transport to the point of no return (point where the cost to develop the rivers becomes too high). Inland waterway transport in Egypt has a high potential, but structural changes and targeted investments are essential to revitalize the sector and make it a sustainable partner in the transport system.

To increase the share of river transport, the Study Team recommends the following:

- **Continue implementation of NICHE/RIRT program.** Now ongoing, this program, under assistance from the Netherlands, targets capacity building of RTA humanware resources, and implementation of modern logistics services. The composite recommendation is contained in Table 7.7.1.
- **Coordination Department within RTA.** There are many stakeholders other than RTA operating in the River Nile and its canals. They include the Ministry of Water Resources and Irrigation who is the Ministry in charge of water management, the Ministry of Interior who is in charge of security affairs of the water bodies, Ministry of Agriculture and Land Reclamation who is in charge of fishing resources, State Ministry for Environmental Affairs who is in charge of monitoring the water quality, local governorates who are in charge of licensing and supervising the operation of river crossing ferries, the Ministry of tourism who is in charge of the supervision of tourist boats in additions to the operators of cargo fleet and other floating units. Without good cooperation with all these entities, it is difficult to have successful river transport operation. The organization of RTA does not include a coordination department to cope with all the issues related to these entities. This department will be in charge of coordination with the above mentioned organizations for smooth and efficient development of river transport activities.
- **Promotion Department within RTA.** Due to the low share of river transport in the cargo transport, it is not enough to construct new facilities. Education and promotion efforts are essential for attracting more clients to use river transport instead of road transport. The RTA is encouraged to establish a Promotion Department within its organization. The promotion department will cooperate closely with barge operators (public or private) and with terminal operators to promote river transport. It is to be noticed that RTA does not have a home page on the internet and the Study Team recommends the establishment of a home page with links to all related authorities and companies.
- **Application of a landlord river management structure.** For the development of modern river ports, the Study Team recommends the separation of ownership and operation via application of the landlord model. Generally speaking, within this context, RTA builds the infrastructure and contracts operators for the installation of the superstructure and the port operation.

Table 7.7.1 Humanware Project 5 – Inland Waterway Transport Sector

Classification		Name	Background/Necessity	Dimension/Specification
Skill&Knowledge	Training	Capacity Assessment & Building	Even though RTA is conducting training to his staff every year but the effectiveness has not been properly evaluated as integrated skill and knowledge of organization of RTA without practical opportunities to utilize such experience	Execution of capacity assessment for all the staff including RTA management and organization and of capacity building for efficient resource development to each staff and RTA himself including monitoring and post evaluation
	Specialty	Strengthening IT Knowledge Utilization	Mobility for taking actions and information held seem low and old-fashioned due to insufficient database structure	Formation of utilizing database system stored in advanced IT infrastructure for enhancement mobility and intelligence of each staff and RTA himself including monitoring and post evaluation
Resource Injection&Allocation	Encouragement	Personnel Exchange & Detachment	Human resource management and development for RTA staff are not sufficient and resource drain might consequently happen in such situation	Implementation of resource exchange periodically within RTA or sometime out of RTA and detachment of personnel to the related advanced public and private sectors in/out of the homecountry including monitoring and post evaluation
	Resource Importation	Specialist/Expert Detachment	New view and action are lacking in RTA for its reformation and restructuring	Incorporation of specialist/expert who assists reformation and restructuring of RTA from third party view including monitoring and post evaluation
Employment Opportunities	Work Sharing	Working Environment Improvement	Task management and capacity maximization is required upon efficient public services of RTA	Strengthening management skill of administrative position and facilitation of the practice including monitoring and post evaluation
	Public Participation	Public Involvement Formation	Distance or estrangement may have been made between IWT and communities but any exploitation can not be done without understanding and cooperation by them	Implementation of public participation structure in any aspects to carry out the related IWT activities with awareness program including monitoring and post evaluation

Source: JICA Study Team

CHAPTER 8: SOFTWARE OPPORTUNITIES

8.1 A NEED FOR MODERNIZATION

8.1.1 The Intermodal Transport Corridor as a Catalyst

The comprehensive Transport Master Plan for Egypt puts forward recommendations for the creation of infrastructure, the installation of software, and the development of qualified expertise (humanware), which

The MiNTS Software Packages

Seven packages of software projects have been included in the prioritization program detailed in Chapter 9 of this volume. The software packages include:

SW-1	Egypt Transport Center	Maintain and enhance MiNTS national transport model; maintain and expand MiNTS national geodatabase; carry out Ministry-wide transport studies and reviews; create "smart systems" for on-going data monitoring; humanware development; road safety initiatives and similar tasks. Focus can address both national (MiNTS) and urban matters. In the latter case, this could include re-activating the recent CREATS (Cairo Regional Area Transport Study) computerized transport model/database and monitoring of urban transport systems to include, for example, performance of the expanding Cairo metro network. Other urban areas can progressively be integrated with such procedures, with Alexandria being a likely "next in queue" candidate.
SW-2	Dedicated transport fund	Explore opportunities for establishing a dedicated transport fund to supplement Ministry of Transport financial resources beyond national budget allocations. Intended use for capital and maintenance outlays.
SW-3	Enhanced road capacity and design	Move toward developing <i>Egyptian Highway Capacity and Design Manual</i> as well as <i>Manual on Uniform Traffic Control Devices</i> . Develop state-of-art standards designed to maximize capacity, operations and safety. Further technical detail in <i>Technical Report 1, Road Sector</i>
SW-4	Road safety initiative	Nationwide focus on 3 E's: Engineering, Education and Enforcement. Possible role for Egypt Transport Center (Project SW-1). Intent is to establish a cross-agency single national entity responsible for road safety. Further detail regarding the Egyptian road safety experience contained in <i>Technical Report 1, Road Sector</i> .
SW-5	Railroad safety initiative	Modern, automated technology to be applied at railroad at-grade crossings to enhance safety. Continuation and expansion of on-going program set to expire year 2017. Closely allied with hardware improvements as overall railroad safety enhancement initiative. Further technical detail in <i>Technical Report 2, Rail Sector</i>
SW-6	Railroad systems and control	Modern technologies for signaling and communications. Further technical detail in <i>Technical Report 2, Rail Sector</i> .
SW-7	IWT navigation and control	Modern technology for inland waterway transport to include navigation management, database structuring, river information systems, and navigation aids improvement/upgrading. Further technical detail in <i>Technical Report 3, Inland Waterway Transport Sector</i>

jointly will establish a modern transport system for transporting persons and goods in Egypt.

One important recommendation for sustainable freight transport in Egypt is the establishment of the Intermodal Transport Corridor (ITC), linking the port of Alexandria with the port of Ain Sokhna via a value added logistics centre in 6th of October (VAL Center). The ITC will focus in the first place container traffic between Egypt and Europe, with destination / origin in Egypt or transiting Egypt. But the corridor will also and gradually concentrate on traffic from Asia, in particular China, destined for the European markets where the Egyptian transport sector will provide value added services. The added value of the ITC corridor is the provision of contract logistics services, a segment of the transport sector at present hardly or not present in Egypt. Along the ITC, specialized logistics service providers will offer cost-efficient and customer-tailored logistics solutions for products originating from Asia (in particular China) and destined for the European markets that meet the specific needs of European clients, such as:

- Managing components for final assembly ;
- Kitting and customizing products for different European markets;
- Managing warehouses including return logistics (in particular for consumer goods);
- Management and supply of time-critical spare parts; or
- Management of the entire end-to-end supply chain.

Any action towards developing value added services, both along the ITC corridor and at specific locations in the Egyptian transport system can only be sustainable if accompanied / complemented by an efficient management and control system. Such system will ensure the efficient functioning of the transport system and of its many divisions / services not only in line with customer expectations but also, and increasingly, in accordance with environmental requirements and international rules and regulations.

8.1.2 Definitions

When developing software and computer programs, it is imperative to clarify the applied terminology, considering that confusion reigns when it comes to discussing the use of modern technology in decision-making and more broadly in public administration.

Following specific terms are frequently wrongly used and source of confusion and misunderstanding:

- **Model:** the word has many meanings, the appropriate definition is: "Simplified representation of a system or phenomenon with any hypotheses required to describe the system or to explain the phenomenon." Models can therefore not be used in itself except as a means to describe something.
- **Tool:** Definition: "Anything used as a means of accomplishing a task or purpose". This is the broadest form of assistance and involves not only physical tools (e.g.: computers) but can also be processes (e.g.: professional training), structures (e.g.: coordination bureau within the Ministry) or even persons (e.g.: professional consultant). Software is frequently and correctly referred to as a (decision-making) tool as it assist its user in accomplishing a particular task, for example forecasting future traffic.

- **Platform:** Many meanings exist for the word, but the relevant definition is: “A major piece of software, as an operating system, an operating environment, or a database, under which various smaller application programs can be designed to run”. The software platform functions on a hardware platform, a group of compatible computers that can run the same software.
- **System:** the definition is: “An assemblage or combination of things or parts forming a complex or unitary whole”. This is the core of the problem as it frequently is the “system” that is used as terminology while actually a “tool” is meant. A “system” in its right meaning and for present purposes is the integration of available software tools into a single system and which can be accessed via one or more communication platform.

8.1.3 Information, Software, and Good Governance

Software and information management technology can be useful for sector management and decision-making, but only as far the users of it understand that

- *The output is the result of the input*, meaning that the application(s) will only be useful and produce relevant results only if the information introduced is accurate, verified, and regularly updated.
- *The output is only a decision-making aid*, suggesting that no software application can be perfect and the interpretation of results is always required. The need for “strategic” brainstorming will remain imperative to ensure that the theoretical outcomes reflect the real needs of policy-making.

So as a first step and prior to any concrete application, public authorities need to clearly specify the objectives that will determine whether development or management is the ultimate goal of the investment.

8.1.4 Planning Tools

The most common and wide-spread application of modern technology are the many transport network development tools are in their generic format relatively simple tools that assist in evaluating existing traffic flows, forecast future demand, identifying infrastructure needs, and assess investment priorities. The basic structure is simple and the concrete technology is generally excel-based or commercially available software. The application can be sector-based or mode-oriented, depending at what level in the administration the tool is used.

The initial objective of using traffic system development tools is to facilitate decision-making processes related to transport infrastructure investments, improving in particular the efficiency in allocating scarce financial and other resources to desired investments and therewith increasing the “return on investment”, be it in financial, economic or social terms. The transport network development model generally includes three key steps, as suggested in Figure 8.1.1.

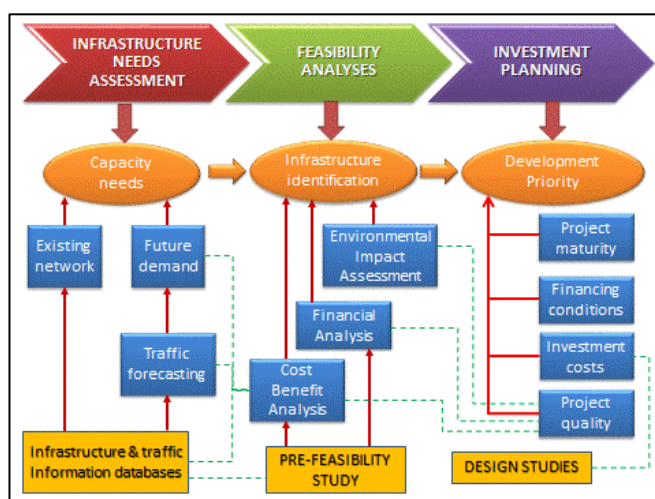


Figure 8.1.1 Basic Architecture of a Transport Planning Development Tool

In a first step, an Infrastructure Needs Assessment identifies what in the future will be the needs in terms of physical transport infrastructure to effectively respond to expected demand growth. This compares the present network with the future demand and determines from that the necessary infrastructure. The evaluation uses traffic - and infrastructure information databases and relies upon traffic forecasting tools to assess future demand. The outcome of the first step is the input for the second step, where the viability of proposed infrastructure investments is investigated at three levels, the economic level (CBA to determine the EIRR), the financial viability (to determine the FIRR), and the environmental impact (EIA in its basic and/or extended versions). The third and final step in the decision-making process is determining the priority of the retained investments in an effort to match the costs of desired investments with the annual or multi-annual budgets allocated for transport infrastructure investments. The priority is determined on the basis of a multi-criteria analysis.

8.1.5 System Tools

With the advancement of technology, a growing application of different transport planning and management tools are applied, commonly with internet based communication and using GIS technology to optimize representation and geographic localization - identification.

Many if not most applications remain stand-alone applications, although the trend to integrate transport planning and management and control tools into a centralized platform is undeniable and can be observed in many countries. The basic reasons for this trend are not only hardware-related (technological progress of internet, GIS, automated identification systems, etc.) but also for reasons of efficiency and cost awareness.

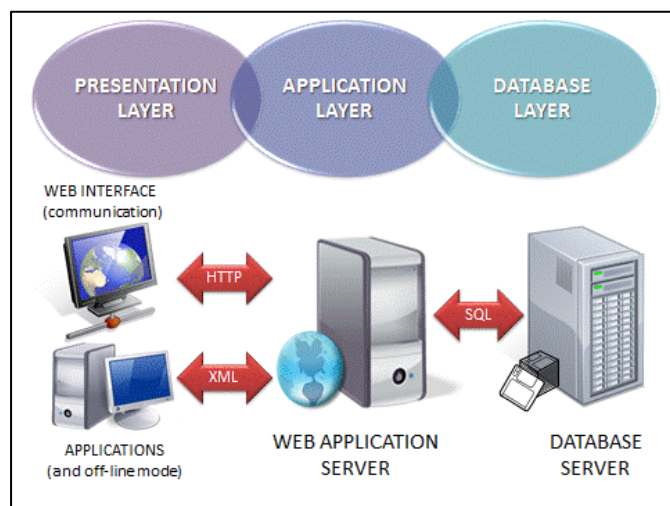


Figure 8.1.2 Basic Architecture for System Management

A basic architecture for an advanced integrated system management system is presented in Figure 8.1.2.

Any system includes at least three layers:

- The presentation layer is the user interface dealing with communication and applications. The former is for communication between users and server using HTML (HyperText Markup Language) and operates via a web navigator using the HTTP protocol (HyperText Transfer Protocol). The latter uses XML (Extensible Markup Language) to communicate with the server and also allows functioning off-line for later data transfer when next connected to internet again. Although not imperative as part of the system, the off-line mode is convenient to develop autonomously new applications and to allow users who are not permanently connected to work without connection to the server.
- The application layer receives requests from the users and runs various application modules. It is at this level that the different models are integrated into a single operating system and where access is managed and controlled to avoid improper use of information.

- The database layer is where all information is stored and where the applications obtain and store the necessary information to run their programs and respond to user queries. The particularly of the database layer is that it makes existing / stored information transparent and facilitates accessibility for all licensed users via standardization of the data platform, and this independent of the data storage methods or systems.

Figure 8.2 is a schematic representation which means that the database respectively application server could be one server and not two independent ones or that all information does not have to be physically stored in the system database but can be stored in a multitude of databases.

8.1.6 Management Application Example

An integrated vessel traffic management system is integrated by the Port of New York / New Jersey, where the port acts as primary port (area) and manages adjacent (logistics) areas to integrate transport and logistics activities and optimize traffic flows. They optimize traffic and cargo handling in the area by coordinating management, interconnecting services, and jointly commercializing port and logistics services.

The principal goal of the system is to maximize the integration of barge ports, inland rail freight terminals, road freight terminals and the seaport to transit containers to regional terminals, such as Albany (NY), Davisville (RI), Bridgeport (CT), New Haven (CT), Camden (NJ), Salem (NJ) and Wilmington (DL), where the cargo is trans-shipped to trucks for haulage to its final destination (Figure 8.1.3).



Source: Jean-Paul Rodrigue: "The Port Authority of New York and New Jersey: Global Changes, Regional Gains and Local Challenges in Port Development" In *Les Cahiers Scientifiques du Transport*, 02/2004.

Figure 8.1.3 Intermodal Facilities and Navigation Channels, Port of New York

The key objective of the management system is to optimize the competitive and commercial situation through coordination and cooperation of cargo handling firms, forwarding firms, logistics service providers, transport companies etc. and via integrated and coordinated management of the total flows.

The integrated approach is essential for the port of New York / New Jersey where traffic has exploded and port expansion was limited and diverting traffic was the only realistic solution. The port handles on average over 5,000 cargo ships per year and is the busiest container port of the East Coast and the third largest port in the United States. The interest of this approach lies not only in the coordination of the sea-leg traffic flows but also in the incorporation of the land-leg transport flows, linking maritime traffic directly with barge and railway traffic.

The approach is possible thanks to the Port Community System of the port of New York and New Jersey, comprehensive and cross-mode information management system as presented in Figure 8.1.4.

The interconnectivity of maritime and land based service providers substantially facilitates and fastens ship handling and therewith reduces the idle time of ships and transport operators in the port. In particular the link with customs services and the arrival of all documents prior to the mooring of the ship make that all clearances have been done at the time the ship is unloaded. Cargo can therewith immediately leave the port area and transported to the hinterland thanks to the on-time arrival of the tractor (railcar or truck) and automated gate management.

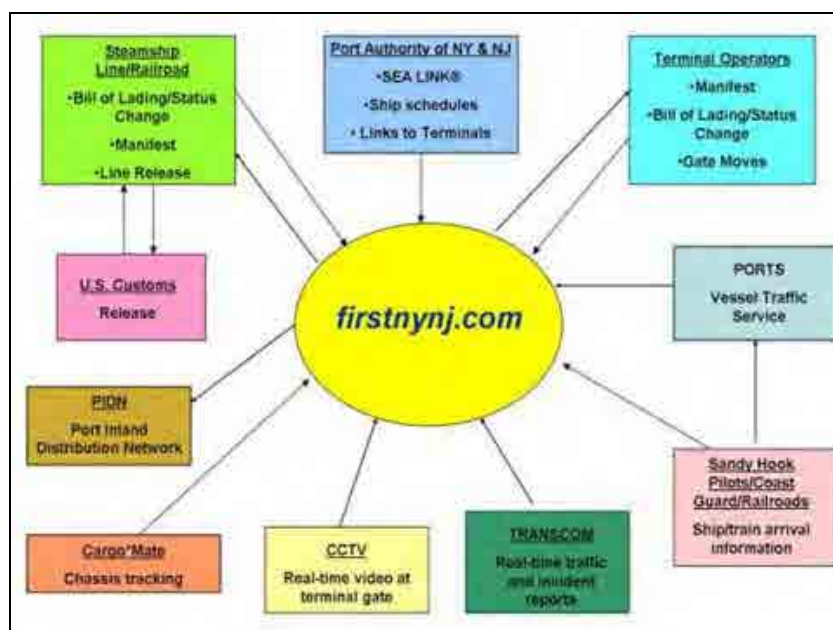
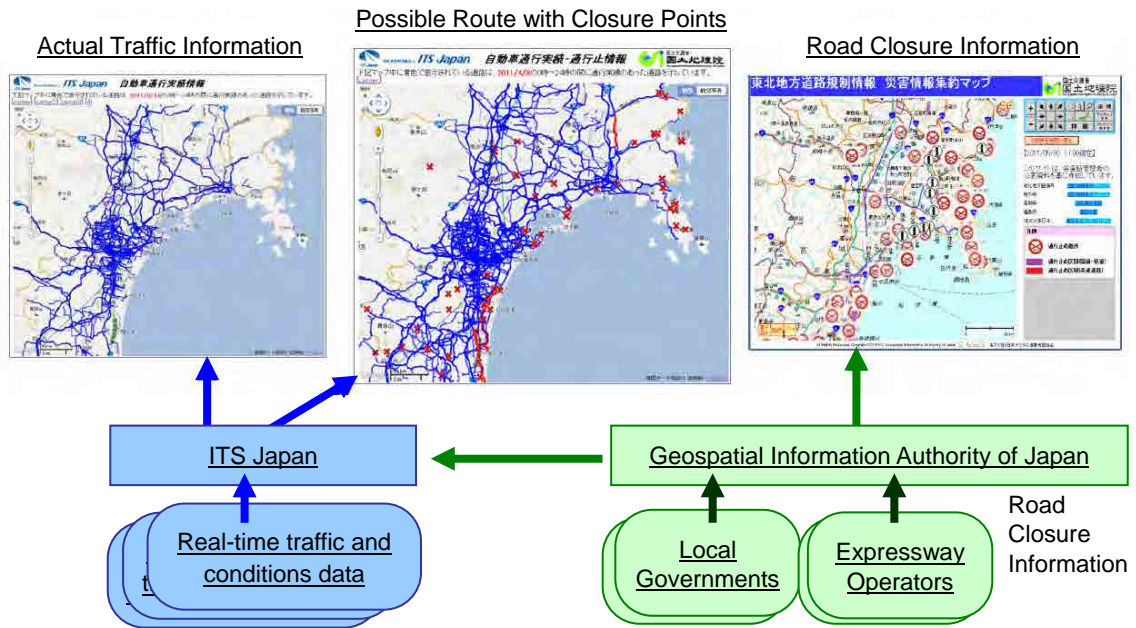


Figure 8.1.4 Port of NY/NJ Information Processing System

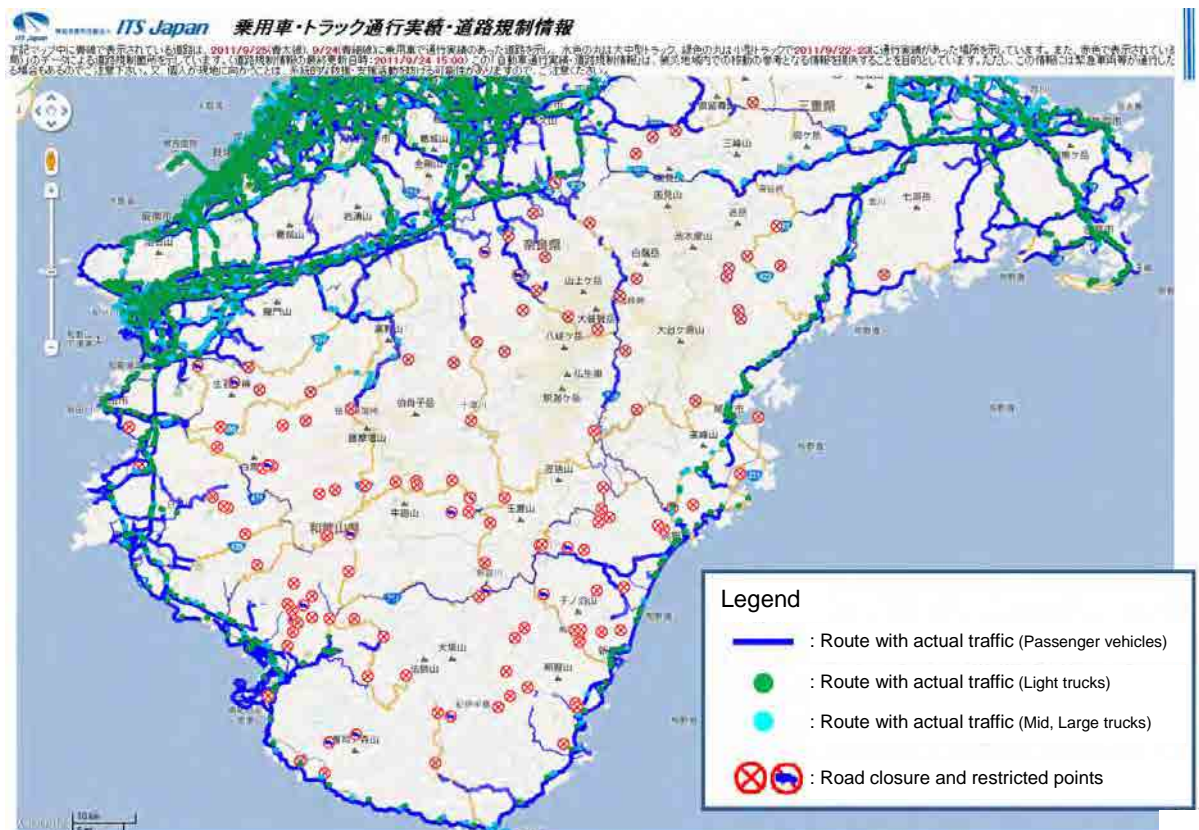
Another management example developed in Japan, which is related to the disaster management such as the Great East Japan Earthquake occurred on 11 March 2011. The essential underlying post-event issue raised by government administration, road users and logistics services is how to obtain up-to-date road network conditions in order to facilitate, among other purposes, the delivery of relief supplies and the allocation of rescue vehicles to stricken areas. The Japanese Administration had previously developed a road information system which provides with updated road information on current available routes and restricted points. ITS Japan played a coordinating role in collecting real-time traffic data from various car navigation systems, vehicle companies as well as taxi operators, and integrating these data with road closure information provided by road operators and public administrations (Figure 8.1.5). The database was updated on a daily basis, and available via a number of communication resources including internet (Figure 8.1.6). This enhanced system has been expanded from its original objectives (earthquake impact mitigation) to other natural disasters such as a typhoon. In terms of comprehensive planning, management

and control, this system would definitely contribute to emergency rescue and assistance as well as proper traffic control in the event of a natural disaster.



Source: ITS Japan, translated by Study Team

Figure 8.1.5 Information Flow for Identifying Route Operations and Conditions



Source: ITS Japan, translated by Study Team

Figure 8.1.6 Real-time Road Condition Information Dissemination Example

Conclusion: Physical transport of passengers and goods has become complex, multimodal, and multi-dimensional with increasing integration of hardware and software that needs high-quality humanware. Innovative information and communication technologies now allow real-time control of transportation network. The implementation of such advanced systems is becoming a reality and Egyptian authorities will need to follow the trend and gradually implement advanced transport management and control systems.

The immediate task is to take responsibility for the implementation and continuing of future updates/enhancements of the MiNTS-derived national transport plan, CUBE simulation software and underlying Arc Info database. Follow-on priorities must include the further integration of major simulation exercises, in particular, those related to the Cairo Area Regional Transportation Study (CREATS), as completed by JICA during 2002.

The establishment of an Egyptian Transport Institute as centre of excellence is highly recommended to create a "Transport Management Model" that strengthens the technical and administrative capacity of public Authorities and leads to the creation of a "Transport (Sector) Management Tool" in its right meaning and for its defined purposes, accessible via one or more Functional Platforms and offering public authorities a comprehensive planning, management and control System for the Egyptian transport network .

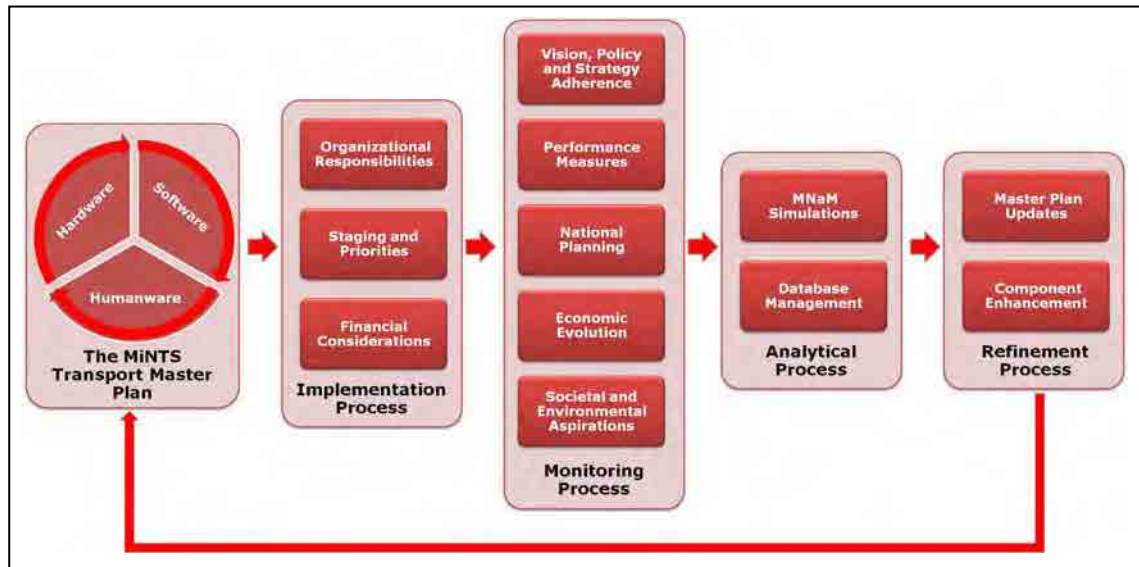
8.2 THE EGYPTIAN TRANSPORT CENTER (SOFTWARE PROJECT 1)

8.2.1 The Immediate Action Plan

Transportation planning is a complex and iterative process that transcends the purely technical aspects of different modal systems and their various elements. Indeed, broader national objectives and aspirations must be considered as part and parcel of the process. The building blocks of the MiNTS planning process (governance, society, economy and environment), which underpin the derivation of hardware, humanware and software initiatives, must continue to be considered if the broader fabric of the Master Plan is to retain its visionary aspects. The integration of these considerations into a post-MiNTS framework is vital if the integrity and value of the Transport Master Plan is to be maintained, indeed enhanced, following the completion of MiNTS (Figure 8.2.1).

Transport professionals must exhibit familiarity with all these aspects. However, such comprehensive transport planning cannot be achieved by a single person or a small group of specialists, but instead requires the coordinated efforts of a multi-disciplinary team. To understand the new trends of intermodal logistics in passenger and cargo transport, a centralized data bank that collects and updates all data and information is an undeniable necessity although lessons of history confirm that:

- Data and analyses are segregated among "kingdoms" with little apparent coordination;
- Retention of trained and qualified staff is problematic;
- Governmental will and/or commitment fluctuates in line with political considerations;
- Location, technology and funding for various databases varies. An obvious concern is the lack of a unified and Egypt-wide comprehensive GIS database;
- External specialists are not always available on an as-needed basis; and,



Source: JICA Study Team

Figure 8.2.1 Core Aspects of the Post-MiNTS Transportation Planning Process

- Enhanced coordination and cooperation is a pressing need.

The absence of an integrated GIS or similar computerized record keeping system at the level of national Administrations is almost universal. Similar to many other countries, the Egyptian Ministry of Transport does not have until now a centralized data bank, only data “centers” sponsored by the sectors and these have evolved according to varying quality standards and along differing formats. There also is no central authority responsible for a unified approach to transport planning; nor does there exist a single, nationwide transport model until the advent of MiNTS.

The basis to achieving integrated transport planning is the overriding goal of enhanced hardware, software and humanware which requires an integrated approach that considers the various modes and their capabilities and should be physically housed within a dedicated Egypt Transport Centre – ETC (Figure 8.2.2).

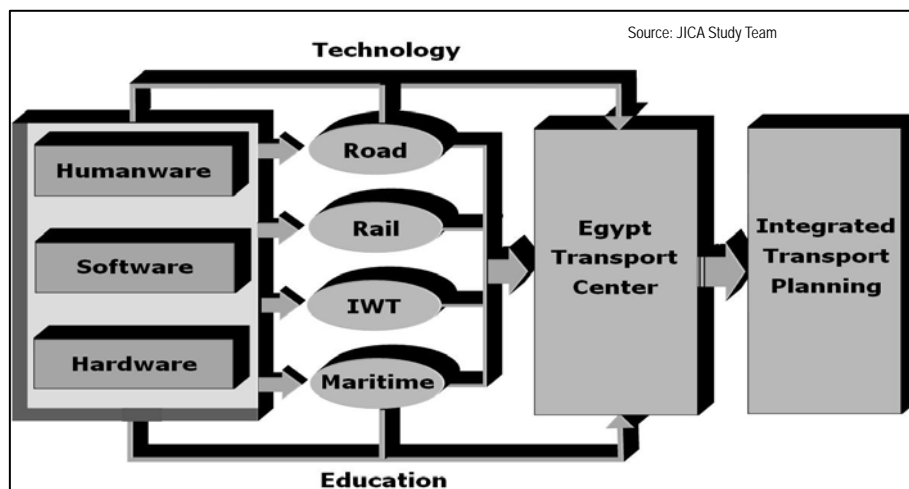


Figure 8.2.2 Framework for The Egypt Transport Center

The core objective of establishing the ETC is to create a *center of excellence* in the realization of integrated transport planning across all modes and services, applying “cutting edge” methodologies and state-of-the-art technology, hinged on joint working relationships between governmental entities, the private sector and academia. There exists at present no organization (or group of organizations) that can provide, on a consistent and on-going basis, short term, medium term or long term transportation planning in Egypt. This is the main reason for requesting, in past, international aid to conduct such studies. With the expected continuous economic growth, Egypt will soon pass the threshold of international aid in terms of technical assistance. Egypt has therefore no alternative but to build her own capabilities in transport planning (among other fields).

Core activities during the immediate action stage of the ETC would be maintain and enhance the MiNTS national transport model; maintain and expand the MiNTS national geodatabase; carry out Ministry-wide transport studies and reviews; create “smart systems” for on-going data monitoring (sample architecture in Figure 8.2.3); humanware development; road safety systems and similar initiatives. Focus can address both national (MiNTS) and urban matters. In the latter case, this could include re-activating the recent CREATS (Cairo Regional Area Transport Study) computerized transport model - database and monitoring of urban transport systems to include, for example, performance of the expanding Cairo metro network.

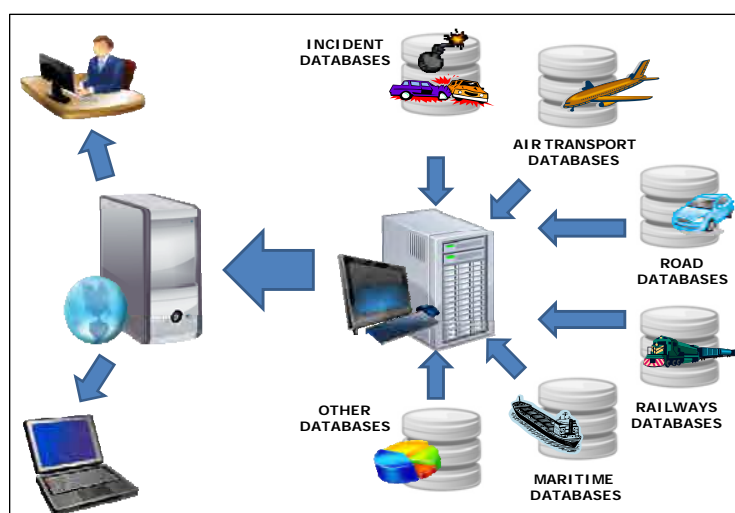


Figure 8.2.3 Concept Architecture of Centralized Transport Data Recordkeeping

Conclusions

A crucial need exists for setting up a Transportation centre to be known as Egypt transportation centre (ETC). Such centre will assume responsibility to fill the gaps identified above that is crucial to secure the sustainable success of the implementation of MiNTS as well as of the preservation of the valuable transport policy and planning databases that were collected for CREATS and MiNTS. The long-term objective is the realization of integrated transport planning across all modes and services, supported by “cutting edge” methodologies and state-of-the-art technology through the ETC without technical support from external resources.

The ETC will provide tailor-made and specialized research and consultancy services to professionals, technical cadre and policy makers working in central and local government agencies, NGO's, private sector and educational institutions. It will foster openness and transparency in planning and implementation.

ETC work will foster urban environmental improvement and better quality of life in cities of Egypt. ETC will become a research and technical centre specialized in post-graduate and tailor-made research, policy research, and technical advisory services in the fields of transportation planning, urban systems, transportation policies, and infrastructure management.

The ETC will play a pivotal role in the development of the Egyptian Transport Management and Control Centre which in time will be(come) the key instrument for traffic management and control as well as infrastructure development and maintenance for the government of Egypt.

8.2.2 The Longer-term Potential

As in every other country, software applications to govern the transport sector find their origin in a specific demand / need, commonly related to a specific mode of transport and / or a clearly defined geographical area. The ETC fully responds to the need of Egyptian Administration to increase software applications for collecting up-to-date information and increase expert-based knowledge of the transport system, which in the end is the only sustainable manner to improve management and control of the entire transport system. But software applications are also emerging in the private sector and in specific areas, for example Port Community Systems (PCS) to facilitate port management and operations. The ETC will also in this field play an important role in integrating these various (stand-alone) applications and correlate these models and platforms to extract all relevant information to improve the management of the transport system.

Once a wide range of software applications becomes available, the need for an integrated traffic management and control system that is operated by a single integrated management centre becomes apparent. This need is even more growing because planning and managing transport in all their different dimensions has evolved to become a multi-dimensional task where basic knowledge about transport is insufficient to efficiently deal with complex issues such as:

- Understanding the nature of various public and private demand flows;
- Identifying the inter-relationships between the various transport systems and flows;
- Comprehending the inherent linkages between transport and the socio-economic as well as demographic evolution of Egypt;
- Rational and balanced infrastructure investment planning;
- Modern demand management tools and techniques; and,
- Maintaining accurate and up-to-date records systems (to include, in the first instance, transport and land development).

In preparation of a comprehensive project in the environmental sector, the UNDP highlighted in 2008 the same concerns¹ and observed that while "... several studies have been conducted and sound strategies and plans have been developed for addressing the challenges faced by the transport sector, the implementation of these plans has suffered from different barriers such as:

- Lack of inter-sectoral co-ordination (harmonization of policies, institutional co-operation) and limited institutional capacity to effectively adopt, implement and further develop the programs;
- Focus on single infrastructure investments or technology driven approaches without an integrated view on broader requirements for successful intervention;

¹ UNDP – GEF Sustainable Transport, PIMS 3523, Government of Egypt, United Nations Development Programme – Global Environment Facility, Project Document, 2008, p.6 (cit)

- Pressing needs to find solutions to pending day-to-day problems at the costs of adequately addressing the long term sustainable development needs of the transport sector;
- Shortage of sustainable transport models and new approaches tested in Egypt to gain experience, reduce the risks and build the confidence of the targeted stakeholders;
- Negative experiences with some early experiments such as the introduction of separated bus lanes in Cairo in late 1970's and 1998 or with trolley busses in 1970's;
- Possible public perception, social and cultural barriers and occasionally conflicting interest between the different key stakeholders;
- Limited access to suitable financing mechanisms to meet the required investments needs; and
- Inadequate emphasis on integrating sustainable transport planning with urban planning of new cities and on promotion of non-motorized transport in middle size provincial cities."

The development of an integrated and comprehensive Transport Management System is a long-term enterprise which will have to start with the development of the range of basic software-based control and management systems for the individual transport modes as well as for particular regions (cities) after which these different mode-based systems can be inter-connected and integrated into system capable of managing and controlling traffic at the national level.

Conclusions:

Transport of passengers and goods has become a complex and integrated process that requires modern infrastructure and tailor-made services. With the increased transfer of transport operations and services to the private sector, the role of public authorities is gradually but undeniably shifting towards management and control of the transport system as a whole.

The transport management obligation of public authorities is very wide ranging, covering all transport modes and overlapping with numerous other themes. It includes traffic management (for all modes) as well as mobility management aspects for passengers and logistics for freight.

The establishment of the Transport Management Centre should be a long-term objective and be developed with the Egyptian Transport Centre playing a central role. The creation of the ETC is therefore a crucial requirement to grow towards modern public management and control of an efficient transport network that will be beneficial to the social and economic development of Egypt.

8.3 DEDICATED TRANSPORT FUND (SOFTWARE PROJECT 2)

Transport has to compete against other, possibly more high-profile, sectors such as health, education, national defense and law enforcement. The tendency could therefore be that transport funding is placed at a considerable disadvantage in the annual budget debate. Some countries have responded to the growing shortage of transport finance by earmarking selected taxes, levies and other charges for direct allocation to an off-budget account, or dedicated transport fund, to support only spending on transport construction, operations and/or maintenance.

In the case of Egypt, planning for the transport sector must take into account its fiscal importance and affordability, now and in future. Recent fiscal data suggest an annual transport infrastructure investment in

vicinity of 20 billion LE. Historically, annual investment has ranged, roughly speaking, from two to three percent of GDP. The year 2009 experience confirms a total GDP share of 2.06 percent, with 1.36 percent derived from public funds, and 0.70 percent from private sector funds. This represents a substantial investment, however, and in particular the public contribution, is notionally seen as insufficient to address the overall needs of the national transport sector.

If similar levels of investment are assumed in future, the allocated amounts must address not only national-level projects such as those contained within MiNTS, but also urban projects, transport projects within urban new developments and investments in maritime as well as air sectors. The Cairo metropolitan area, for example, has, in the early part of the 2000's decade, accounted for roughly one-fourth of national capital transport expenditure. This is unlikely to decrease, and quite possibly increase, in light of commitments towards Cairo International Airport as well as Metro Lines 3 and 4. Obviously, the role of the private sector remains an opportunity. However, as borne out by recent experiences, there are few "success stories" for private sector investment in the Egyptian road, rail and (arguably) inland waterway sectors. The lessons of history thus suggest that a likely expectation is that the majority of funding will arise from public sources.

Several scenarios have been tested as to opportunities for alternative sources of revenue for transport funding (refer Chapter 5, this volume, for additional detail). This, in turn, carries potential in terms of MiNTS funding (Table 8.3.1).

- Increasing fuel price to market levels, that is, a simulated de-facto adjustment of the fuel subsidy, will release considerable commitments in terms of governmental expenditure. Current estimates are that the gasoline and diesel subsidy consumes some three per cent of GDP, in aggregate more than the historic commitment to investment in transport infrastructure. Once the subsidy is removed, additional funds can become available for investment in other sectors of society, including transport. Even over a reduced 10 year period, funding for the currently proposed scenarios can largely be derived from allocation of a future partial equivalencies of the current fuel subsidy.
- Scenario C-3 more than doubles fuel price, that is, a simulated imposition of "at the pump" fuel tax. This is priced at about 20 percent of the per liter market cost of fuel. Whether such a tax will be levied, and to which financial account the proceeds would be allocated, remains unknown. However, considerable amounts of the MiNTS implementation budget could be derived via such a strategy.

Table 8.3.1 Alternative Funding Sources for National Transport (Million LE)

Scenario	Half Percent of National GDP	Fuel Subsidy Equivalence Allocation		"At the Pump" Fuel Tax Allocation	
		25 Percent	50 Percent	25 Percent	50 Percent
C-1	145,507	98,100	196,200	0	0
C-2	145,507	56,700	113,400	0	0
C-3	145,507	96,300	192,600	114,300	228,600

Source: JICA Study Team. Other possible revenue contributors include private sector investment. GDP growth based on post-revolution conditions.

The establishment and operation of a dedicated transport fund must take place under rigorously transparent conditions. Annual independent audits are seen as an absolute necessity. Key needs in this regard are:

- Sound legal basis;
- Strong oversight - broad based private/public board;
- Agency which is the purchaser should not be a provider of transport systems or services;
- Sound financial management systems, lean efficient administrative structure; and,
- Regular technical and financial audits.

Conclusion: considerable financial resources will be required to realize the projects and programs embedded within the MiNTS Master Plan. The implementation will require considerable will and commitment on part of the Government, not only in terms of financial resources but also having a steadfast and consistent approach towards realizing the proposed transport vision for Egypt. It is therefore suggested that, in addition to traditional sources of funding from governmental allocations, as well as potential participation of the private sector in select projects, that efforts be initiated to identify other revenue sources, whose yields could be allocated exclusively to funding construction and maintenance of transport systems and facilities.

8.4 ENHANCED ROAD CAPACITY AND DESIGN PRACTICES (SOFTWARE PROJECT 3)

GARBLT is one of several agencies designing and building intercity roads; these are categorized as expressways, primary roads and secondary roads. However, underlying definitions are vague and not reflective of road characteristics and functions. While GARBLT has developed internal design criteria based on the widely-used American Association of State Highway and Transportation Officials (AASHTO) guidelines, application is not uniform throughout Egypt. Cross sections on existing higher-order, limited access road systems are frequently at variance with international standards. Furthermore, MHUUC planning and construction of roads proceeds via differing standards² which do not have clear definitions for expressways or similar high-order roads. It is seen as mandatory for the Governorates to follow these standards; however, application outside of Cairo has not been rigorously audited.

- *Conclusion: There is a clear and pressing need to develop a single set of road planning and design standards which are compatible with international practices, and which should be applied uniformly across all road types in Egypt, regardless of organizational responsibility. MiNTS urges that preparation of a Highway Design Manual as well as a Manual on Uniform Traffic Control Devices proceed in the earliest possible instance.*

The primary functions of the *Highway Design Manual* would be to (a) provide requirements and guidance on highway design methods and policies which are as current as practicable, and (b) assure uniformity of design practice throughout Egypt consistent with the collective experience of Egyptian and international precedence. The *Manual on Uniform Traffic Control Devices* would address all national design, application, and placement, standards, guidance, options, and support provisions for traffic control devices. These are defined to include signs, signals, and pavement markings. **The overall goal of the process is the realization of attractive highways which provide adequate safety and convenience to motorists**

² Egyptian Code for the Work of Urban and Rural Roads, MHUUC, Cairo, Egypt 2008

while maintaining proper balance among highway functional classifications, environmental concerns and fiscal restraints.

The US *Highway Capacity Manual* is frequently used as a foundation tool for calculation of road capacity in Egypt. Various ad hoc investigations have proceeded in this regard. However, efforts to rigorously quantify speed, volume and capacity across all road types, in both rural and urban settings, does not appear to have evolved. The *Highway Capacity Manual* may be considered an excellent choice as a basis for the Egyptian capacity framework. However, Egyptian driving behavior, enforcement practices, right-of-way rules, traffic mix and other issues do differ from those observed in more developed countries.

- *Conclusion: There is a clear and pressing need to develop a single set of road capacity standards and criteria, across all classes of road types and usage settings, which should be applied uniformly in Egypt. MiNTS urges that preparation of an Egyptian Highway Capacity manual proceed in the earliest possible instance.*

There is ample precedence in Egypt that land use developments have been permitted to proceed with little responsibility towards providing concurrent enhancements to surrounding transport systems. The Mediterranean Sea corridor west of Alexandria is frequently quoted as a case in point. While numerous residential, commercial and retail establishments have proliferated in this coastal corridor, little evidence exists that commensurate upgrading of road and public transport systems/services have been undertaken. During the peak season, congestion in the corridor has become intolerable. There is a pressing need to begin considering the adoption of a transport impact assessment procedure.

- MiNTS fully supports the conduct of **transport impact assessments**, which in turn would be buttressed by a series of rigorous and transparent procedures.

Elements of the procedure would include:

- Establish a *Trip Generation Manual* that is applicable to Egypt. This manual should be based on the best international practices in developing trip rates, such as the Institute of Transportation Engineers. The *Egypt Trip Generation Manual* should include trip rates for all different land uses applicable to the Republic, such as residential, commercial, retail, mixed-use developments and any other relevant land uses.
- Develop the *Egypt Transport Impact Assessment and Parking Guidelines Manual* based on the *Trip Generation Manual*. The *Transport Impact Assessment and Parking Guidelines Manual* should include a requirement for developers to participate in cost sharing for off-site transport improvement needs catalyzed by the development in question. The approach should be structured, transparent and linked to further approval processes.
- The *Transport Impact Assessment and Parking Guidelines Manual* should clearly define threshold requirements for submitting a impact assessment. Such requirements should be founded on trip rates quantified in the *Trip Generation Manual*.

8.5 ROAD SAFETY INITIATIVE (SOFTWARE PROJECT 4)

Official records indicate that approximately 6,000 to 8,000 persons die every year as a result of road accidents. The number of fatalities is apparently higher because of an unsatisfactory system of reporting and follow-up; the World Health Organization, for example, indicated a recent all-inclusive total of near 16,000 annual road fatalities. This identifies Egypt as one of the highest unit fatality incidence nations within

the Middle East - North Africa region. Direct causes of death and injury on Egyptian roads are seen as disregard of road warning signs and signals, changing lanes without due care, dangerous overtaking, poor maintenance of vehicles, driving too close to the vehicle in front, fatigue and speeding.

Some forms of remedial action are already being achieved if on an ad-hoc basis. However, much remains to be done in that road safety is a responsibility shared by many stakeholders in both the public and private sectors. In more generic terms, that the "Three E's", being integrated engineering, enforcement and education, are intrinsically linked in a systemic approach to improving road safety.

MiNTS urgently proposes that a road safety assessment and action plan be undertaken. Core elements could well include:

- Identify a lead agency in government to guide the national road safety effort. While the Ministry of Interior (the Police) at present has considerable responsibilities in this area, a lead agency would have legal authority to make decisions, control resources, coordinate the efforts of all participating sectors of government and liaise with non-governmental entities.
- Assess the current issues, constraints and opportunities within the sector. Part and parcel of this element would be options for enhancing data availability to include automated procedures for information recording, detailed to the site level of detail ("black spot reporting").
- Prepare a national strategy and Plan of Action. This emphasizes the multisectorial and multidisciplinary dimensions of the task, engaging a broad range of stakeholders. A national strategy in road safety should also be linked with strategies in other sectors, and set safety targets complemented by a plan of action designed to achieve those targets.
- Implement specific actions and interventions to prevent road crashes as well as minimize injuries and fatalities. In essence, this is the implementation of the Plan of Action and would include a variety of initiatives. Some representative actions are depicted in Table 8.5.1.
- Support a sustainable approach to road safety, by having available dedicated funding sources to support continuous activity by the designated lead agency, and to enhance cooperation with international agencies to participate in global plans of action and safety initiatives.

8.6 RAILROAD SAFETY INITIATIVE (SOFTWARE PROJECT 5)

ENR is already addressing safety measures especially prevention of accidents at grade crossings (railroad – roadway conflicts). Crossing accidents represent the second-highest accident category for ENR; however, the social impacts are expected to be significant given that more than 100 incidents are recorded per year. Note that the highest accident category - derailment caused by human error - is addressed by Humanware Project HW-4 in Chapter 7.

The railway crossing accident pattern can certainly be addressed via hardware projects such as grade separation of road and rail facilities. However, this is seen as problematic given the number of at-grade crossings throughout Egypt. The application of enhanced software (technology) is therefore seen as an affordable and effective countermeasure, and is thus proposed within the framework of Software Project 5.

The on-going project includes installation of modern, automatic at-grade crossing systems at 696 locations. These upgrades, to be completed by year 2017, address half of all crossings in Egypt. The full 1,392

Table 8.5.1 Software Project 4: National Road Safety Initiative

Proposed Traffic Safety Program/Project		Short Term	Mid-Term	Long Term	
A. Road Infrastructure	1	Traffic Safety Inspection and Audit System			
		Inter-urban Motorways and Expressway	√	√	
		Other high traffic accident risk roads		√	√
		Development of Traffic Safety Audit System	√		
	2	Black Spot Improvement Projects			
		Inter-urban Motorways and Expressways	√	√	√
		Other high traffic accident risk roads		√	√
	3	Urban/Village Bypass Construction Projects			√
	4	Vulnerable Road User Accident Prevention Project		√	
	5	Road Sign and Pavement Marking Improvement Project		√	√
	6	Traffic Safety Corridor Improvement Project		√	√
7	Road Work Traffic Safety Improvement	√			
8	Railway Crossing Improvement Projects		√	√	
B. Transport Management	1	Commercial Vehicle Safe Driving Management System			
		Motor Vehicle Safety Regulation	√	√	
		Safety Inspection System	√	√	
	2	Improvement of Driver Training and Testing			
		Establishment of National Standards of driving school	√	√	
		Improvement of Driving Test	√	√	
	3	Improvement of License Renewal System		√	√
4	Driver License Database Development		√	√	
5	Vehicle Registration Renewal System		√	√	
C. Traffic Enforcement	1	Upgrading Enforcement Capacity on the Major Highways			
		Patrol and Enforcement Equipment	√	√	
		Installation of Enforcement Camera		√	√
	2	Upgrading Enforcement Capacity in Major Urban Areas		√	√
	3	Traffic Accident Database Development	√	√	
4	Upgrading Enforcement Capacity in other areas		√	√	
D. Education	1	Traffic Safety Education for Student		√	√
	2	Safety Practice for Pre-school Children		√	√
	3	Traffic Safety and Public Information Campaign			
Seat-belts, Helmets, Child Safety Equipment		√			
E. Medical. Emerge	1	Strengthening Pre-hospital Care	√	√	
	2	Improvement of Hospital Emergency Department	√	√	
	3	Development of Mass Casualty Emergency System		√	√
F. Institutional	1	Safety planning Capacity Development			
		Five-Year Traffic Safety Plan	√		
		Traffic Data and Information Database (Census)		√	√
	2	Enhancement of National Road Traffic Safety Board	√		
3	Financial Resource Development for Traffic Safety		√	√	

Source: JICA Study Team. Refer *Technical Report 1, Road Sector*, for additional detail.

locations are to be retrofitted by year 2022, as described in the *ENR Strategic 10 Year Investment Plan*. Software Project 5 aims to continue and expand this on-going program in view of following considerations:

- Education program for vehicle drivers stressing safety awareness at and near railroad grade crossings. These programs are to be supported by safety campaigns focused on improved visibility, lighting, and traffic control devices.
- Installment of modern technologies to improve the safety of at-grade crossings. Three possible strategies are seen as being appropriate:
 - Device for obstruction detection: alerts the train driver to the presence of vehicles and other obstructions within the railroad traveled way at grade crossings.
 - Time activated warning system: activates warning signal/sounds based on the train speed with same time between warning starts and train arrivals, normally the sensor based mechanical warning system only detects the train without recognizing their speed, therefore, vehicle drivers who cannot wait may happen to enter crossing.
 - Emergency notification system: emergency signals activated via “stop buttons” installed at grade crossings.

8.7 RAILROAD SYSTEMS AND CONTROL (SOFTWARE PROJECT 6)

ENR has programmed the signal improvement plan within four major corridors to install automatic signal system which works ETCS level-1 and can activate Automatic Train Protection (ATP). This system is designed to prevent train drivers from ignoring signal indications and exceeding restricted speed, however, can be effective only if installed on all railway lines. In this context, in order to ensure railroad safety operation and control, following items are necessary:

- Train operation status recorder: this device logs operational speed, acceleration and breaking status during the train is operated. It helps to analyze and identify the cause of accidents.
- Monitoring system for its rolling stock condition: can be displayed at the console of train operator to recognize the condition of rolling stock such as engine, break system etc., also used for maintenance program when parts should be replaced at workshops.
- Emergency notification system among neighbor trains: ATP signal system cannot manage emergency stops when derailments occur. The proposed system features emergency communication among neighbor trains to notice the situation once any emergency braking, horn and signal indicators are activated.

8.8 INLAND WATERWAY TRANSPORT NAVIGATION AND CONTROL (SOFTWARE PROJECT 7)

The focus of the inland waterway transport software (technology) improvements varies across a comprehensive spectrum including navigation, modernization, institutional/organizational matters and technology. Application varies across the sector, as well as specified sections of the waterways. The direct classification of software enhancements relates to waterway, navigation devices, fleet, river information system as well as database. The complete program is depicted in Table 8.8.1.

Action	Name	Sta/Subject	Background/Necessity	Dimension/Specification
Watershed	Detailed Waterway Assessment & Improvement	All IWs	No full scaled technical assessment has been discussed on sedimentation process for IW navigation and measures taken are in a spiral of huge costs and works generated.	Monitoring yearly river bed sedimentation, water level, lock operation, navigation and so on, simulating and analyzing the cause & effect trend, and execute alternative studies with finding most suitable and reasonable measures to be taken
		Navigation Buoy, Beacon, Sign etc	RTA does not have any movable waterborne equipment for patrol, survey, investigation, site visit or such and is resultantly lack of direct information to be quickly settled	Provision of fixed search and rescue boats in max.30 knt speed and 5xsurvey boats with full survey instruments, which would be allocated to each regional core port/lock along the IWs
Navigability	Procurement of Survey Equipment & Special Boats	Asyut-Aswan	Considering future night operation for accommodation of 2027 NaTIM IWT traffic demand forecast, the installation is to be required between Asyut and Aswan where no navigation aids have been placed	Installation of buoys every 2 km and of beacon & sign every 1 km with certain protective measures for missing
		Cairo-Alex	Considering future night operation for accommodation of 2027 NaTIM IWT traffic demand forecast, the installation is to be required to all around along the IW	Installation of buoys every 2 km with certain protective measures for missing
Modernization	Navigation Aids Improvement & Upgrading	Cairo-Damietta	Fleet modernization contributed to maximization of higher traffic capacity of lock and IW and its updated information is to induce investment of fleet by private sectors	Installation of buoys of beacon & sign every 1 km with certain protective measures for missing
		All related	To implement night navigation required for accommodation of 2027 IWT NaTIM traffic demand forecast, the two IWs need to equip the system well-linked with the already installed in Cairo-Aswan IW	Updating advanced technology and latest trend of IW navigation fleet with suitable application to Egyptian IWT.
Institution/Organization	Modernized Fleet	Cairo-Alex	Organization and institution of IWT are the backbone of themselves but they are probably old-fashioned without flexible and timely modification, renewal and establishment, corresponding to surrounded industrial and business activities as well as other transport sectors	Installation of RIS and network formation with necessary trading including consultancy services
		Cairo-Damietta	JICA Master Plan made in 2003 which is a basis of Vision 2020 of IWT is to get previous plan without incorporation of the latest challenges in Egyptian IWT	Implementation of study to assess Egyptian IWT industries, business, concerned sectors, operations, management and other matters related, and to suggest necessary legal reformation plan of IWT in terms of organization with involvement to the relevant government sectors, which would be a basis of change in laws, rules and guideline
Sustainable Finance	RIS Network Formation	IWT	Through observation of RTA operation, RTA seems to have lack of organization mobility and sectionalized close body with uncertain sections, divisions, departments etc. and most staff does not know well operation of their group	Implementation of study to carefully assess RTA organization and administrative operation and propose comprehensive reformation plan of the body itself with administrative rationalization in operation and organization including monitoring and post evaluation
		RTA	No sufficient income is not generated to all the operation activities of RTA without financial plan projected, due to budget allocation and subsidies from the Government	Implementation of study to assess financial situation and revenue system of RTA and propose reconstruction of proper revenue system which RTA body can operate with having financial self efficiency including monitoring and post evaluation
Technology	IWT Promotion	RTA	IWT promotion suggested in JICA master plan has not been taken effectively in difficulty due to lack of definite awakening of advantage and disadvantage with their strategic measure and overcoming sales promotion should have been led by RTA and MOT on time with involvement of the relevant IWT industries and possible private sectors intended to utilize IWT	Implementation of study to assess strengths and weakness of IWT concurrently with undertaking practical actions to minimize the weakness by RTA and MOT involving private sectors and other academic bodies and propose sales promotion and business plans of IWT with consideration of establishment of IWT fund which can easily drawn possible private sectors in IWT industries including monitoring and post evaluation
		All related	IWT has many challenges to enhance its opportunities for the related agencies and sectors but issues exist beyond the agencies and sectors and then need to have proper coordination continuous with strong initiative upon the implementation by RTA and MOT	Execution periodically and timely of interagency coordination among stakeholders from public and private sectors by RTA and MOT initiatives for which IWT development and operation would be beneficial and effective with harmonization to the other sectors including monitoring and post evaluation
Technology	Water Management & Interconnection Enhancement	RTA	RTA does not have systematic database formation for the both administrative and technical knowledge and can not quickly utilize such kind of information due to complicated format and paper information without effective and useful IT introduction be basically shared at any time to all the staff related for effective quality service and task undertaking	Formation of IT introduction for all information accumulated and establishment for timely data collection system from the related branches and other sectors in/out of RTA with modernized IT infrastructure including monitoring and post evaluation
		IT Database & Information Sharing System Formation		

Source: JICA Study Team

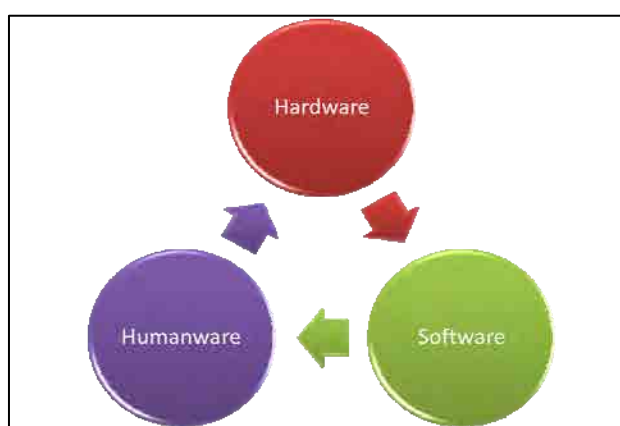
Table 8.8.1 Software Project 7: Inland Waterway Transport Sector

CHAPTER 9: PROJECT PRIORITIZATION

9.1 INTRODUCTION

MiNTS has identified a series of problems which need to be addressed in the future. These problems relate not only to infrastructure needs (hardware level), but also include initiatives to be taken at the non-infrastructure levels, i.e. the software and humanware levels. These three intervention levels are fully integrated and need simultaneous and coordinated attention as suggested in Figure 9.1.1.

At the hardware level, for both passenger and freight transport, the key issue is the ever growing dominance of road transport and the stagnation and even gradual decline of the IWT and rail modes. This is due to a number of reasons including lagging investments, dated infrastructure as well as rolling stock/fleets that have exceeded their practical service life. This situation increases operating costs and reduces revenues and performance. At the societal level, the dominance of road transport has catalyzed increasing congestion problems, considerable safety concerns as well as environmental degradation due to the use of polluting equipment.



Source: JICA Study Team

Figure 9.1.1 The Integrated Approach

The key issue at the software level is the lack of modernization of the transport sector as a whole and of the railway and river transport sectors in particular, leading to low performance, poor capacity utilization and weak growth prospects. This

Further Information

Additional detail regarding methodologies, analyses and findings of the multi-criteria analysis are presented in *Technical Report 12, Project Prioritization*.

created the present situation where the IWT and railway sectors are limited in their capacity to capture new cargo, shift towards new markets, container transport in particular, and efficiently compete with the road sector. The rail and IWT sectors are at present confronted with a wide range of internal hindrances and external impediments related to market access, administrative practices, lack of intermodal systems, the poorly adapted regulatory frameworks and inability to operate in an increasingly competitive and global market

The final of three components is at the humanware level. One of the key elements to attend is the problem that the sector suffers from a severe shortage of qualified staff, due to a lack of training programs and human resource development, in particular related to the introduction (and maintenance) of modern technologies in the sector. Qualified personnel to implement and operate a unified, computerized, GIS friendly data system encompassing all transport modes, are a key objective and projects in this field need to be addressed with priority, given they are an urgent prerequisite for efficient transport planning. The

humanware factor is therefore a necessary complement to efforts at the software level as it will provide the necessary expertise to efficiently and effectively apply modern software applications and therewith guarantee the return on software investments.

9.2 THE APPROACH

Project evaluation is frequently conducted by means of precise costs and benefits. This evaluation technique is widely recognized as appropriate for appreciating the contribution of a project to long-term sustainable economic development. The analysis of costs and benefits is centered on quantifiable parameters without possible implications generated by efforts to assess non-quantifiable variables. But the value of projects is not only defined by its monetary performance, but also increasingly by external non-quantifiable variables. This consideration underlies the selection of a multi-criteria analysis (MCA) for the prioritization of MiNTS projects and programs.

The key advantage of MCA is that it allows integrating into a comprehensive assessment both quantifiable and non-quantifiable variables, offering therewith a full-scale multi-dimensional appreciation of different development alternatives facilitating at the end its ranking and prioritization. The reason for evaluating the MiNTS candidate projects by means of an MCA is in order to be as robust as possible in an effort to appreciate a range of strategic variables using an algorithm-based calculation methodology. The generated information will enable decision-makers to formulate a reasoned decision under consensus conditions, rather than according to exclusively financial or economic rationales.

The rank-weighting evaluation method of MiNTS will in particular incorporate arguments generally excluded in traditional (numerical) evaluation methods to allow comparing possible investment alternatives against concrete monetary and non-monetary policy objectives, therewith attributing equal importance to hardware software and humanware needs.

The prioritization process in MiNTS ranks the selected projects on the basis of a range of evaluation criteria and applies weighting techniques and sensibility testing to appreciate the contribution of different projects to achieving policy objectives according to different priorities.

The key features of the proposed evaluation method are:

- The use of objectively verifiable indicators (OVI) to guarantee an evaluation that reduces the risk of data manipulation thanks to the potential to verify the validity of the variables;
- The allocation of weights to evaluation criteria based upon a range of variables considered realistic and in line with socio-economic and political policy priorities that guarantees that those projects considered most "important" are given a suitable and equitable evaluation; and,
- Sensitivity testing of the different alternatives to assess the level to which any particular alternative contributes to the achievement of specific objectives and to identify the true boundaries that projects contribute to improving current situation.

The detailed settings of the model have been thoroughly tested on their relevance, quality and consistency. Several tests were conducted to investigate the relevance of the criteria and the quality of the weighting system.

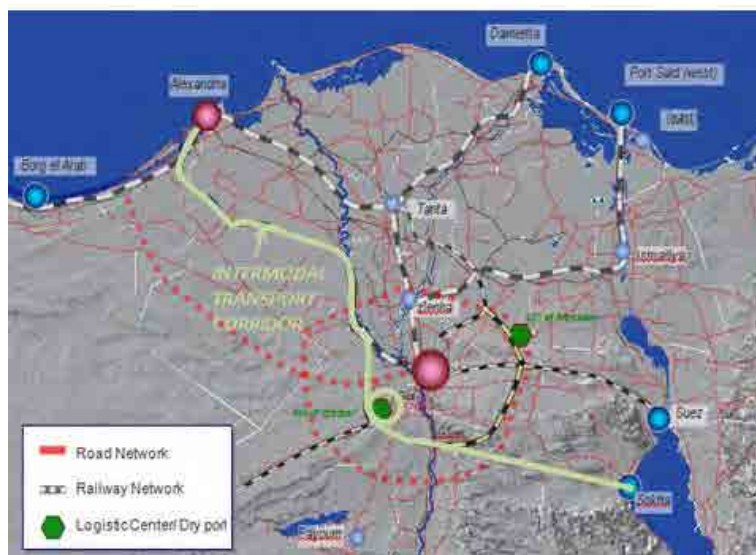
The OVI parameters, factors and weightings attached thereto were reviewed in detail with members of the Steering Committee as well as during a December, 2011 workshop with representatives of the Ministry of Transport. The exchange of information was most helpful and beneficial. Complete consensus on factors and weightings was achieved. Conclusions of the consensus building process are part and parcel of the MCA and project prioritization process.

9.3 THE PRIORITY PROJECTS

The proposed projects and programs, as presented in the previous Chapters 6, 7 and 8, are divided between hardware, stratified by corridor in which the infrastructure investment is proposed, as well as software and humanware programs.

Most of the proposed hardware projects represent capital investments that focus the development, - upgrading or – maintenance of transport infrastructure for the different transport modes and along the recognized key eleven transport corridors. The proposed infrastructure investments are not selected solely on the basis of expected demand and available capacity. Particular attention has been paid to investments in river transport, railway and port projects with the objective of reducing the use of road infrastructure in favor of the more environment-friendly transport modes.

The project grouping concept is illustrated via the important, as identified in Chapter 6, intermodal transport corridor. This is intended to catalyze the creation of a new sector for value added logistics services. Combined, the proposed infrastructure investments will create the various elements of the ITC (Figure 9.3.1).



Source: JICA Study Team

Figure 9.3.1 The Intermodal Transport Corridor

The main infrastructure development components of the ITC are respectively:

- Upgrading (double track electrified) of the Alexandria – Cairo rail connection, dedicated to freight transport, ensuring a direct connection to the 6th October VAL (Value Added Logistics) Center;
- Development of the VAL Center;
- Development of a new double track electrified railway connection to Sokhna Port;
- Improvement of impacted maritime facilities at terminus ports;
- Realization of an IWT transfer facility linking the Nile River axis with the ITC; and,
- Outer Ring Road (south section) to link the bonded road transport center to the VAL Center and link the Upper Egypt corridor to the ITC railway corridor (via the VAL Center)

In the long-term, this corridor will create a new economic corridor where modern logistics services are affiliated with high value economic activity such as computer and car assembly, research centers, some already under development (Design City and Smart Village) . The project will also increase the role of Egypt in global traffic. It will on the one hand concentrate EU traffic on the ITC corridor and consolidate the Damietta-Port Said area as principal transit hub for Eastern Europe, Turkey and the Black Sea area.

The proposed projects also include a range of investments in software and humanware development. These investments are important because they are essential to modernize the Egyptian transport sector and will guarantee that the planned infrastructure investments will actually contribute to improving the

transport of persons and goods. The key non-infrastructure project is the creation of the Egyptian Transport Center and the development of state-of-the-art software. Concrete interventions will also be necessary at the humanware level to put in place the necessary expertise to develop, maintain and use the proposed software.

9.4 THE EVALUATION INDICATORS

9.4.1 The Objectively Verifiable Indicators

The objectively verifiable indicators (OVI) used in the multi-criteria evaluation are summarized in Table 9.4.1 and briefly explained hereafter.

(1) Operational Indicators

The operational indicators include (1) person/freight demand, (2) supply utilization, (3) cargo transport facilitation and (4) priority corridor relation. The numeric values are translated into an appreciative value according to following approach:

- Demand is related to the hierarchy of services with the perspective of year 2027 demand. The passenger and transported ton values of the model are translated into person and ton movements using (1) number of passengers per day per direction, adjusted with (2) cargo transport volume per day per direction (expressed in units of tonnes basis).
- Supply utilization evaluates the ability of supply to match demand.
- Cargo transport facilitation assesses whether the recommended project contributes to efficiently moving cargo from origin to destination. The evaluation is based upon the percentage of trucks in total traffic.
- The relationship to the priority corridor is quantified via a Boolean value (yes/no) that specifies whether the project is located on the priority corridor, interconnects with the corridor, or has no relationship with / attachment to the priority corridor.

(2) Performance Indicators

Performance indicators are strategic qualitative assessments of the effects of the projects. They particularly refer to elements that increase the performance of the Egyptian transport system without necessarily relating to the capacity of transport infrastructure. The criteria used are (1) transport system improvement (2) enhanced market

Table 9.4.1 The MiNTS Indicators

OI - Operational indicators	
OI - 1	Person Demand / Freight Demand
OI - 2	Supply Utilization
OI - 3	Cargo Transport Facilitation
OI - 4	Relation to priority corridor
PI - Performance indicators	
PI - 1	System improvement
PI - 2	Enhanced Market Mechanisms
PI - 3	Knowledge Based Management
PI - 4	ICT development / improvement
PI - 5	Equipment modernization
II - Implementation indicators	
II - 1	Improved Governance (public sector)
II - 2	Regulatory Framework
II - 3	Stakeholder Involvement
II - 4	Private sector involvement
II - 5	Development Cost
SSI - System Sustainability indicators	
SSI - 1	Environmental Impact
SSI - 2	Transport Safety
SSI - 3	Job creation
SSI - 4	Gateway Center Connectivity
SSI - 5	Regional Center Connectivity

Source: JICA Study Team

mechanisms, (3) knowledge based management or more generally expertise building, and (4) information and communication technology development or improvement and, finally (5) equipment modernization:

- Transport system improvements relate to the contribution of projects in improving the structure of the transport system as a whole to allow either more efficient operations or ensuring better management of traffic.
- Enhanced market mechanisms refer to the contribution of the project in increasing the level of commercialization and competitiveness of Egyptian transport service providers. Market mechanisms include in particular initiatives that reduce transport time and costs or increase efficiency and revenues. As for the transport system improvement, these mechanisms can be infrastructure related but also deal with software or expertise building initiatives.
- Knowledge based management refers to the introduction of methods and techniques that improve the management, monitoring, and evaluation of transport performance, focusing technology applications and expertise building that lead to transport efficiency improvements and better system management.
- Intelligent technology and equipment modernization are self-explanatory indicators. It is common knowledge that investments in software and expertise building are factually contributing to improved transport.

(3) Implementation indicators

Implementation indicators assist to evaluate the overall potential that a recommended project can be realized on the basis of its complexity and maturity. Several sub-indicators are used to determine the implementation potential of the recommended projects. Projects that have a high score can be implemented much earlier than projects with a lower score.

- Improved governance of the public sector reflects the contribution of projects to enhance public governance of the transport system. These enhancements can generally be achieved either via reducing the fragmentation of decision-making processes, limiting the direct involvement of various governmental and semi-governmental entities in the functioning of the transport system. But enhancements are also possible by promoting efficient centralization of administrative procedures with a reduction of manual control procedures or also of more accurate and targeted control of the transport system functioning and its structural characteristics, using advanced technology and techniques applied by specialists and technocrats rather than personnel from the public administration.
- The legal framework assesses the level of maturity of a project. While some projects require no specific decisions at the regulatory level, others can only be implemented if laws or regulations are changed. These legal requirements could hinder the short-term implementation potential of projects or could contribute to making its realization more complex.
- Stakeholder involvement refers to the number of partners involved in the project (decision or execution) which is a strong indicator of the complexity of its implementation. Some projects only need the participation of one public authority while others can only be implemented after approval by and participation of a range of governmental bodies. The more stakeholders involved, the more the implementation potential reduces.
- Private sector involvement assesses the level of private sector participation in the project. The level of private involvement is an interesting indicator for the economic and financial value of the project. Private sector involvement can vary in form and structure based upon concrete agreement between the private company and government on operational targets and budgets. Of course,

there are projects which are not suited for private sector involvement and remain therefore fully public investments.

- Development cost is an important indicator for the (short-term) implementation possibility of projects. The development cost for infrastructure projects is higher than the cost of “soft” projects, the former relating to the cost per kilometer of new infrastructure and the numbers of people moved and the latter relates to the total project investment and expected direct impacts (e.g., reductions in operating cost or critical need of the project before another can be started). The development cost of course is closely related to the other criteria in the implementation potential indicator. The volume of the investment cost can facilitate a decision, but it is not a deciding factor. If political will and stakeholder involvement is high, an expensive project could be more easily decided than a “cheap soft” project which has could be confronted with a high level of opposition.

(4) Environment and Safety Indicators

The last set of indicators relates to environmental impact safety and the generation of socio-economic benefits that not always can be calculated / quantified.

- The environmental criterion use environmental assessments conducted in the context of the MiNTS study. They include an assessment of the need for an Environmental Impact Study, the need for resettlement, the reduction of CO₂ or the contribution to achieving a modal shift.
- The criterion dealing with safety appreciates to what level candidate projects contribute to improving the safety of traffic, reflected in the reduction of road accidents, speed limitations and congestion reduction, protection of pedestrians and weaker traffic infrastructure users, etc...
- The third criterion is the first of several socio-economic indicators, not always quantifiable, that assesses the contribution of the project to (regional) job creation with a clear preference for projects that show a clear potential to generate long-term employment.
- The fourth criterion relates to the potential impact on domestic regional economic performance as well as international trade. The surrogate measure adopted was connectivity of gateway centers.
- The fifth criterion, also a socio-economic indicator, is the level a project contributes to link regional centers (and their hinterland) within Egypt to the main urban and economic agglomerations, thereby increasing the potential of these precincts to increase living standards and economic activity.

The objective of using proposed indicators is to ensure that the evaluation and prioritization of the proposed projects/programs contributes to the improvement of identified problems and allocate priority to actions not only at the level of infrastructure creation/rehabilitation but also focuses the enhancement of software and humanware aspects. In addition to the traditional performance indicators, the applied criteria reflect specific hardware, software, or humanware issues that contribute to the overall quality of the future transport network.

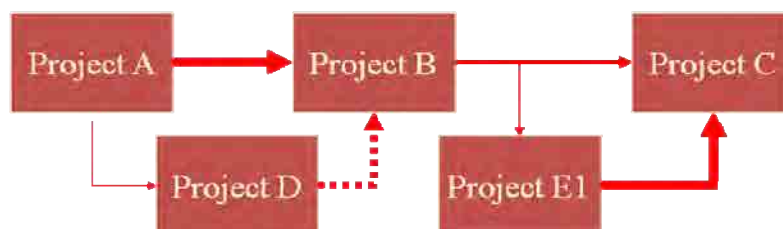
9.4.2 Implementation Logic

Considering the obtained priority list is the result of a computer-based process, the results need to be integrated into a “Relational Matrix” in which the priority projects are linked together and implementation logic is introduced that adjusts where necessary project priorities according to their logical relation, if any such relationship exists.

The relational matrix thus fine-tunes the MCA results, taking into account conditions imposed upon the implementation process that cannot be influenced or changed in the short-term future and might hinder the realization of the projects if implemented according to the initial priority list. The approach is based upon the

PERT and GANT techniques for project management and upon the approach of LogFrame (Logical Framework)..

The concept of the Relational Matrix and its evaluation outcome is visualized in following Figure 9.4.1



Source: JICA Study Team

Figure 9.4.1 Relational Framework: Project Evaluation and Prioritization

While the various projects have sequential and determined implementation logic from the project ranked first to the one ranked last in the MCA-based priority list, the relational framework assesses the practical logic of the implementation sequence and could therefore impose a different sequence of implementation.

The changes are exclusively determined by the relationship between the different projects and the strength of this relationship is determined by the type of arrow as follows:

- *Bold solid arrow*: fixed sequence, the first project needs to be completed before the second can start;
- *Solid arrow*: strong recommendation for implementation sequence, assuming that the second project results will be better if the first project is realized although the success of the second project is not determined by the realization of the first project;
- *Bold dotted arrow*: relationship between both projects exists although there is no need for a sequential realization. But due to the relationship between projects, it is recommended that projects are implemented simultaneously to maximize individual benefits;
- *Dotted arrow*: there is a relationship between the projects but there is no need for simultaneous implementation or there is no relationship between projects.

9.4.3 Indicator Values

Priority and urgency of the proposed projects are defined by their concrete contribution to resolving or improving identified problems in the Egyptian transport system without necessarily being a high-profile infrastructure development project. To ensure that the priority of projects is clearly defined, the MiNTS multi-criteria analysis of the proposed pilot projects uses as much as possible objectively verifiable indicators with quantifiable values and only applies an expert appreciation when the quantification of the value is impossible.

The approach therewith acknowledges that improving competitiveness is achieved not only by developing hardware (infrastructure) but needs in addition a program of modernizing equipment and operations (the software component) as well as expertise and innovative concepts (the human factor).

The reference values for each of the indicators are presented in Table 9.4.2.

Table 9.4.2 Evaluation Indicators and Underlying Reference Values

Indicators in MiNTS	Scoring Definition				
	"++" [=5]	"+" [=4]	"N" [=3]	"-" [=2]	"--" [=1]
Operational Indicators (OI)					
Person Demand / Freight Demand	> 50,000 pers/day/dir	30,000 - 50,000 pers/day/dir	10,000 - 30,000 pers/day/dir	2,000 - 10,000 pers/day/dir	<2,000 pers/day/dir
	> 20,000 tonne/day/dir	10,000 - 20,000 tonne/day/dir	1,000 - 10,000 tonne/day/dir	0 - 1,000 tonne/day/dir	None
	High	Medium	Neutral	Low	Very Low
Supply Utilization	V/C > 0.50	V/C = 0.25 - 0.50	V/C = 0.10 - 0.25	V/C = 0.05 - 0.10	V/C < 0.05
	High	Medium	Neutral	Low	Very Low
Cargo Transport Facilitation	Share of trucks > 50%	Share of trucks > 25%	Share of trucks > 10%	Share of trucks > 5%	Share of trucks < 5%
	High	Medium	Neutral	Low	Very Low
Relation to priority corridor	On the key corridor	Link to the corridor	Outside corridor	XX	XX
Performance Indicators (PI)					
System improvement	Certain / High improvement	Certain/ Midium	Possible/ Some	XX	Non contribution
Enhanced Market Mechanisms	Certain / High increase	Certain/ Midium	Possible/ Some	XX	Non contribution
Knowledge Based Management	High contribution	Midium	Limited	XX	Non contribution
ICT development / improvement	Full ITC project	ITC components	Limited contribution	not foreseen, would improve system	not foreseen although needed
Equipment modernization	High	Medium	Low	not foreseen, would improve system	not foreseen although needed
Implementation Indicators (II)					
Improved Governance (public sector)	High	Medium	Low	XX	XX
Regulatory Framework	Legal framework OK	Changes initiated	Irrelevant	Foreseen but not initiated	Not foreseen
Stakeholder Involvement	Single stakeholder	Single stakeholder, complex	Irrelevant	Multiple stakeholders	Multiple stakeholders, complex
Private sector involvement	Fully private	Majority private	Irrelevant (undecided)	Minority private	Fully public
Development Cost	< 0.3 bil.LE in total	0.3 - 1.0 bil.LE in total	2.0 - 3.0 bil.LE in total	2.0 - 3.0 bil.LE in total	> 3.0 bil.LE in total
	< 5 mil.LE/km (road)	5.0 - 7.0 mil.LE/km (road)	7.0 - 10.0 mil.LE/km (road)	10.0 - 20.0 mil.LE/km (road)	> 20.0 mil.LE/km (road)
	< 7 mil.LE/km (rail)	7.0 - 10.0 mil.LE/km (rail)	10.0 - 20.0 mil.LE/km (rail)	20.0 - 50.0 mil.LE/km (rail)	> 50.0 mil.LE/km (rail)
SSI - System Sustainability indicators					
Environmental Impact (Integrated Score)	Less/none	Low	Medium	Large	Significant
Transport Safety	High Safety	Low	Neutral (irrelevant)	Reduce Safety	Dangerous
Job Creation	High	Medium	Neutral	Minor Reduction	Major Reduction
Gateway Center Connectivity	High	Medium	Low	None	Negative
Regional Center Connectivity	High	Medium	Low	None	Negative

Source: JICA Study Team

Quantitative rating is judged from the reference of quintile percentage of each value, which is estimated future transport demand by MiNTS National Transport Model (MNaM). Others are rated based on professional opinion. The environmental integrated score (SSI Indicator 1) is, due to the importance of the environmental consideration, based on a series of indicators designed to address various aspects of each project. The detailed environmental indicators are shown in Table 9.4.3.

Table 9.4.3 Detailed Environmental Indicators

Environmental Impact (Breakdown)	Scoring Definition				
	"++" [=5]	"+" [=4]	"N" [=3]	"-" [=2]	"--" [=1]
Resettlement and land acquisition (30%)	None	Within ROW	Minor construction	< 10km for settlement/ agri. Land	> 10km for settlement/ agri. Land
Location of Project (30%)	Desert		Urban		Agricultural
Natural: protect area (20%)	No-interaction	Neutral Interaction	Close to the area	Interact proposed area	Penetration existing area
Global warming (CO ₂) (10%)	> 100km Non-road or Significant reduction	0 – 100km Non-road or Some reduction	No impact	0 – 100 km road or Some increase	> 100km road road or Significant increase
Air Pollution (NO _x SO _x) (Modal Shift) (10%)	Significant reduction	Some reduction	No impact	Some increase	Significant increase
Integrated Envi. Impact	Less/none	Low	Medium	Large	Significant

9.4.4 Evaluation Indicators and Political Strategy

The use of the OVI acknowledges the strategic objectives of the transport policy and ensures compliance between OVI and strategic objectives. But it is important to ensure that all strategic dimensions can be incorporated in the MCA.

An important step of the consensus building process was mutual agreement as to strategies, reflective of both Ministry of Transport and MiNTS aspirations, that should serve to identify the baseline condition. The jointly adopted strategies are:

- Integrated and harmonized transport modes;
- Increase of non-road freight services;
- Promoting private sector participation;
- Secure and safety of transport modes;
- Good Ministry of Transport governance of an integrated transport system;
- International Gateway strengthening;
- Integrated passenger transport services;
- Toll road network provision;
- Development of human resources;
- Connection to the *Egypt Vision 2052* New Development Zones;
- Modern transport techniques; and
- Minimize negative environmental impacts.

The relevance of the different evaluation indicators for the above strategies are presented in Table 9.4.4.

Table 9.4.4 Relationship Assessment

	Operational (O)				Performance (P)					Implementation (I)					System Sustainability (SS)					Total
	OI-1	OI-2	OI-3	OI-4	PI-1	PI-2	PI-3	PI-4	PI-5	II-1	II-2	II-3	II-4	II-5	SSI-1	SSI-2	SSI-3	SSI-4	SSI-5	
3: Strong relationship, 2: Some relationship, 1: Limited relationship, 0: Irrelevant																				
1 Integrated and Harmonized Transport Modes	3	3	3	1	2	3	1	1	1	0	1	1	2	1	1	0	2	1	1	1
2 Increase of Non-Road Freight Services	2	3	2	1	1	2	1	1	2	0	1	1	2	3	2	1	1	1	2	30
3 Promoting of Private Sector	1	1	2	2	2	2	1	2	1	1	1	3	2	2	2	2	2	1	1	30
4 Secure and Safety Transport Modes	0	0	1	0	2	1	2	3	3	1	2	2	0	2	1	3	1	0	0	24
5 Good governance of MOT for Integrated Transport System	0	1	2	1	3	2	1	1	0	3	3	3	0	1	1	1	1	0	0	24
6 International Gateway Strengthening	1	2	2	2	2	1	1	1	2	0	1	2	3	2	1	0	1	2	0	26
7 Integrated Passenger Transport Services	2	2	0	0	2	2	2	1	1	1	1	2	2	1	0	0	1	0	2	22
8 Toll road network provision	3	0	1	2	1	1	1	1	1	0	1	2	3	2	1	1	1	2	1	25
9 Development of Human Resources	0	1	1	0	2	1	3	2	1	1	0	1	1	0	2	2	0	0	0	18
10 Connection to the New Development Zones	1	1	1	2	1	2	0	0	1	1	1	2	2	2	1	1	2	0	2	23
11 Modern Transport Technique	1	1	2	0	3	1	1	3	2	0	1	1	3	1	1	0	2	0	0	23
12 Minimize Environmental Negative Impacts	0	1	1	0	2	0	1	1	1	0	1	1	1	1	3	1	1	0	0	16
Total Number of Score for relationship to each indicator	14	16	18	11	23	18	15	17	16	8	15	18	22	18	14	13	17	7	9	289
Sub-Total of strategies for Each category					89					81					60					289

Source: JICA Study Team based on consensus agreement with client group.

9.4.5 Testing The Weighting System

The priority and urgency of the recommended projects is defined by their concrete contribution to resolving or improving identified problems in the Egyptian transport sector without necessarily being a high-profile infrastructure development project. But this type of appreciation is only valid if the appreciation is based upon accredited weights that are consistent and meet all policy objectives.

The weighting system of the MCA has therefore been tested for consistency and logic prior to the actual multi-criteria analysis. The allocation of weights during the testing phase is arbitrary and does not reflect the weighting system used during the MCA. Following tests were executed to appreciate the consistency of the model:

- All weights receive an equal percentage value and weight of "1" (neutral). This test assesses the impact of attributing a qualitative and / or quantitative appreciation but does not take into account any impact of attributing weights. This test is used as benchmark for assessing the results of the other tests.
- All criteria receive a weight percentage value that is an equal share of their generic criterion while the weights of the generic criteria remain equal. This test evaluates the impact of the individual criteria on the sample projects, given that the percentage weight differs between criteria.
- Each generic criterion receives a variable weight value to reflect a variable importance at the generic level. The weight distribution of the sub-criteria remains unchanged with an equal distribution. This test assesses the impact of attributing different levels of importance to the generic criteria.
- Using the generic settings as in Test 3, different weights will now be allocated to the individual criteria ensuring that their distribution adds up to the weight value at the generic level. This final test will, if proven satisfactory, be the starting point for the formal evaluation and ranking process.
- In this test, different weights will now be allocated to the individual criteria and the value of the generic criteria will be determined by this weighting. The total weight distribution at the generic and detailed level should be 100%. This final test will, if proven satisfactory, be the starting point for the formal evaluation and ranking process.
- Each of the individual tests will lead to a ranking of the sample projects according to attributed weights. The rankings of each individual test will then be combined to generate final ranking of the sample projects. This last test will allow appreciating the overall sustainability of the methodology and give an indication on what can be expected as final ranking of the total set of proposed projects.

The first two tests focused on the consistency at the indicator level, while the thereafter following sensitivity tests focused the robustness of the sub-criteria and the impact on the evaluation criteria of changes at the sub-criteria level.

The different tests proved satisfactory and demonstrated that the model is functioning correctly and criteria are well balanced and appropriate to allow the MCA evaluation of the proposed pilot projects.

Suez Canal Development	Ismailia Suez Road (Expressway)	39,3	38	3,6	39	3,4	43	3,4	44	3,2	50
Nation wide	Passenger Intermodal Facilities	10,7	12	3,7	30	3,8	10	3,6	16	3,6	11
	Logistics Centers including improvement of Station Facilities for Freight Services (4 stations)	8,3	8	3,7	32	3,9	8	3,6	27	3,7	6
Software	Egyptian Transport Center (ETC)	1,0	1	4,1	2	4,5	1	4,0	3	4,4	1
	Establishment of Dedicated Transport Fund	93,7	94	3,0	83	3,2	78	2,7	104	3,0	68
	Development of road function based design and capacity standards	28,3	27	3,3	64	3,7	20	3,5	37	3,3	28
	Road safety initiative (3E; Engineer, Education and Enforcement)	17,3	18	3,4	57	3,8	13	3,8	6	3,4	17
	Railway Safety Initiative	22,7	22	3,3	63	3,6	21	3,8	10	3,4	23
	Introduction of State of the art railway systems and control	29,3	30	3,3	65	3,7	19	3,5	40	3,3	31
	Development of IWT management database and Installation of IWT Navigation Information System	40,3	40	3,4	58	3,6	23	3,3	63	3,3	40
Humanware	Strengthening MOT's responsibility covering all transport modes for integrated multimodal transport system & logistics	46,7	49	3,2	70	3,9	5	2,9	98	3,3	43
	Training in modern traffic management and control systems	17,7	19	3,3	61	3,7	18	3,8	7	3,4	21
	Training in modern road maintenance techniques	10,0	11	3,4	54	3,9	7	3,9	4	3,5	16
	Extension of transformation plan	6,3	5	3,7	28	4,2	2	3,7	15	3,5	12
	Extension of NICHE program	9,0	10	3,7	31	4,1	4	3,6	18	3,5	14

Source: JICA Study Team

9.5.3 The MCA Project and Program Ranking

The top ten projects are in order of priority:

1. Development of the Egypt Transport Center;
2. VAL Center at 6th of October City;
3. Railway link for 6th of October City;
4. Railway link between Sokhna Port to Helwan;
5. Extension of ENR transformation plan,
6. Double Tracking of bypass line for Cairo - New Alexandria;
7. Improvement of station facilities for freight services (two stations);
8. Following two projects have an equal score:
 - i. Cairo Alexandria Desert Expressway (upgrade to 8-lanes);
 - ii. Logistics Centers including improvement of station facilities for freight services;
10. Extension of IWT NICHE/RIRT program.

The MCA evaluation was made with the hardware, software, and humanware projects combined to ensure that the implementation priority is consistent with the government objectives of modernizing the Egyptian transport sector and is not limited to just creating new (additional) infrastructure.

The evaluation clearly shows that there is a need for concrete priority initiatives at the three levels with for each of the three intervention levels following priority:

- Infrastructure Developments
 - VAL Center at 6th of October City;
 - Railway link for 6th of October City;
 - Railway link between Sokhna Port to Helwan;
 - Double tracking of bypass line for Cairo - New Alexandria;
 - Improvement of station facilities for freight services (2stations);
 - Cairo Alexandria Desert Expressway (upgrade to 8-lanes);
 - Logistics Centers including improvement of station facilities for freight services;
- Software Developments
 - Development of the Egypt Transport Center;;
- Humanware Developments
 - Extension of ENR transformation plan,
 - Extension of IWT NICHE/RIRT program.

These ten priority projects are consistent with the government's objectives of modernizing the transport sector and increasing its efficiency via modernization and intermodal integration. Each of above projects has been proposed and specifically designed to achieve just that:

- The Egypt Transport Center is an essential development to modernize the sector and increase its efficiency because expert knowledge and modern planning and monitoring technology have become indispensable tools for governing an increasingly complex transport and logistics sector;
- The development of the Intermodal Transport Corridor is a high-priority infrastructure development program that aims at creating efficient national and international freight transport flows while simultaneously increasing the competitiveness of the Egyptian transport and logistics sector by creating new market-oriented services. Several of the priority infrastructure investments are directly associated with this program:
 - The VAL Center at 6th of October City is essential to stimulate the development of intermodal transport, increase freight transport efficiency and open the sector to new services and applications. This project is the central element in the ITC development program which has as priority aim to develop intermodal transport and modern for Egypt new VAL services;
 - The railway link between Alexandria and the VAL Center is an imperative investment for the successful development and exploitation of the VAL Center as it links the center to the key gateway for the traffic susceptible of being treated along the corridor.
 - The same is true for the railway link between Sokhna and Helwan where the need is even higher as planned investments in Sokhna port will create a new prime gateway for Egypt, needing imperatively a railway connection to the main consumption and production center of Egypt.
 - Upgrading the Cairo-Alexandria Desert Expressway to 8-lanes will be necessary to safely accommodate expected road traffic growth. In spite the efforts on the ITC corridor to shift cargo from the road to the railways, the role of road transport will continue to be very important and the upgrading of the key road connection between the two cities is of strategic importance to ensure safe and secure traffic of goods and persons.

- The extension of the transformation plan is logically high in the ranking because it targets the extension of current support to ENR officers' capacity development to ensure in the short-term future proper operations and marketing programs for passenger and freight transport. Considering that ENR is planned to become the backbone of Egypt's transport system and the principal replacement for road transport, ensuring modern and appropriate expertise and know-how is urgent and imperative.
- The extension of the NICHE/RIRT program has the same priority as the transformation plan and therewith at a similar level of importance. The current support to RTA officers for capacity development, especially RTA management and operation capacities and strengthening of marketing and logistics knowledge and skills, including the utilization of modern databases and other information systems needs to be continued to ensure that the river transport sector one day will become competitive and represent a true alternative for the road transport sector.

The two remaining (infrastructure) projects in the top 10, the improvement of station facilities for passenger transport and the development of logistics centers for freight services score equally high as these are important elements in the effort of improving freight transport and the transfer of cargo from one mode to another. The development of these transport and logistics centers will also provide an impetus in developing new modern logistics services, an essential component in the Government's sector modernization program.

9.5.4 Segregated Project Priority Ranking

Comments received from the client group noted the desirability of segregating the integrated results of the prioritization process (refer previous Table 9.5.2) into a relative grouping of hardware, humanware and software initiative priorities. This is presented in the subsequent Table 9.5.3 (hardware initiatives), Table 9.5.4 (software initiatives) and Table 9.5.5 (humanware initiatives). It is noted that the project identification codes (ID) are identical to those used previously; that is, linked to individual sectors (RD: road, RW: railway, IW: inland waterway, PT: maritime port, L: logistics systems and facilities, P: passenger terminals).

Among hardware initiatives, projects associated with the intermodal transport corridor receive highest relative rank with the Value Added Logistics Center at 6th of October City achieving highest hardware rank (and second highest integrated rank).

Table 9.5.3 Priority Ranking: Hardware Initiatives

Hardware Rank	Integrated Rank	Corridor	Project ID	Name	Project Outline
1	2	Intermodal Transport	L-1	VAL (Value Added Logistics) Center at 6th of October City	New VAL/ Distribution Center
2	3	Intermodal Transport	RW-406	Railway Link for 6th of October City	Connects from RW-403 and Baharia line via L-1 [New Rail Line]
3	4	Intermodal Transport	RW-420	Railway Link between Sokhna Port to Helwan	New freight railway line for direct link from Sokhna port to 6th of October [New Rail Line]
4	6	Intermodal Transport	RW-403	Double Tracking of Bypass Line for Cairo - New Alexandria	for freight line (diesel) with local passenger
5	7	Intermodal Transport	RW-412	Improvement of Station Facilities for Freight Services (2stations)	Good intermodal connection & facilities, railway layout/arrangement, warehouse and station office at Qabbary and other station
6	8	Intermodal Transport	RD-204	Cairo Alexandria Desert Expressway (Upgrade to 8-lanes)	Committed project is 6-lanes. [Upgrade of Expressway]
7	8	Nationwide	L-2	Logistics Centers including improvement of Station	Logistics Centers 50 locations nationwide and Good intermodal connection &

Hardware Rank	Integrated Rank	Corridor	Project ID	Name	Project Outline
				Facilities for Freight Services (4 stations)	facilities, railway layout/arrangement, warehouse and station office at Cairo-Damietta (Mansura, Damietta), Cairo-Ismailia-Port said (Tel el Kebir, Port Said)
8	12	Nationwide	P-1	Passenger Intermodal Facilities	50 locations nationwide
9	13	Upper Egypt	IW-2	IWT port improvement for Upper Egypt	connects roads/ railway smoothly, Asyut and Quena ports port improvement, includes waterway, navigation and lock operation improvement.
10	14	Cairo - Damietta/Port Said	RD-308	Cairo Ismailia Port Said Road (Expressway)	connects from ring road to Port Said, 6-lanes, 100km/h [Upgrade to Expressway]
11	15	Intermodal Transport	IW-1	IWT port for ITC	connects to south ring railway route around Helwan, Tebbin port improvement, includes waterway, navigation and lock operation improvement.
12	16	Cairo - Damietta/Port Said	RW-309	Double Tracking for Mansoura - Damietta	connects to Damietta [Double Tracking]
13	16	Cairo - Suez	RD-310	Cairo -Suez Road (Expressway)	connects form ring road to Suez, 6-lanes, 100km/h [Upgrade to Expressway]
14	20	Upper Egypt	RW-412-4	Improvement of Station Facilities for Freight Services (6 stations)	Good intermodal connection & facilities, railway layout/arrangement, warehouse and station office at stations of Imbaba, Beni Suef, Minya, Asyut, Qena and Aswan
15	21	Cairo - Alexandria	RD-302	Cairo Alex Agriculture Bypass Kafr El Zayat - Alexandria	bypass road for Tanta to Alex. in south side of agricultural road in 6-lanes [New Art. Road]
16	22	East - West	RW-409	Rehabilitation of Tracks for Qena - Safaga	for local passenger and cargo traffic connected to red sea and Quena and Luxur [Rehabilitation]
17	24	Intermodal Transport	PT-2	Development of Management and Operation for Multi Purpose Terminal in El Dekheila Port	To ensure future cargo demand in 2027 as an essential port for the window of Intermodal Transport Corridor to connect to railway and road with smooth and well organized, located between berth 91 and 92, A maritime dock composed of 2 berths with total length up to 800m and a depth not less than 14-15m, Storing yards, warehouses and administrative buildings over an area up to 262.370 thousand m2, Water surface of about 162 thousand m2, Breakwater project is under construction.
18	25	Intermodal Transport	RD-300	3rd Cairo Alex Expressway	connects from Cairo to Borg el Arab in desert area by 6-lanes [New Expressway]
19	26	Upper Egypt	RD-312	Cairo - Asyut Desert Western Road (Expressway)	runs to the west side of Nile river in desert, 6-lanes, 100km/h [Upgrade to Expressway]
20	27	Intermodal Transport	RW-304	High Speed Railway for Cairo – Alexandria [High/Higher speed Alt-1]	connects to Alex. to Cairo (6th of October, Smart city) along Cairo - Alex. dessert road, directly, max. speed 250kph, [New HSR]
21	29	Intermodal Transport	RD-998	Alexandria Bypass	forms urban ring road connects the Cairo-Alex desert expressway [New Art. Road]
22	30	Sinai	RD-311	Suez Ras elnakab Road (Expressway)	connects from Suez to Taba border, 4-lanes, 100km/h [Upgrade to Expressway]

Hardware Rank	Integrated Rank	Corridor	Project ID	Name	Project Outline
23	32	Mediterranean	RD-309	Qantara-Rafah Road	connects to Rafah along coast line, 6-lane, 100km/h [Upgrade to Expressway]
24	33	Intermodal Transport	PT-3	Dekheira Port: New Container Terminal	Foster year 2027 cargo demand within Intermodal Transport Corridor, access to railway and road with smooth and well organized connection, breakwater construction under implementation
25	34	Inland Delta	RW-401	Improvement of Track Arrangement for Cairo - Qalyub	Cairo and Qalyub Station: Rearrangement of track lines, Qalyub Station: Construction of elevated railway, [Track Improvement]
26	35	Red Sea	RD-321	El Ain El Sokhna - Zafarana Road	Northern side of Red Sea coastline, 4-lanes, 80km/h [Widening]
27	36	Intermodal Transport	RD-301	3rd Stage Regional Ring Road (Southern Part of Expressway)	forms southern part of Outer Ring Road [New Expressway]
28	37	Upper Egypt	RW-402-4	Improvement of Tracks	1) Track renewal, 2) New track maintenance machines on Cairo - Aswan
29	38	Suez Canal Development	RD-317	Ismailia Suez Road (Expressway)	connects from Suez to Ismailia at west side of Suez canal, 6-lanes, 100km/h, connects to RD-308 (upgrade to Expressway from Ismailia to Port Said) [Upgrade to Expressway] Note: Railway projects related this corridor are RW-200 (west side, signal improvement (on-going) and RW-410 (east side, railway rehabilitation)
30	39	Intermodal Transport	RW-407	Railway Link between Robeki to Helwan	forms a part of south ring railway route [New Rail Line]
31	40	East - West	RD-314	Zafarana Elkoraymat Road (Expressway)	creates expressway connection from Fayoum, Helwan to Red Sea (Zafarana), 6-lanes, 100km/h [Upgrade to Expressway]
32	42	Upper Egypt	RD-299	Abo Tig Bridge and Selim Coast (Asyut)	connects to both side of Nile river [New Bridge]
33	43	Inland Delta	RW-308	Triple Tracking for Qalyoub - Benha	connects Cairo - Qalyoub with triple tracks [Triple Tracking]
34	44	Mediterranean	RD-307	Alexandria-Saloum Road	connects to Libya along coastline, 4-lanes, 100km/h [Upgrade to Expressway]
35	45	Inland Delta	RD-200	Belbeis-Banha-El Bagour-El Khatatba Regional Ring Road	forms Northern part of Outer Ring Road, also the role of Mediterranean Corridor, 6-lanes, 100km/h [New Expressway]
36	46	Inland Delta	RD-334	Al Mahalla - Kafr El Sheikh - Damanhour	connects regional road located on the north side of Tanta, 4-lanes, 80km/h [Widening]
37	46	Inland Delta	RD-320	El-Qanater El-Bagour Shebin El-Koum Tanta Mahalla Matboul Road	In parallel to Cairo - Tanta agricultural road, 4-lanes, 80km/h [Widening]
38	46	Inland Delta	RD-216	Qantara Salheya Faqous Abu Kbeir Hehya Zaqaqiz Road	under GARBLT 5 year plan (2007-2012), 4-lanes, 80km/h [Widening]
39	50	Intermodal Transport	PT-1	Establishment of a Multi Purpose Terminal (Containers and General Cargo) at Alexandria Port	to ensure the capacity of future container demand for Alex. and Dekheila, 1) The development of the berths area (55,56,57,58,59,60), 2) Dredging the berths to reach a depth of 14 m instead of 5,6,9,10m, 3) Using the soil resulting from the dredging operations in the establishment of the terminal's yards, 4) The lengths of the berths are expected to reach 1,630m, 5) The area = approx. 290 thousand m ² , (proposed by previous JICA study in 1990)

Hardware Rank	Integrated Rank	Corridor	Project ID	Name	Project Outline
40	50	Cairo - Damietta/Port Said	RW-313	Railway Link for 10th of Ramadhan City	connects between Tel el Kebir to Robeki through Logistics Center [New Rail Line]
41	50	Upper Egypt	IW-4	Waterway Improvement on Cairo - Asyut	aims to dredging for safe navigability preventing from sedimentation (width 40m x dredging depth 2m x 200km).
42	53	Cairo - Alexandria	RD-315	Shubra elkhema - Banha Agriculture Road (Expressway)	bypass road for Cairo to Benha in west side, 6-lanes, 100km/h [Upgrade to Expressway]
43	53	Upper Egypt	RD-313-1	Asyut Aswan Abu simble Desert Western Road (Expressway) Asyut to Aswan	connects from RW-312 in desert, 6-lanes, 100kh/h [Upgrade to Expressway]
44	55	Inland Delta	RD-304	Rod El Farag Road	connects from Cairo city to 6th of October, 6-lanes, 80km/h [New Art. Road]
45	56	Cairo - Damietta/Port Said	RW-402-2	Improvement of Tracks	1)Track renewal, 2) New track maintenance machines, Damietta, Port Said line
46	57	Inland Delta	RD-332	Zakaziq - Toukh	bypass road for Benha to Zagazik in south side, 4-lanes, 80km/h [New Art. Road]
47	57	Inland Delta	RD-319	Imbaba Qalyub Tawfekia Road	located along Nile river left side from Cairo, 4-lanes, 80km/h [Widening]
48	59	Inland Delta	RD-214	Zaqaziq Sinbellaween Road	under GARBLT 5 year plan (2007-2012), 4-lanes, 80km/h [Widening]
49	60	East - West	RD-226	Oena - Safaga Road	connects from Qena to Safaga for under GARBLT 5 year plan (2007-2012), 4-lanes, 80km/h [Widening]
50	61	Mediterranean	RD-316	Alamein Road	forms shortcut route from Cairo-Alex. Desert Road to Western Mediterranean Coast Roads, 4-lanes, 80km/h [Upgrade of Art. Road]
51	62	East - West	RD-303	Upper Egypt East Desert Red Sea Road	connects from Asyut to Red Sea (Safaga), 4-lanes, 80km/h [New Art. Road]
52	63	Cairo - Alexandria	RW-402-1	Improvement of Tracks	1)Track renewal, 2)New track maintenance machines, Cairo - Tanta - Alex.
53	64	Cairo - Damietta/Port Said	RW-310	Improvement of Signaling System for Increase of Freight Trains	connects for Tanta - Mansoura - Damietta [Signal Improvement]
54	65	Inland Delta	RD-999	Cairo - Tanta Bypass	bypass road for Cairo to Tanta in east side, 4-lanes, 80km/h [New Art. Road]
55	66	Mediterranean	RW-410	Rehabilitation of Tracks for El-Kab - Bir El Abd	connects to Suez bridge, Port Said East and RW-312 [Track Improvement]
56	67	Inland Delta	RD-333	Tanta - Kafr El Sheikh	forms regional road for north bound from Tanta, 4-lanes, 80km/h [Widening]
57	68	Upper Egypt	RD-298	Kalabsha Bridge (Koum Ombo) (Aswan)	connects to both side of Nile river [New Bridge]
58	69	East - West	RD-313-2	Asyut Aswan Abu simble Desert Western Road (Expressway) South part from Aswan	connects from Aswan to Abou Sembel, RW-313-1 in desert, 6-lanes, 100kh/h [Upgrade to Expressway]
59	70	Upper Egypt	IW-3	Lock Expansion with Comprehensive Lock Operation Improvement	upgrades the present capacity of Asyut Barrage Lock by expansion and improves operation of other locks.
60	71	Cairo - Damietta/Port Said	PT-5	Port Said East: Logistic Center	exist the plan by 1st Stage in 2008, not sure the detail
61	72	East - West	RD-994	Fayoum-Beni Suf Bypass	connects from Fayoum to Nile east side, 4-lanes, 80km/h [New Art. Road]
62	73	Upper Egypt	RW-999	(High) Speed Railway for	New line for passenger railway

Hardware Rank	Integrated Rank	Corridor	Project ID	Name	Project Outline
				Cairo - Aswan [Electrified]	(max.250kph) stopping at only major cities [New HSR]
63	74	Inland Delta	RD-215	Mansoura Talha Dekernes Mataria Road	under GARBLT 5 year plan (2007-2012), 4-lanes, 80km/h [Widening]
64	75	East - West	RD-997	Helwan-Beni Suef Bridge	connects from Fayoum to Nile east side, 4-lanes, 80km/h [New Bridge]
65	76	Cairo - Alexandria	RW-400	High Speed Railway for Cairo - Alexandria via Tanta [High/Higher speed Alt-2]	Alternative route of Italian proposal [RW-304 Alt-1], max. speed 250kph <only for confirming demands compared with RW-304> [New HSR]
66	77	Red Sea	RD-322	Safaga Baranis Halayeb Road	Southern side of Red Sea coastline, 4-lanes, 80km/h [Widening]
67	78	Cairo - Suez	RW-300	Double Tracking for Ain Shams - Robeki	from Cairo - Robekki along Cairo - Suez line [Double Tracking]
68	79	Sinai	RD-327	Suez Canal Tunnel Ismailia	New tunnel at Suez Canal to connect RD-328, 4-lanes, 80km/h [New Tunnel]
69	80	Inland Delta	RD-318	Desouq Fowa Metobas Road	located along Nile river right side near Alex., 4-lanes, 80km/h [Widening]
70	81	Mediterranean	RD-323	Wadi Alnatroum Saloum Road	connects to Libya, in parallel to RD-307 in desert area, 4-lanes, 80km/h [New Art. Road]
71	82	Inland Delta	RW-307	Double Tracking for Qalyoub - El Qnater	not in main line between Cairo - Alex. [Double Tracking]
72	83	Sinai	RD-328	Alawga Ismailia Road	connects from Ismailia to Alawaga border, 4-lanes, 80km/h [Widening]
73	83	Upper Egypt	RD-331	Qena Aswan Nile East Bank Road	runs to the east side of Nile river in desert, 4-lanes, 80km/h [New Art. Road]
74	85	Inland Delta	RW-301	Single Tracking for Basion City	not in main line between Cairo - Alex. [New Rail Line]
75	86	Intermodal Transport	IW-5	Waterway Improvement on Cairo - Alexisandoria	aims to dredging for safe navigability preventing from sedimentation (width 40m x dredging depth 1.5m x 203km).
76	86	Cairo - Damietta/Port Said	IW-6	Waterway Improvement on Cairo - Damietta	aims to dredging for safe navigability preventing from sedimentation (width 40m x dredging depth 2m x 200km).
77	88	East - West	RD-306	Bahriya Minya Road	connects from Siwa to Nile river for east section, 2-lanes, 80km/h [New Art. Road]
78	89	East - West	RW-303	Single Tracking for Luxor - Hurghada [Electrified]	for tourists from Hurghada to Luxor to save travel time, max.150kph, [New Rail Line]
79	90	East - West	RD-330	El-Dakhla Assyuit Road	connects from Dakhla to Nile river, 4-lanes, 80km/h [New Art. Road]
80	91	East - West	RD-329	Farafra Malwa Road	connects from Farafra to Nile river, 4-lanes, 80km/h [New Art. Road]
81	92	Upper Egypt	RD-225	El-Belina - Tahta Road	connects from RD-312 to west agricultural road, under GARBLT 5 year plan (2007-2012), 4-lanes, 80km/h [Widening]
82	93	Upper Egypt	RD-326	Albetrol Malwa Road	forms shortcut route from Borg el Arab to Asyut, 4-lanes, 80km/h [New Art. Road]
83	94	East - West	RW-408	Rehabilitation of Tracks for Qena - Kharga	for passenger, even the paralleled cargo line from Kharga to Qena are existed [Track Improvement]
84	96	East - West	RD-996	Minya Bridge	cross the Nile river [New Bridge]
85	97	East - West	RD-305	Bahriya Siwa Road	connects from Siwa to Nile river for west section, 2-lanes, 80km/h [New Art. Road]
86	98	Upper Egypt	RW-306	Development of Railway Bridge for Lemon - Abbasiya - Tora	runs in southern area of grater Cairo region [Track Improvement]

Hardware Rank	Integrated Rank	Corridor	Project ID	Name	Project Outline
87	99	East - West	RD-325	ALbetrol Beni Mazar Road	connects RD-324 to Fayoum, 4-lanes, 80km/h [New Art. Road]
88	100	Mediterranean	RW-312	Single Tracking for Bir El Abd - Rafah	connects to Rafah along coast line [New Rail Line]
89	101	East - West	RD-324	Eldaba Albetrol Road	connects from Fayoum to Mediterranean sea, 4-lanes, 80km/h [New Art. Road]
90	101	East - West	RD-995	Wasta Bridge Connection	connects from Fayoum to Nile east side, 2-lanes, 80km/h [New Art. Road]
91	103	Cairo - Damietta/Port Said	RW-302	Single Tracking for Kafr El-Batikh - New Damietta City	Damietta City only [New Rail Line]
92	104	Cairo - Damietta/Port Said	PT-4	Damietta Port; Study on Sedimentation problem	detailed study (10mil.LE) is required to find suitable solution to sedimentation problem. Note that Damietta port authority used about 75mil.LE for annual maintenance for dredging.

Note: There are two alternative of HSR project for Cairo – Alexandria, RW-304 and RW-400. It is the reasons of 92 projects are listed in stead of 91 projects for further nominated master plan projects.

Source: JICA Study Team

The Egyptian Transport Center exhibits highest priority rank in terms of software initiatives, followed by safety initiatives in the road and railway sectors, respectively.

Table 9.5.4 Priority Ranking: Software Initiatives

Software Rank	Integrated Rank	Project ID	Name	Project Outline
1	1	SW-1	Egyptian Transport Center (ETC)	has the function of transport related database, planning tools and model development and maintenance, training of transport planner, development of traffic accident database and as National Road Traffic Safety Board
2	18	SW-4	Road safety initiative (3E; Engineer, Education and Enforcement)	examines historical traffic accident data and conducts safety audit, then takes effective countermeasures (hard and soft) for reducing traffic accidents.
3	22	SW-5	Railway Safety Initiative	modernization of railway crossing to automatic system (696, half of crossings in Egypt are improved by ENR funds till 2017) and continued improvement.
4	27	SW-3	Development of road function based design and capacity standards	researches and designs effective visible road signs and pavement markings for preventing road accidents in night time and fogging, also rearranged highway standards.
5	30	SW-6	Introduction of State of the art railway systems and control	apply modern railway signal control system and improvement of workshop facilities.
6	40	SW-7	Development of IWT management database and Installation of IWT Navigation Information System	provides guaranteed navigation information to any IWT users for waterways, fleets, navigation aids and RIS, and IWT management database including these improvement and development
7	94	SW-2	Establishment of Dedicated Transport Fund	researches and arranges the matter of subsidy/carbon tax/envi. incentive tax or subsidy for future earmarked road funds

Source: JICA Study Team

The two on-going technical assistance projects in the rail and inland waterway sectors achieve highest priority in the humanware category. These are followed by the training in modern road maintenance techniques and traffic management/control systems.

Table 9.5.5 Priority Ranking: Humanware Initiatives

Humanware Rank	Integrated Rank	Project ID	Name	Project Outline
1	5	HW-4	Extension of transformation plan	targets to extension of current support to ENR officers capacity development for proper operation and marketing for passenger and freight transport.
2	10	HW-5	Extension of NICHE program	targets to extension of current support to RTA officers capacity development , especially RTA management and operation capacities and strengthening of marketing and logistics knowledge and skill, including utilization of database.
3	11	HW-3	Training in modern road maintenance techniques	targets to GARBLT officers for improving overload control and asset (roads and bridges) management
4	19	HW-2	Training in modern traffic management and control systems	targets to GARBLT officers to regulate the traffic management on roads (traffic safety control and warning system, traffic information provision, facilities).
5	49	HW-1	Strengthening MOT's responsibility covering all transport modes for integrated multimodal transport system and logistics	includes civil aviation, tourism and the Suez Canal

Source: JICA Study Team

A further request of the client group is to present an average ranking of the eleven identified corridors in terms of rankings achieved by individual hardware initiatives contained in each corridor. It should be noted however that corridor rankings do not mean all projects inclusive of one corridor to be more important than those of other corridor but they only show relative importance among the recommended eleven corridors. Within that context, highest priority is clearly achieved for the Intermodal Transport Corridor followed, in order, by the Cairo – Alexandria Corridor and Mediterranean Corridor (Table 9.5.6).

9.6 IMPLEMENTATION LOGIC

A multi-criteria analysis objectively ranks proposed projects on the basis of their performance against a set of weighted criteria. Characteristic for this approach is that the appreciation does not consider the logical relationship between individual projects and therefore could provide a ranking of projects that needs further treatment to ensure that the relevance of investments is upheld and the benefits of these same investments maximized.

The in-depth testing of quantifiable objectively verifiable criteria against the Government's strategic policy objectives and the repetitive consultation of the key sector stakeholders and of various representatives from the Ministry of Transport has lead to a final weighting system has generated a highly sustainable model that generated results that are totally consistent with the Government's policy and prioritized projects in a fully logical manner.

Consequently, the top ten results that emerged out of the MCA do not need any additional analysis to uphold an implementation logic that maximizes the potential benefits of proposed investments.

Table 9.5.6 Results of Corridor Ranking

Corridor Name	Average Rank	Corridor Rank
Intermodal Transport	13.0	1
Cairo - Alexandria	24.5	2
Mediterranean	37.8	3
Cairo - Suez	39.5	4
Cairo – Damietta/Port Said	41.7	5
Red Sea	46.0	6
Suez Canal Development	46.3	7
Inland Delta	48.3	8
Upper Egypt	51.8	9
Sinai	54.0	10
East - West	69.0	11

Note: Further detail regarding corridors, and projects located therein, is presented in *Technical Report 12*. Average rank refers to a combination of individual ranks achieved by all hardware initiatives located within each corridor.

Source: JICA Study Team

The results clearly focus three key components of a modern transport system, namely:

1. Modern governance (Egypt Transport Center),
2. Efficient intermodal transport (Intermodal Transport Corridor, several terminal and station developments), and
3. Adequate expertise (ENR Transformation and IWT programs).

If any improvement can be made to the MCA results, these are at the lower level of the ranking where some projects could be upgraded as they link directly or indirectly to the top ten projects. However, as can be observed in above Table 9.5.2, several of these linking projects score substantially lower as the top ten projects and are not essential for the successful implementation of the proposed key developments.

When looking at the next ten projects in the ranking, it is noted that the sequential implementation of the top ten projects, followed by the sequential implementation of the next ten projects seems a more logical approach. The projects scoring 11 to 20 in the ranking are :

11. Training in modern road maintenance techniques;
12. Passenger Intermodal facilities;
13. IWT port improvement for Upper Egypt;
14. Cairo - Ismailia - Port Said Road (expressway);
15. IWT port linking the Nile River with the ITC;
16. Double tracking for Mansoura – Damietta;
17. Cairo -Suez Road (expressway);

18. Following two projects have an equal score:
 - i. Road safety initiative (3E; Engineering, Education and Enforcement);
 - ii. Training in modern traffic management and control systems;
20. Improvement of station facilities for freight services.

As can be observed in the above list, the initial logic in the first ten projects is also maintained in the following ten projects, but the projects now also focus river transport and terminals. The development of the Cairo river terminal "completes" the development of the Intermodal Transport Corridor with the upgrading of river terminals in Upper Egypt will further improve the competitiveness of river transport.

Considering that road transport will continue to dominate also in the future and in spite of the many efforts to improve rail and river transport competitiveness, the project that ranked number 11 (training in modern road maintenance techniques) is particularly important as it will contribute to expanding the lifespan of main roads and improve safety of travel due to better quality roads. The second group of road projects is improving the links between important production and consumption centers namely Ismalia and Port Said and Cairo with Suez. The program of improving stations and terminals is also continued in the second group of projects with projects for the development of intermodal stations for passengers and the improvement of a further six freight stations.

Finally, road safety and traffic management are the last two projects in the list and are considered equally important. In particular the training in traffic planning and control systems is an important follow-up of the establishment of the Egypt Transport Center and in preparation of the long-term vision of establishing a national transport management center as advocated in Chapter 8 of this volume.

In order to ensure that in the short- and medium-term future, all important projects are coherent and all necessary projects are considered for implementation at the appropriate time, the next ten (to rank 30) projects are listed hereafter:

21. Cairo Alex Agriculture Bypass Kafr El Zayat - Alexandria ;
22. Rehabilitation of tracks for Qena – Safaga;
23. Railway safety initiative;
24. Development of management and operation for multi purpose terminal in El Dekheila Port;
25. Western Cairo - Alexandria Expressway;
26. Cairo - Asyut Desert Western Road (expressway);
27. High Speed Railway for Cairo – Alexandria (250kph technology applied, commercial speed as 200-230kph);
28. Development of road design, capacity and traffic control devices manuals;
29. Alexandria Bypass ; and,
30. Following two projects have an equal score: (a) Suez Ras El Nakab Road (expressway) and (b) Introduction of state-of-the-art railway systems and control.

The third group of projects is in large majority of very specific transport infrastructure projects ranked; except for the projects ranked 23 and 30(ii) that are respectively the railway safety initiative and the introduction of a modern railway system and control.

The presence of a large majority of very specific infrastructure development / rehabilitation projects suggests that the first 20 projects are coherent, necessary to be implemented during the same short and medium term future and will combined modernize the Egyptian transport sector.

9.7 CONCLUSIONS AND RECOMMENDATIONS

Considering the individual relationships between the different projects, it is conceivable to develop a slightly amended listing of the first 20 projects to ensure that the implementation order of the projects consolidates the development program for the Egyptian Transport Center and the Intermodal Transport Corridor, two key projects to modernize the Egyptian transport sector (Table 9.7.1).

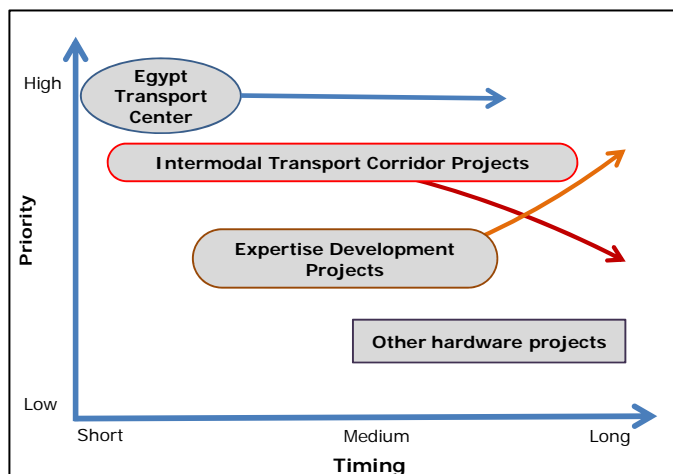
Table 9.7.1 Implementation Logic for the Short and Medium Term Planning Horizon

Type	Project
SOFTWARE	1. Egypt Transport Center
Intermodal Transport Corridor (HARDWARE)	<ol style="list-style-type: none"> 1. VAL (Value Added Logistics) Center at 6th of October City 2. Railway link for 6th of October City 3. Railway link between Sokhna Port and Helwan 4. Cairo Alexandria Desert Expressway (upgrade to 8-lanes) 5. IWT port linking Nile River with Intermodal Transport Corridor 6. Management and operation for multi purpose terminal at El Dekheila Port 7. Alexandria Bypass
HUMANWARE and SOFTWARE	<ol style="list-style-type: none"> 1. Extension of ENR transformation plan 2. Training in modern road maintenance techniques 3. Road safety initiative (3E's; Engineering, Education and Enforcement) 4. Development of road design, capacity and traffic control device standards 5. Training in modern traffic management and control systems 6. Railway safety initiative 7. Extension of IWT NICHE/RIRT program 8. Introduction of modern railway systems and control
HARDWARE	<ol style="list-style-type: none"> 1. Improvement of station facilities for freight services at Alexandria 2. Suez - Ras el Nakab Road (expressway) 3. Logistics centers including improvement of station facilities for freight services 4. Passenger intermodal facilities 5. IWT port improvement for Upper Egypt 6. Cairo - Ismailia - Port Said Road (expressway) 7. Double tracking for Mansoura – Damietta rail link 8. Cairo -Suez Road (expressway) 9. Improvement of station facilities for freight services at upper Egypt 10. Cairo - Alexandria Agriculture Bypass Kafr El Zayat - Alexandria 11. Rehabilitation of tracks for Qena – Safaga 12. Western Cairo Alexandria Expressway 13. Cairo - Asyut Desert Western Road (expressway) 14. High speed railway for Cairo – Alexandria (200 km/hr commercial speed) 15. Double tracking of bypass line for Cairo - New Alexandria

Source: JICA Study Team

Although the previous table suggests a sequential implementation of the different projects, the proposed software, hardware, and humanware projects can start simultaneously because the implementation time and components that together make up the respective projects differ, allowing an approach as suggested in Figure 9.7.1.

The first, urgent, and most important project for the modernization of the Egyptian transport sector is the establishment of the Egypt Transport Center which will be supplied with state-of-the-art software and trained personnel. It will be the key tool for public decision-makers for transport planning and strategy development. With the ETC expertise and equipment available, the Egyptian government will no longer need expensive external assets to assess the performance of the transport sector nor forecast the future evolution of transport in Egypt, both being key inputs to the long-term monitoring of the MiNTS Transport Master Plan. The contribution to the modernization and transformation of the Egyptian transport sector will be continuous and should in the long-term future lead to the creation of a governmental transport management system that will control, manage and govern the sector at the national level.



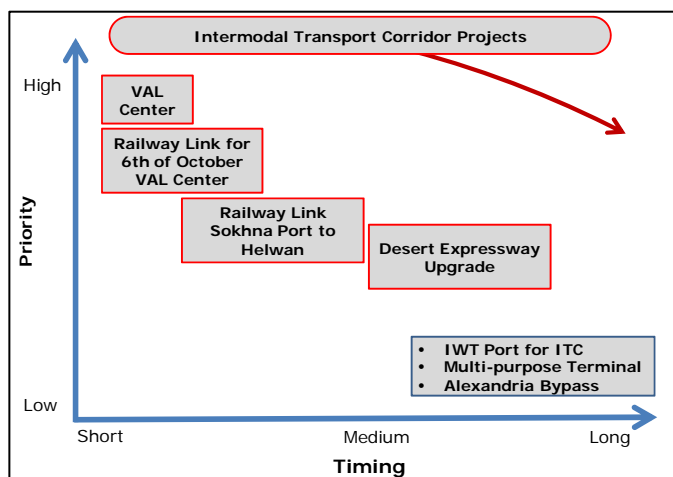
Source: JICA Study Team

Figure 9.7.1 Consolidated Implementation Logic

The second key project of which the implementation should not be delayed is the gradual development of the Intermodal Transport Corridor. This project will be spread over a long period of time as it involves different sometimes important infrastructure investments which should be implemented in a sequential order of decreasing importance as suggested in more detail in Figure 9.7.2.

The construction of the VAL center at 6th of October City is undoubtedly the first project of the ITC program that needs to be realized as soon as possible for several reasons:

- It is located at the center of Egyptian consumption and production;
- It will generate benefits as soon as the infrastructure is operational;
- Its development cost is low; and,
- The need is immediate.



Source: JICA Study Team

Figure 9.7.2 Implementation Logic: Intermodal Transport Corridor

But to maximize the benefits of this investment and to ensure the center can play in full its role in the envisaged transport corridor, it should be linked to the Alexandria – Cairo railway connection, hence making the link between the center and the railway network an equally important investment.

Once these two projects have been initiated, the other components of the ITC project can be envisaged, with the highest priority in the short- to medium-term attributed to the railway link to the port of Sokhna, the eastern terminus of the Alexandria – Cairo – Sokhna corridor. To a lesser extent, upgrading the Desert Expressway can also be envisaged because road transport will remain a dominant mode of transport for bringing freight from Alexandria port to the Cairo region. The three remaining projects, although important, are to be envisaged in the long-term, with the IWT port in the Cairo region to link to the ITC corridor as first in line of implementation.

The third group of projects of which the first ones should start once the Egypt Transport Center is realized, is the increased know-how and expertise of all stakeholders as well as programs to improve the traffic conditions on the infrastructure (maintenance and control applications), with the highest priority to be attributed to the road sector, followed by the railway sector, corresponding to their respective roles in the transport of freight and passengers in Egypt.

All remaining hardware projects, are developments to be considered in the long-term, and its implementation can be realized in the order as proposed in the multi-criteria analysis, with a priority to the projects listed from 21 to 30 in above Table 9.7.1. The final timing of the concrete development will most likely be decided based upon budgetary considerations rather than on considerations of priority. Given that these projects all can be considered as amendments to the above priority projects, the concrete implementation of some of these projects could be considered in case of a budgetary surplus, but only if most if not all short- and medium-term projects have been realized.

CHAPTER 10: IMPLEMENTATION CONSIDERATIONS

10.1 PRIVATE SECTOR INVOLVEMENT IN EGYPT

10.1.1 The PPP Central Unit

In line with the Egyptian Government's strategy to promote and increase the private sector involvement in the country's economic and social development plan- particularly in the area of public utility services- the Government has taken initiative to introduce the Public Private Partnership.

Affirming the government seriousness to activate the PPP initiative, a PPP Central Unit was established within the Ministry of Finance that reports directly to the Minister. The Ministry of Finance PPP unit is in charge of coordinating the PPP national program across ministries and public bodies. The upcoming period will witness the intensification of contacts with line ministries, other government bodies and with the private sector to activate this initiative. In this context, the Central Unit in the Ministry of Finance will provide support to line ministries on all forms of PPP projects.

Further Information

Additional details regarding the fiscal framework for implementation, in particular the potential role of the private sector, are presented in *Technical Report 8, Private Sector Participation*.

The Ministry of Finance PPP unit is in charge of coordinating the PPP national program across ministries and public bodies. It will be working closely with the Ministry of Planning and the Ministry of Investments to ensure a controlled roll-out of a series of significant infrastructure and public services projects. The Unit will be in charge of the study, application, implementation as well as coordination with line Ministries and with the private sector to develop this PPP theme in a policy framework and a clear action plan.

An essential task of the unit is to ensure that PPP project proposals are supported by sound analysis on the needs and values, receive the necessary budget approvals and that partner selection takes place as a result of a rigorous and fair competition. In all cases, the unit's guidelines on project selection, appraisal and tendering will be communicated to all parties involved in a timely manner. This should coincide with the establishment and commencement of specialized units located in the line ministries that have plans to implement projects under the PPP program.

The PPP Central Unit vision is as a "center of expertise" which is vested with the mission to introduce and communicate the Public Private Partnership policy, to develop practice and to take a vital role in the delivery of the initial projects. The centre will bring in support and experience from domestic and

overseas experts. It is a department of the Ministry of Finance that is responsible for overseeing and implementing the policy.

The lead responsibilities of PPP Central Unit include:

- Articulating a single national PPP policy so that its objectives and mechanisms are understood by the Ministries and State agencies, funders, contractors, the press and the general public;
- Developing and sponsoring new legislation and regulation for PPP procurement and practice which must be observed by all ministries submitting PPP proposals;
- Importing experience from other countries and developing guidance and methodologies that is appropriate to Egypt. The centre should be a recognized authority on the PPP process developing a "tool kit" to standardize PPP practice across the Government;
- Assisting Ministries/public bodies develop/vetting PPP proposals (Business Cases). The MOF must agree that these cases are sound before procurement can proceed and budget be allocated;
- Communicating the process to the professional private sector participants (banks, lawyers etc);
- Helping devise the structure of PPP funding and security packages;
- Identifying issues that may impede the programme and orchestrate their resolution;
- Shepherding and advising on project tenders, being a watchdog for good practice, and learning the lessons from pilot exercises. This should involve active participation in all aspects of early projects tenders (process, documentation, negotiation, evaluation and review);
- Developing and enforcing the use of generic commercial terms for PPP contracts (standardized contract model);
- Being the "intelligence gatherer" to appreciate the development of concession/PPP practice in other countries;
- Being a "public face" to the initiative with a newsletter and website;
- Promoting the development of concession/PPP/Project finance advisory skills for export to the Eastern Mediterranean and Gulf regions;
- Being the guardian and promoter of the new methods and a proactive agent for change. In short, in matters of PPP development and practice, it has to be both the originator and final arbiter;
- Communicating the process to the professional private sector participants (banks, lawyers etc);
- Helping devise the structure of PPP funding and security packages;

- Building technical capacity; first its own and then that of the Line Ministries and agencies sponsoring projects, but also that of the private sector. This often takes the form of training sessions, publications and seminars; and
- Promoting the development of concession/PPP/Project finance advisory skills for export to the Eastern Mediterranean and Gulf regions. This could eventually represent a key area of high-added value business for Cairo as a regional financial center

10.1.2 Critical Issues and Requirements for Successful PPPs in Egypt

Despite the Government's attempt and initiative to promote the PPP projects, not many are realized. In order to achieve a successful PPP project, rather than a BOT project in Maritime sector, the following issues and requirements are identified:

- Strong National Political Backing;
- Rigorous pre-procurement analysis on the project's feasibility: a good business case (based upon clear outputs) and a public sector comparator or benchmark exercise to ensure the Government can afford the required PPP unitary payments;
- Detailed risk identification and analysis on the project for both technical and commercial risks as well as political risks;
- A well-structured, transparent, and competitive procurement process;
- Willingness of the Public Client to accept innovative solutions from competing private bidders;
- A detailed contract: which can accommodate certain changes in the requirements of a project over time;
- Professional and effective monitoring of the private contractor by the public client over the entire operational phase of the contract with the spirit of making the overall partnership work;
- Selection of appropriate project candidates that are not too small, that are replicable and that matches clearly with private sector interest;
- Good, detailed preparation with established clear business cases (feasibility analyses), clear output specifications, and a committed, well-resourced, and experienced PPP project procurement team;
- Proper advisory support from experienced PPP legal, technical and financial specialists;
- A well-structured, transparent, competitive PPP procurement process;
- A clear and consistent methodology for evaluating value for money based upon clear models, templates, and Standard Operating Procedures (SOPs);
- Proper monitoring of the entire (15 – 20 + years) operational phase; and
- A determination by all parties and stakeholders to make the PPP work for all the stakeholders (governments, private investors, private lenders, and public users and consumers)

10.1.3 Categories of PPP

PPP's falls into three broad categories. The majority of transport projects will be located under the first category.

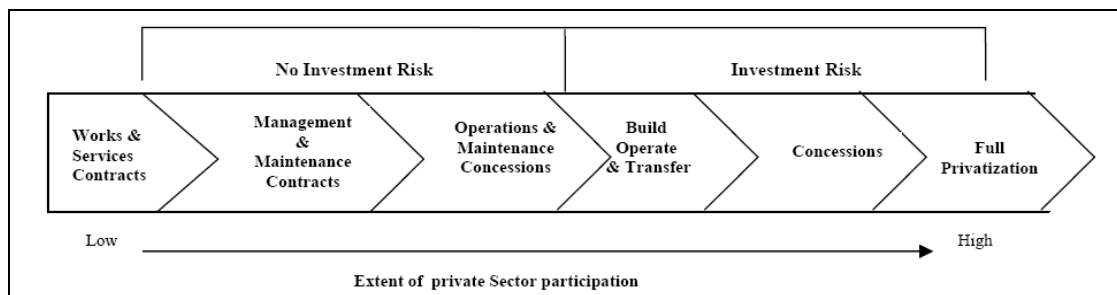
- **Financially self-standing concessions:** these comprise tolled roads and river crossings where the traffic volumes and toll charges are sufficient to finance the investment and ongoing services and support. They also apply to certain municipal services, typically water treatment and supply, sewerage and wastewater, waste collection and management and transport services. For such concessions, which can take many of the features of privatization, it is essential that user charges should be regulated but set at economic levels to pay for the investment required as well as the ongoing service.
- **Hybrid PPP's:** these cover areas of service where user charges are made, but for political and/ or social reasons are maintained at levels that are insufficient to sustain the required outlays of capital and operational expense. In these cases user charges have to be supplemented by subsidy from the Public Authority.
- **PFI-type PPP's:** this category has seen the largest growth in recent years, particularly in the United Kingdom, and is applicable to all those sectors where no user charge is possible or politically acceptable. In public services, examples are public schools, hospitals and health centers, and for the use of government itself, courts, prisons, municipal buildings, police and fire stations.

The nature of the partnership between the private and the public sector can range from fairly simple contractual arrangements to supply a specific service (e.g., garbage collection), to complex arrangements to design, construct, operate, maintain, finance, and provide an infrastructure service (e.g., a new airport). In other words, there are many variants of PPPs, including management contract, leasing investment concessions, build-operate-transfer (BOT) and related version such as Rehabilitate-Operate-Transfer (ROT), Build-Own-Operate (BOO), and Build-Own-Operate-Transfer (BOOT). In return for agreeing to provide the service, the private sponsor receives a fee (in payment for specific services rendered, or a tariff or user charge depending on the type of the PPP used) according to certain standards of service and other criteria as specified in the contract.

Figure 10.1.1 illustrates the broad spectrum of private sector participation in service delivery. As more equity and control is transferred to the private sector, so is more risk. PPP, in which the private sector can provide significant amounts of finance for the project, provides relief to government budget. With these savings the government could invest in those projects that are less amenable to PPPs.

10.1.4 Identifying Suitable PPP Projects

PPP is a method for procuring more effective investment and service delivery, not just in the area of public services but also in public administration. However, not all areas of investment in public service improvement are suitable for PPP methodology. Experience has shown that potential PPP projects should conform to the following characteristics:



Source: MOF, PPP Guide

Figure 10.1.1 Full Spectrum of Private Sector Participation in Service Delivery

- The investment required, in particular for pilot projects should be over 100 million LE. This is because the complexity and expense involved in launching such projects using proper public procurement procedures are only justified for projects of a larger-scale;
- The assets and services required should be those that the private sector is capable of supplying, and there should be an actual or potential competitive market for such supply;
- Projects should not have a high technology content and should not require technology that is not readily available on a competitive basis;
- The Public authority proposing a PPP should be able to specify in output or outcome terms the scope and scale of its needs over the lifetime of the project;
- The project proposal should be justified by a detailed analysis of needs and arguments for the suitability of the PPP approach. This is frequently called the Business Case.

It is essential that the Business Case is well argued, and receives the formal approval of senior governmental/political authorities before a PPP project is put out to formal tender.

The Business Case should be the formal analysis document that justifies the project and the PPP procurement route. It is likely to be presented to sponsoring and budgetary ministries, as well as to political authorities. It will be a document of record, potentially subject to audit scrutiny. Its existence and approval at the appropriate governmental level are a key factor for encouraging potential partners to tender for projects.

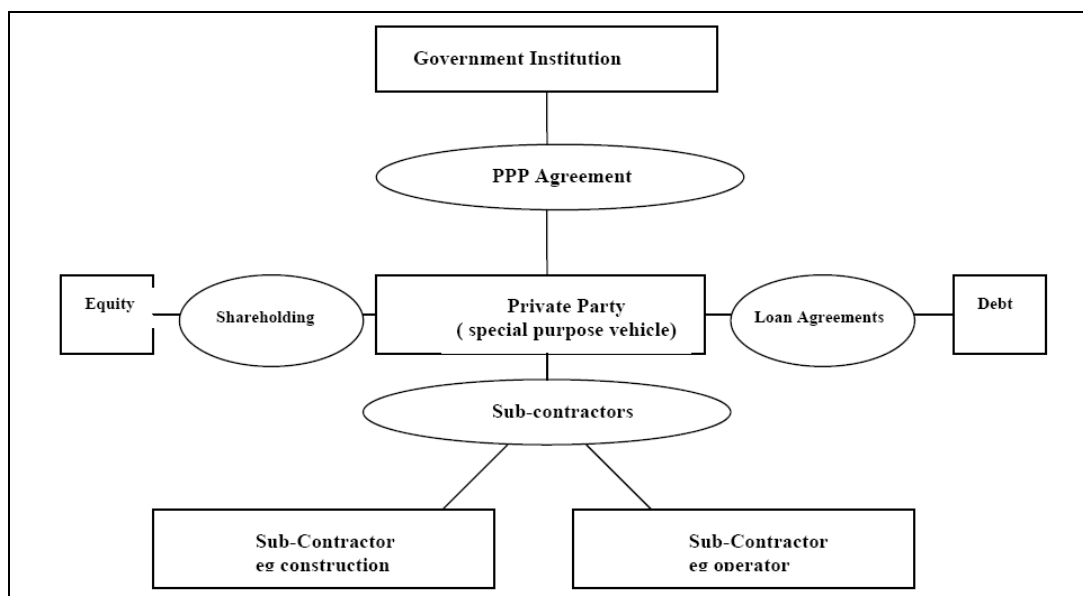
The Business Case is a detailed exercise and is likely to take some months of careful preparation frequently requiring inputs from external experts. It should address the following:

- The need for and nature of the proposed investment;
- Options for investment and why the PPP route is proposed;
- The risks and implications of the project as a PPP;
- Estimates of annual cost and considerations of affordability; and

- Timing and preparedness for a PPP procurement

10.1.5 The PPP Structure

In PPPs where substantial risk is being passed to the private sector, including financing risk, the capital cost is usually funded through project finance. Project finance is the mechanism whereby projects are financed using the future revenues flowing from the projects. By involving private sector in service delivery, the cost to the public sector is spread over the long term, rather than incurred up front, thus freeing limited public sector resources for more projects without needing to raise funds via taxation; seldom a popular alternative. In addition, concession-based project finance allows for the asset to be transferred back to the public sector at the end of concession term after a period of time sufficient for the private sector to earn a return. A diagram representation of typical PPP structure is shown in Figure 10.1.2.



Source: MOF, PPP Guide

Figure 10.1.2 Typical Structure of a Project Financed PPP Structure

Typically, in project financing, a new company normally called a Special Purpose Vehicle (SPV) is created for specific purpose of carrying out a particular project. The SPV relies on the revenue it receives in return for providing the services to the client for meeting its debt obligation to the financiers, for covering operational costs, and to ultimately produce a return on the equity for the shareholders.

10.2 PPP PROCUREMENT PROCESS AND TRANSPORT PROJECTS

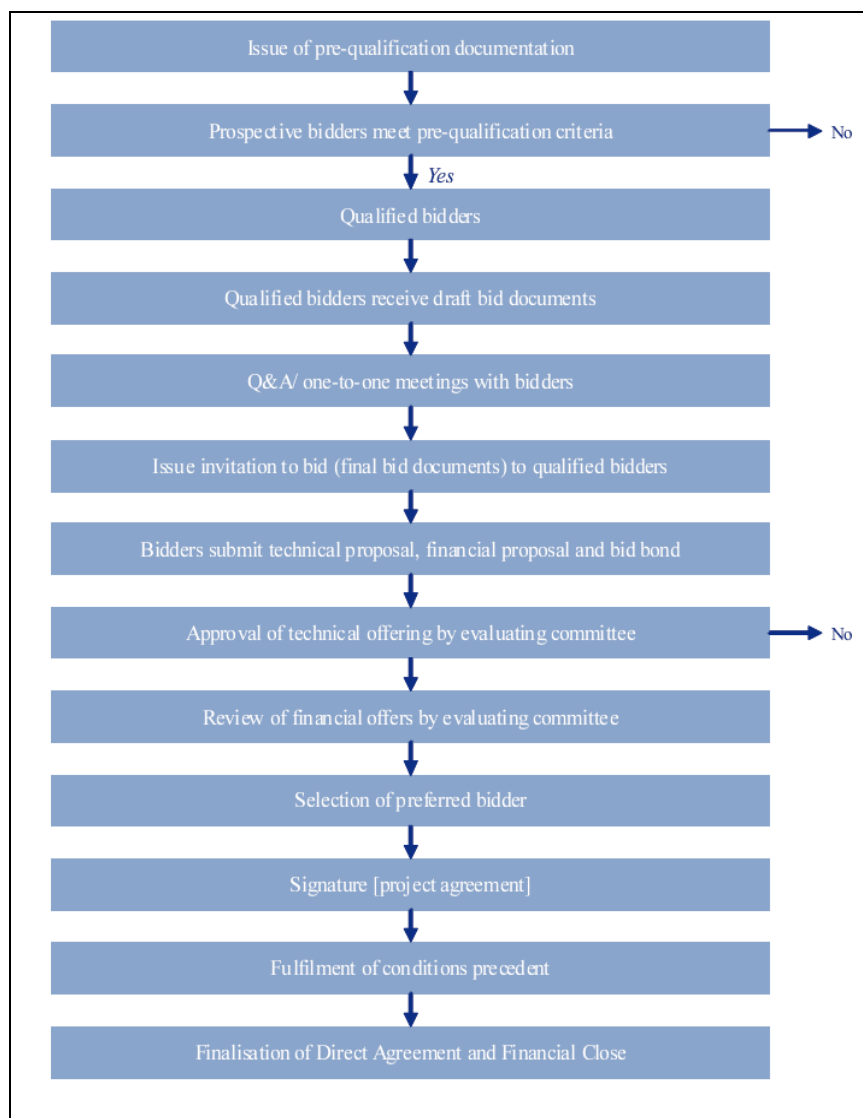
10.2.1 Procurement Process and Contractual Structure

Based on MOF Public Private Partnership Central Unit, the current PPP procurement process consists of five steps. The steps set out the process to be followed by the Client in the PPP procurement and highlight some of the issues that may arise during the process. The procedure is set out as a series of steps, which correspond to milestones and/or decision points. The steps described presuppose that the new PPP Law and any consequential amendments to public procurement law will clearly establish

the legal framework for the adoption of best international tendering practice for PPP transactions. The steps can be summarized as follows:

- Step 1: Preparing for procurement
- Step 2: Selection of candidates and short listing
- Step 3: Invitation to candidates to present detailed proposals
- Step 4: Dialogue/discussion phase leading to final offers
- Step 5: Call for final offers on the basis of agreed proposals, evaluation, and contract award.

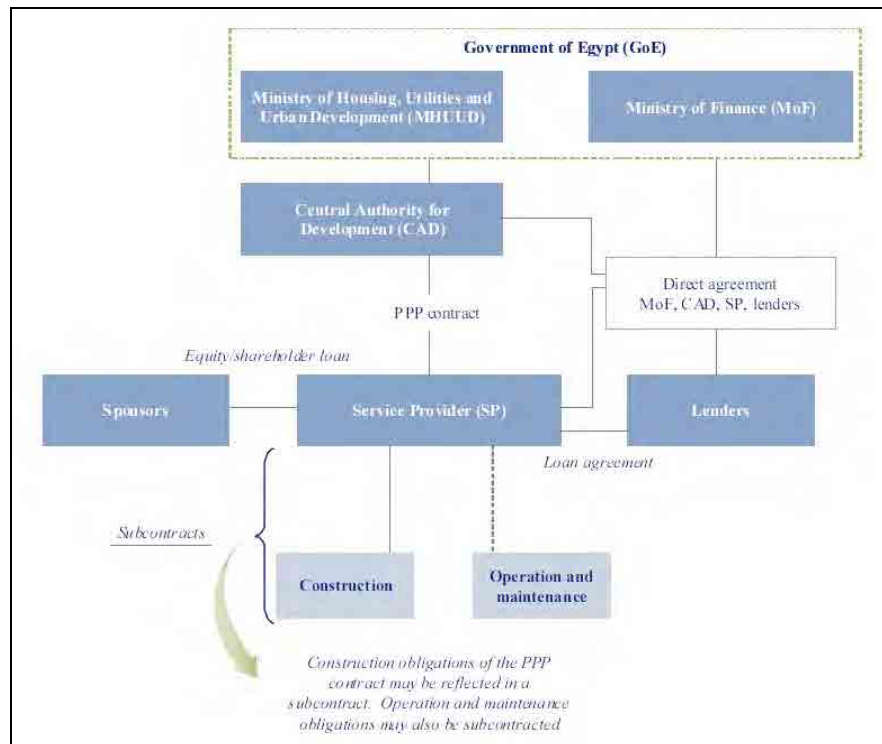
Further details of the procurement process will be described by such key stages as shown in Figure 10.2.1.



Source: MOF

Figure 10.2.1 Key stages in the Procurement Process

A contractual structure, which may, as an example, consist of such main players of the PPP project as Government of Egypt, Central Authority for Development, Service Provider, Subcontractor, Sponsor and Lender, can be depicted as shown in Figure 10.2.2



Source: MOF

Figure 10.2.2 Contractual structure of the Project

10.2.2 PPP Projects in Transport Sector

According to the consultation with the MOT Authority, current Egyptian MOT policy depends on assessment of the project risk. If the project needs to be provided by a guarantee, the project will be implemented by PPP. If the project does not, on the other hand, require a guarantee, the project will be implemented by concession such as BOT. Almost all port projects can be managed by a concession contract. Other transport sector projects will be almost always subject to a PPP agreement.

The project is classified to be either viable or non-viable based on feasibility studies. In case of the project is deemed non-viable and yet there is a national need for construction, the project capital will be provided by the Government. In case the project is considered viable, capital will be provided by concession or PPP depending on the result of the risk assessment.

Attempts have been made to implement a Build Operate Transfer (BOT) structure for road procurement during the last ten years but none of them have reached the implementation stage.

Another form of procurement that evolved was applied to Al-Sokhna road, Al-Korimat road, and its extension further south. These roads were financed, designed, and constructed by the armed forces in return for giving them the right to collect toll revenues.

Another project was the Sohag Al-Bahr Al Ahmer road which is financed, designed, and constructed by the Ministry of Investment under the supervision of GARBLT, in return for the rights to invest in specific areas around the road.

Based on the recent information obtained from the website of PPP Central Unit, there are only two projects under the category of transport sector. One project is under pipeline construction and the other is under highway construction as shown in Table 10.2.1.

Table 10.2.1 Ongoing Transportation Projects in PPP Central Unit

Project	El Galala Quarry Road
Sector	Roads and Accesses
Classification	Pipeline
Status	Advisors under procurement and Project Study ongoing, expected request for Tendering: request for Prequalification: Q2/2010, and expected Financial closure: Q1/2010
Description	Construction, Operation, and Maintenance of El Galala Quarry road in Suez with a total length 38 km.
Project	Rod El Farag Axis
Sector	Roads and Accesses
Contracting Authority	Central Authority for Development "CAD" - Ministry of Housing, Utilities, and Urban Development "MHUUD"
Supervisor	Public Private Partnership Central Unit
Project Duration	20 Years
Location(s)	Greater Cairo
Status	Five bidders from 57 requests were qualified in October 2010 Tender documents are under preparation
Other	Invitation for Prequalification issued on April 13th, 2010 and deadline for submission postponed to August 1st, 2010. Rod El Farag Highway Project is one of the key PPP Pilot Projects whereby the MHUUD (The Ministry of Housing, Utilities and Urban development) with the Ministry of Transport and by the technical assistance of the PPP Central Unit will invite the private sector participation through a competitive bidding process to enter into PPPs for the construction, operation and maintenance of Rod El Farag Access. The Project will connect the existing ring road around Cairo with Cairo - Alexandria highway with a total length of 34 km.

Source: JICA Study Team based on PPP Central Unit Data

Potential candidates for concessions and PPP roads can be proposed as listed below.

- Cairo –Alexandria – Matrouh 470 km
- Port Said – Alexandria 285 km
- Shoubra – Banha 45 km
- Toukh – Zaghazeig 45 km
- Khafr Zayat – Hosh Eisa – Alexandria 110 km
- Mehalla –Kafr El Sheikh – Desouk – Damanhour 76 km
- Tanta – Kafr El Sheikh 37 km

10.3 POSSIBLE INVESTMENT AMOUNT BY GOVERNMENT

Investment in Egypt has been growing in the past, and accounted for about 20% of GDP, as shown in Table 10.3.1.

Table 10.3.1 Past Trends of Investment in Egypt

	Total Investment (LE billion, current)			Total Investment (% to GDP, current)		
	public	private	total	public	private	total
2002/2003	34.46	33.65	68.10	8.25	8.06	16.31
2003/2004	42.46	37.10	79.56	8.75	7.64	16.39
2004/2005	50.04	46.42	96.46	9.29	8.62	17.91
2005/2006	49.42	66.33	115.74	8.00	10.74	18.74
2006/2007	58.04	97.30	155.34	7.79	13.06	20.86
2007/2008	70.46	129.08	199.53	7.87	14.41	22.28
2008/2009	83.59	113.53	197.12	8.05	10.93	18.98

Source: Ministry of Economic Development

Table 10.3.2 presents the past trends of the investment in the transport sector of Egypt. Public spending has been always larger than that of the private sector. Private investment has shown a large fluctuation from year to year.

Planning for the transport sector must take into account its fiscal importance and affordability, now and in future. Recent data suggest an annual transport infrastructure investment in vicinity of 20 billion LE. Historically, annual investment has ranged, roughly speaking, from two to three percent of GDP. The year 2008/2009 experience confirms a total GDP share of 2.06 percent, with 1.36 percent derived from public funds, and 0.70 percent from private sector funds.

In order for Egypt to achieve rapid economic growth, large investment must be made continuously in the transport sector. The 1994 World Development Report of the WB stressed the importance of infrastructure for growth, and more recent researches have examined the dynamics of the relationship between the two. Findings indicate that the impact of infrastructure investment is different depending on the relative size of investment to the scale of existing infrastructure. This means that infrastructure investment has a smaller impact in already developed countries than in developing countries. Since

Egypt will still remain to be a developing country in the coming, at least, 20 years or so, the investment on infrastructure should naturally be strengthened.

Table 10.3.2 Past Trends of Transport Investment in Egypt

	Transport Investment (LE billion, current)			Transport Investment (% to GDP, current)		
	public	private	total	public	private	total
2002/2003	8.04	1.76	9.80	1.93	0.42	2.35
2003/2004	9.91	2.72	12.63	2.04	0.56	2.60
2004/2005	10.33	2.22	12.55	1.92	0.41	2.33
2005/2006	7.87	7.34	15.21	1.27	1.19	2.46
2006/2007	10.31	5.31	15.62	1.38	0.71	2.10
2007/2008	12.90	12.02	24.92	1.44	1.34	2.78
2008/2009	14.08	7.26	21.35	1.36	0.70	2.06

Source: Ministry of Economic Development

Then how much should be invested on transport infrastructure in Egypt? This is a difficult question to answer, because it is affected by socio-economic condition, political will and past achievements.

If similar levels of investment are assumed in future, the allocated amounts must address not only national-level projects such as those contained within MiNTS, but also urban projects, transport projects within urban new developments and investments in air sector. The Cairo metropolitan area, for example, has, in the early part of the 2000's decade, accounted for roughly one-fourth of national capital transport expenditure. This is unlikely to decrease, and quite possibly increase, in light of commitments towards Cairo International Airport as well as Metro Lines 3 and 4.

Obviously, the role of the private sector remains an opportunity. However, as noted in early part of this Chapter 10, and borne out by recent experiences, there are few "success stories" for private sector investment in the Egyptian road, rail and inland waterway sectors. The lessons of history thus suggest that a likely expectation is that the majority of funding will arise from public sources, which, historically, have averaged some one to two percent of GDP per annum.

Current data on public investment to transport sector for the 6th 5-year Development Plan have been made available from the website of the Ministry of Planning as shown in Table 10.3.3, which indicates that the expenditure to the pure government sector accounts for 50% of the total public investment on average for the transport sector.

Further, assuming that 50% of the pure government sector expenditure is applied to the urban and air transport sectors the remaining portion, i.e. quarter to half percent of GDP can be dedicated to pure MiNTS projects. Thus, based on the estimated future GDP, the fiscal framework affordable to implement the MiNTS projects is derived as follows:

- In case Quarter percent of GDP Affordable budget up to 2027=72.8 billion LE
- In case of Half percent of GDP Affordable budget up to 2027=145.5 billion LE

In consultation with MOT, it was accepted to assume that a target affordable budget of the respective future 5-Year Plan could reach the vicinity of 50 billion LE for MiNTS projects.

Table 10.3.3 Government Investment on Transport Infrastructure: Sixth 5-Year Plan

Responsibility		Fiscal Year				
		2007/2008	2008/2009	2009/2010	2010/2011 Expected	2011/2012 Planned
Governmental Sector	Billion LE	5.1	7.6	11.0	7.1	9.2
	%	39.5	49.0	65.5	49.0	42.8
Economic Public Organizations	Billion LE	4.2	4.3	2.6	3.1	4.9
	%	32.6	27.8	15.5	21.0	22.8
Public Companies	Billion LE	3.6	3.6	3.2	4.3	7.4
	%	27.9	23.2	19.0	30.0	34.4
Total	Billion LE	12.9	15.5	16.8	14.5	21.5
	%	100	100	100	100	100

Source: Report of Development Plans, 2011/2012 Plan, website of MOP

CHAPTER 11: STAGING THE PLAN

This chapter formulates the staging of the Master Plan over three consecutive 5 year periods; namely, short-term (present to year 2017), mid-term (years 2018-2022) and long-term (years 2023-2027). The proposed MiNTS Transport Master Plan requires a total expenditure of 320 billion LE over this composite time period. Forty one percent of this expenditure is linked to the public sector with the remaining expenditure potentially associated with the private sector.

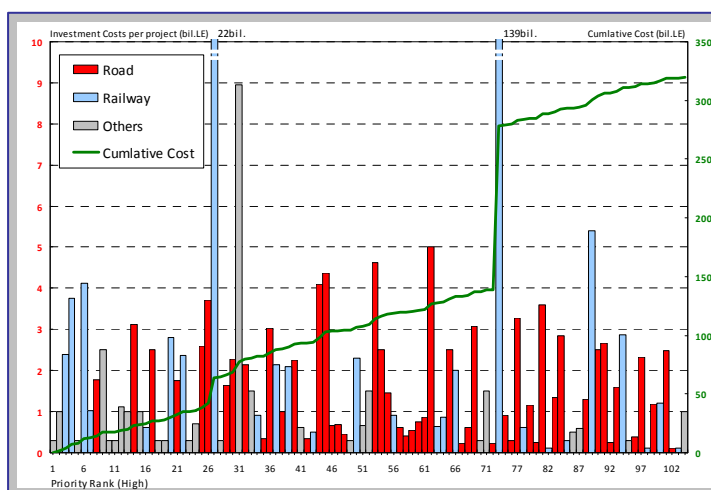
11.1 METHODOLOGY

The projects included within each of the three 5 year programs are based on analyses document in the previous Chapter 9 (project prioritization and implementation logic) as well as Chapter 10 (implementation/fiscal considerations). In addition, potential for public-private participation (PPP) for each project has been examined via the results of future traffic demand as well as project outline and categories.

These results confirm that allocation within budgetary stages will consider:

- Public funding of 50 billion LE for each 5 year period;
- Costs for projects exhibiting potential for a public-private partnership are excluded in the public investment allocation; and
- Identification of high priority projects is governed by the previously-defined (refer Chapter 9) implementation logic.

Figure 11.1.1 depicts the cumulative project costs, with projects arrayed from high to low priority. The total cost is estimated at 320 billion LE for 103 projects. These include hardware (encompassing high speed rail projects), software and humanware initiatives.



Source: JICA Study Team

Figure 11.1.1 Cumulative Project Cost

Projects with identified PPP potential include 14 road projects at a cost of 36 billion LE, and two high speed rail projects at a cost of 145 billion LE. This aggregate of 181 billion LE is earmarked for potential private investment.

The cumulative costing analysis gives rise to further considerations:

- Implementation of the composite Transport Master Plan via only public sector funding is not possible under the current 50 billion LE per planning period allocation.
- An expanded role for the private sector is seen as essential if the master plan is to even approach full reality. However, it must concurrently be acknowledged that private sector investment in the road, rail and inland waterway sectors carries a number of risks and uncertainties.
- The staging of projects and programs, as undertaken by MiNTS, is an essential exercise in priority allocation. Such rankings must, following the conclusion of MiNTS, be repeated to ensure up-to-date technical and fiscal information is incorporated into the review.
- A staged approach to implementation, relying on rankings of initiatives and a corridor grouping approach, will permit additional flexibility in terms of Ministry planning should anticipated funding sources increase or decrease, or should technical merit of proposed initiatives be reconsidered.
- The ranked costing process clearly confirms that some projects, such as high speed rail, are, vis-à-vis other endeavors, seen as being disproportionately expensive, technical merit aside. This consideration in isolation may well, given the financial resources of Government, and potential reluctance of the private sector, prove daunting.
- The costing approach has focused on public and private sector funding. The public sector contribution is, as noted in Chapter 10, based on a review of historical and near-term future governmental commitments. These capabilities may change in light of the revolution given that broader national fiscal patterns are likely to come under increasing scrutiny. The Ministry may wish to consider, as a new source of revenue, lobbying for alternative funding sources. Software Project 2, for example, urges consideration of a dedicated funding source for transport construction and maintenance. Such funding can come from a variety of sources be they taxes, levies or re-allocation of part/all of the current fuel subsidy. While unlikely to be met with a positive reaction from central financing entities, such a “new” approach may well point the way for enhanced transport funding in Egypt.

11.2 PLANNING PERIOD CONTENT

The allocation of projects and programs within each of the 5 year planning periods is depicted in Tables 11.2.1 through 11.2.3. Each of the indicated projects is identified in mapping attached as an annex to this chapter.

Table 11.2.1 Initiative Staging – Short Term Planning Period (Present to Year 2017)

Category	Hardware					Software	Humanware
	Roads	Railways	IWT	Ports	Logistic/others		
Public	5 projects 8.8 bil.LE	10 projects 22.3 bil.LE	2 projects 2.0 bil.LE	-	3 projects 4.5 bil.LE	5 projects 10.2 bil.LE	4 projects 1.2 bil.LE
Private	8 projects 18.6 bil.LE	-	-	2 projects 2.2 bil.LE	-	-	-
Total	Public: 49.0 billion LE, Private: 20.8 billion LE						

Source: JICA Study Team

Table 11.2.2 Initiative Staging – Mid-Term Planning Period (Year 2018 through Year 2022)

Category	Hardware					Software	Humanware
	Roads	Railways	IWT	Ports	Logistic/others		
Public	20 projects 26.4 bil.LE	9 projects 10.2 bil.LE	2 projects 0.9 bil.LE			2 projects 0.9 bil.LE	1 projects 0.3 bil.LE
Private	6 projects 17.9 bil.LE	1 project ⁽¹⁾ 19.9 bil.LE		2 projects 3.0 bil.LE		-	-
Total	Public: 38.7 billion LE, Private: 40.8 billion LE						

Source: JICA Study Team

(1) High speed rail project, Cairo-Alexandria, 90% of total 22.1 billion LE cost for private sector investment with a 10% public contribution.

Table 11.2.3 Initiative Staging – Long Term Planning Period (Year 2023 through Year 2027)

Category	Hardware					Software	Humanware
	Roads	Railways	IWT	Ports	Logistic/others		
Public	12 projects 19.0 bil.LE	7 projects 24.0 bil.LE	2 projects 1.1 bil.LE	1 projects 1.0 bil.LE		-	-
Private	-	1 project ⁽²⁾ 125.6 bil.LE				-	-
Total	Public: 45.1 billion LE, Private: 125.6 billion LE						

Source: JICA Study Team

(1) High speed rail project, Cairo-Aswan, 90% of total 139.5 billion LE cost for private sector investment with a 10% public contribution.

Staging opportunities and implications are further addressed in a series of annexes attached to this chapter. Corridor-specific tabulations and illustrations highlight the temporal requirements for further study, design and construction associated with nominated initiatives. The presentation focuses on the practical needs of project realization; that is, required lead and lag times which must be considered to ensure that the initiatives will be integrated with the overall transport fabric in a timely manner.

11.3 ECONOMIC EVALUATION OF THE PLAN

11.3.1 Analytical Approach

In order to evaluate the viability of this master plan, an economic analysis was undertaken based on following considerations (all costs and benefits are priced in terms of constant year 2011 Egyptian Pounds):

- “With” and “without” case: three different 5 year planning horizons (short, mid and long-term) have been adopted. The “with case” is set with the projects which are thought to be implemented for that period with transport demand and fuel price strategy in accordance with preferred transport scenario (please refer Chapter 5) conditions. The without case does not include the new projects foreseen for that stage of the Master Plan.

- Evaluation period and project life: the economic evaluation period extends to the year of 2037 and each project life is assumed as 30 years from middle year of each 5 year period. This means the residual value for each project investment is taken into consideration.
- Costs: project costs for each 5 year plan have been converted into economic cost using a conversion factor of 0.85. Therefore, the capital costs in terms of economic price in short, mid and long-term are 61.9, 70.6 and 151.4 billion LE, respectively. The evaluation input for investment cost is averaged over 5 years for each 5 year period. In addition, road maintenance unit costs are added for projects roads in accordance with road length. The unit cost of maintenance has gradually been improved from the current 20,000 LE/km expenditure pattern to an optimized 82,000 LE/km by year 2037. The maintenance costs of other modes is noted as being included in unit operating costs.
- Benefits: Economic benefits can include direct and indirect benefits. Direct benefits consist of saving of travel time and vehicle operation costs, reduction in traffic accidents and environmental improvement due to reduction of CO₂ emission. Indirect benefits can include regional economic growth, job creation and income improvement as well as changes of land value. The MiNTS economic analysis quantifies only direct benefits.

11.3.2 Economic Viability

The proposed MiNTS master plan requires an investment of 320 billion LE between years 2011 and 2027 including hardware, humanware and software projects/programs. The costs have been estimated in economic terms, with results summarized in Table 11.3.1. The investment, converted to an economic cost of 289 billion LE, is shown as producing direct economic benefits of 13.6 billion LE in year 2027, and a B/C ratio (at 12% discount rate) of 1.10. The economic internal rate of return (EIRR) is estimated at 17.8 percent. It may therefore be concluded that the MiNTS initiatives are economically viable and worth being implemented in terms of a national economic context. The result of sensitivity analysis shows that the “worst case scenario”, defined as experiencing minus 10 percent benefits and plus 10 percent costs, slightly exhibits an EIRR of more or less 12 percent.

11.3.3 Broader Implications

A series of performance indicators were, in addition to economic viability, examined in order to ascertain the broader implications and benefits of the Master Plan. These indicators address both national and corridor implications; to wit (Figures 11.3.1 through 11.3.3):

- Enhanced mobility of the general populace; that is, accessibility of the Cairo metropolitan area (considers a variety of trip purposes including personal and business travel). By year 2027, with the Master Plan in place, the Cairo metropolitan area is accessible to near 80 percent of the national population, compared to less than two-thirds of the population in the “without Master Plan” case.
- Focal areas offering lowest cargo transport cost. By year 2027, the road mode is indicated as exhibiting lowest cost in areas near Alexandria and Cairo, in particular shipments within the Delta. However, for longer distance transport, rail and inland waterway transport exhibit mode-specific areal advantages.

Table 11.3.1 Economic Analysis Results

Unit: LE million (Economic Price)

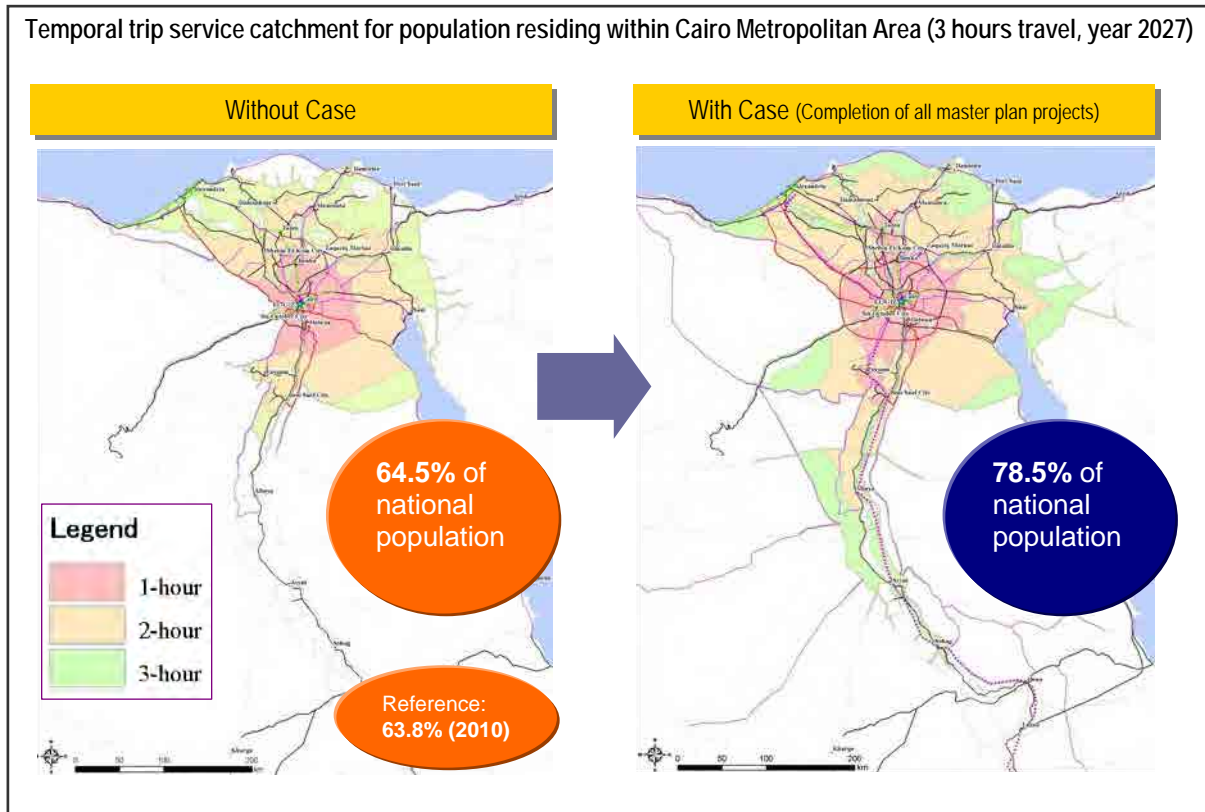
Year	Cost			Benefit			Total	Net Cash Flow
	Investment	Maintenance for Road	Total	VOC + Time Cost + Freight	Reduction in Accident	Reduction in Pollution		
2011	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0
2013	12,389	8	12,397	3,915	-3	-92	3,820	-8,577
2014	12,389	16	12,405	7,830	-6	-184	7,639	-4,765
2015	12,389	24	12,413	11,745	-9	-276	11,459	-954
2016	12,389	32	12,421	15,660	-12	-369	15,279	2,858
2017	12,389	40	12,429	19,575	-15	-461	19,099	6,669
2018	14,126	83	14,208	19,803	-7	-357	19,439	5,230
2019	14,126	125	14,251	20,032	0	-253	19,779	5,528
2020	14,126	167	14,293	20,260	8	-149	20,119	5,826
2021	14,126	210	14,335	20,488	16	-45	20,459	6,124
2022	14,126	252	14,378	20,717	23	59	20,799	6,422
2023	30,286	306	30,591	19,154	101	99	19,355	-11,237
2024	30,286	359	30,645	17,591	179	140	17,910	-12,735
2025	30,286	413	30,698	16,028	257	180	16,465	-14,233
2026	30,286	466	30,752	14,465	335	220	15,020	-15,732
2027	30,286	520	30,805	12,902	413	260	13,575	-17,230
2028		555	555	12,902	413	260	13,575	13,020
2029		573	573	12,902	413	260	13,575	13,002
2030		591	591	12,902	413	260	13,575	12,984
2031		609	609	12,902	413	260	13,575	12,966
2032		627	627	12,902	413	260	13,575	12,948
2033		645	645	12,902	413	260	13,575	12,930
2034		663	663	12,902	413	260	13,575	12,912
2035		681	681	12,902	413	260	13,575	12,894
2036		699	699	12,902	413	260	13,575	12,876
2037	-137,981	698	-137,282	12,902	413	260	13,575	150,857
Total	146,020	9,366	155,385	369,185	5,409	1,373	375,968	220,582
NPV	68,714	1,201	81,388	89,941	547	-644	89,845	8,456
B/C	Discount rate 12%							1.10
EIRR								17.8%

Source: JICA Study Team

Indicator	Results
Economic Internal of Return (EIRR)	17.8 percent
B/C (Benefit/cost ratio, 12 % discount rate)	1.10
NPV (Net present value, 12% discount rate)	8,456 million LE

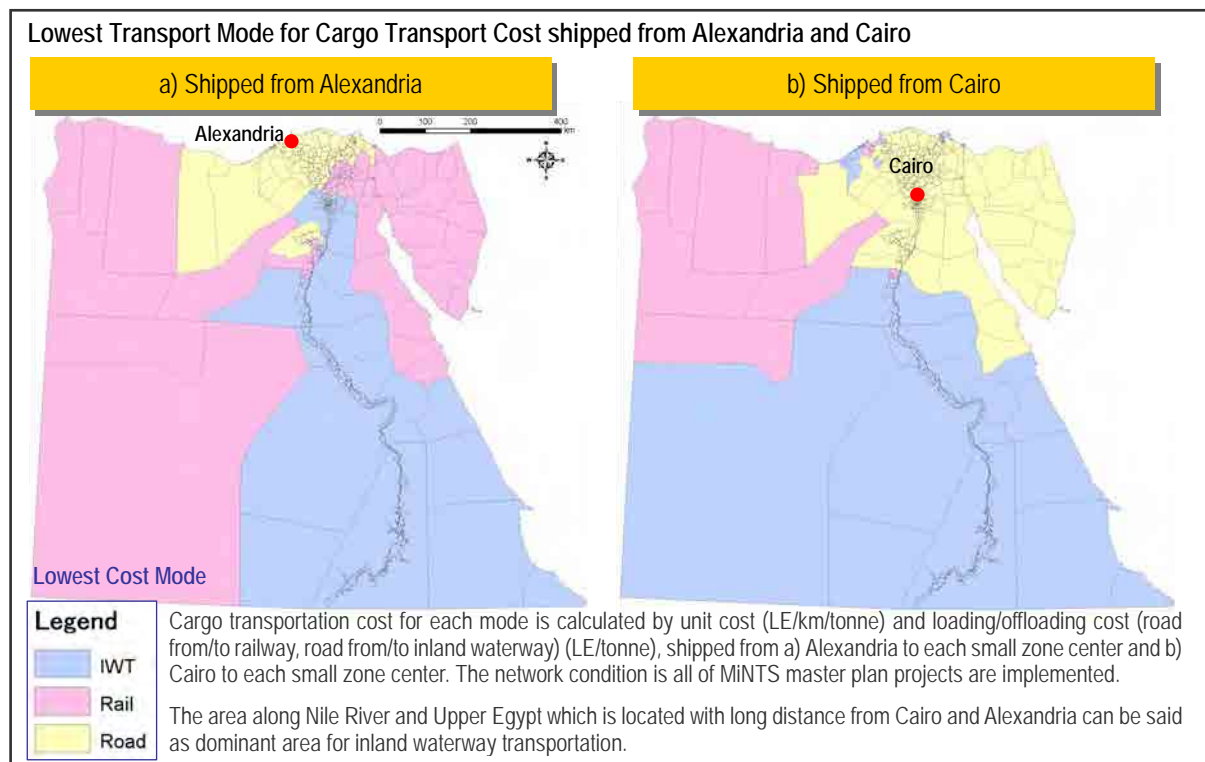
Sensitivity Case	Base Case	Benefits : -10%	Costs: +10%	Benefits: -10% & Costs: +10%
NPV	8,456	-542	422	-8,561
B/C	1.10	0.99	1.00	0.90
EIRR	17.8%	11.7%	12.2%	8.6%

Source: JICA Study Team



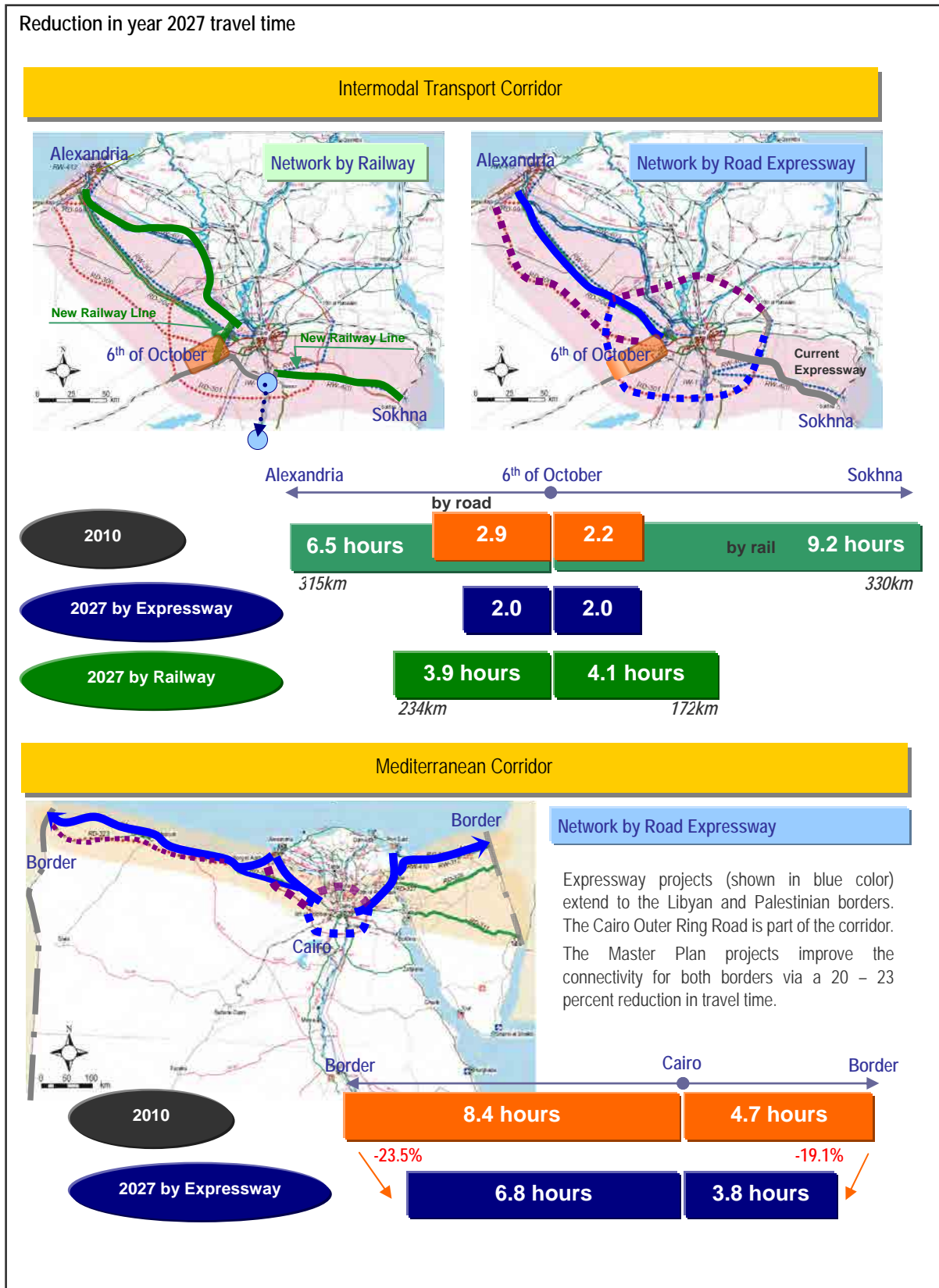
Source: JICA Study Team

Figure 11.3.1 Enhanced Mobility Consideration



Source: JICA Study Team

Figure 11.3.2 Market Competition for Cargo Transport



- Improved travel opportunities by assessing the implications of reduced trip time catalyzed by the ITC and Mediterranean corridors. Considerable corridor-specific improvements are foreseen. In case of the ITC, as an example, current rail shipments to Sokhna port consume some 9.2 hours. However, this is anticipated to be reduced by more than half to some 4.1 hours due to improved services and reduced trip distance. In case of the Mediterranean Corridor, trips from Cairo to the Libyan border are expected to be reduced from the current 8.4 hours to some 6.8 hours.

11.4 RECOMMENDATION ON FEASIBILITY AND FOLLOW-ON STUDIES

11.4.1 A Short-list of Four Initiatives

It is recommended that four initiatives be immediately considered due to their critical importance for the realization of the nationwide integrated transport system in Egypt. The nominated projects and programs include not only hardware (infrastructure development), but also software and humanware initiatives. All have been ranked highly as part of the multi-criteria analysis.

- Egypt Transport Center;
- Intermodal Transport Corridor;
- Road Maintenance and Safety; and,
- Mediterranean Corridor .

11.4.2 Egypt Transport Center

As discussed in Chapter 8 (Software Opportunities), the Egypt Transport Center (Project SW-1) will play a crucial role in the enhancement and development of transport planning in Egypt.

Core initial activities during the immediate action stage of the Egypt Transport Center would be maintain and enhance the MiNTS national transport model; maintain and expand the MiNTS national geodatabase; carry out Ministry-wide transport studies and reviews; create "smart systems" for on-going data monitoring; humanware development; road safety systems and similar initiatives. The focus can address both national (MiNTS) and urban matters. In the latter case, this could include re-activating the recent CREATS (Cairo Regional Area Transport Study) computerized transport model/database and monitoring of urban transport systems to include, for example, performance of the expanding Cairo metro network.

The Center should be realized within the institutional framework of the Ministry of Transport. Initial important steps are establishing the framework for structuring of the Center and recruitment of sufficient numbers of staff having suitable professional capabilities. Both domestic or international resources, from within and external to the Ministry of Transport, must be marshalled for these purposes. The Ministry of Transport should concurrently seek the cooperation of domestic academies, institutions of higher learning and international organization for technical support.

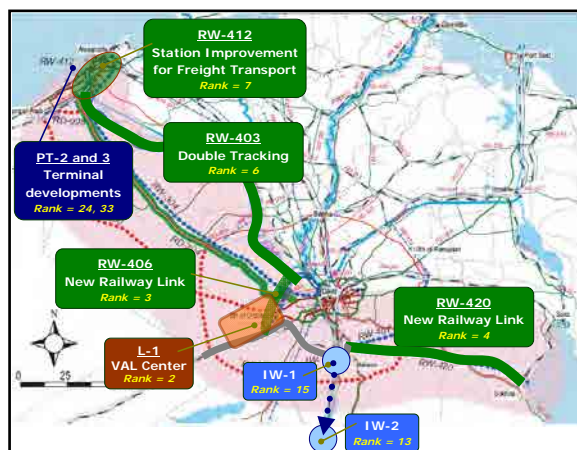
11.4.3 Intermodal Transport Corridor

The highest ranked hardware package is the Intermodal Transport Corridor. This is a new sector for value added logistics services with projects as shown in Figure 11.4.1. This package is roughly estimated to total

approximately 16.0 billion LE (10.7 billion LE for railways, 2.0 billion for inland waterways, 2.2 billion for ports, and other associated works).

A follow-on feasibility study for realizing the ITC should include:

- “Road Mapping” toward realization of this corridor with several types of investments for infrastructure and logistics service developments. Legal and administrative issues will need to be explored, clarified and put in place. It will be necessary to discuss amongst, and seek consensus of, possible stakeholders for the creation of integrated plans. These will form the framework for possible investors, as well as future demand and logistics markets after realization of the corridor concept.



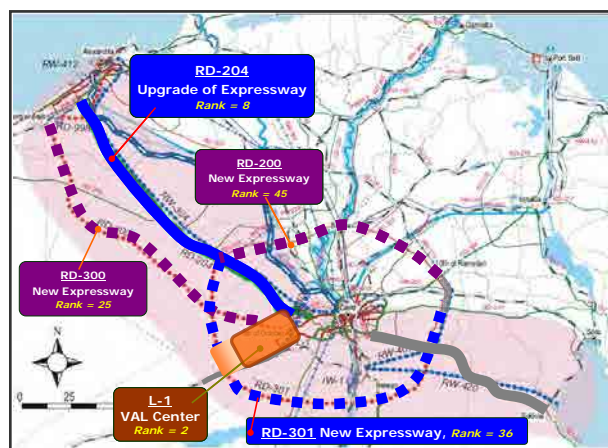
Source: JICA Study Team

Figure 11.4.1 ITC Projects Grouping

- Detailed investigations to confirm the viability of individual and grouped projects across a spectrum of locational, technical, environmental and financial considerations. A key initial element is siting of the 6th October VAL center given that several possible locations exist. The dedicated railway lines and VAL Center offer strong potential for private sector participation. An enhanced focus, using detailed viability approaches, should therefore be dedicated to PPP activities.

Close coordination with latest EU initiatives, to include the Mediterranean Motorways of the Seas (MEDA-MOS), will need to be maintained throughout the conduct of the feasibility study.

The road network, despite the anticipated renaissance of the rail and inland waterway modes, is expected to continue playing a pivotal role in providing national mobility. That is, underpinning opportunities for social and economic growth. This is particularly so in areas where rail and inland waterway infrastructure is limited or non-existent. Figure 11.4.2 depicts the expressway network underpinning the ITC corridor. Facilities include the existing Sokhna Expressway (linking Sokhna Port and metropolitan Cairo) as well as enhanced connections with the planned Cairo Outer Ring Road (southern arc).



Source: JICA Study Team

Figure 11.4.2 ITC Expressway Content

Some alignment and design concept differences among the road, rail and inland waterway modes invariable exist at this master planning level of detail. Ancillary issues, such as precise location of the VAL

Center, and broader urban planning implications¹ associated with the ITC, require further review and discussion. A likely venue for such investigations would be follow-on review and/or feasibility studies.

11.4.4 Road Maintenance and Road Safety Initiatives

Software Project 4 (Road Safety Initiative) and Humanware Project 3 (Training in Modern Road Maintenance Techniques) are ranked highly.

Core elements of a **road safety assessment and action plan** should include:

- Identify a lead agency in government to guide the national road safety effort. While the Ministry of Interior (the Police) at present has considerable responsibilities in this area, a lead agency would have legal authority to make decisions, control resources, coordinate the efforts of all participating sectors of government and liaise with non-governmental entities.
- Assess the current issues, constraints and opportunities within the sector. Part and parcel of this element would be options for enhancing data availability to include automated procedures for information recording, detailed to the site level of detail (“black spot reporting”).
- Prepare a national strategy and Plan of Action. This emphasizes the multisectorial and multidisciplinary dimensions of the task, engaging a broad range of stakeholders. A national strategy in road safety should also be linked with strategies in other sectors, and set safety targets complemented by a plan of action designed to achieve those targets.
- Implement specific actions and interventions to prevent road crashes as well as minimize injuries and fatalities. In essence, this is the implementation of the Plan of Action and would include a variety of initiatives.
- Support a sustainable approach to road safety, by having available dedicated funding sources to support continuous activity by the designated lead agency, and to enhance cooperation with international agencies to participate in global plans of action and safety initiatives.

The primary focus of **road network management** is to foster development of a road network that is fundamental to national evolution and development. Network management includes the challenge which has been to promote policy reforms aimed at sustaining road networks and preserving road assets. In other words, to maximize the condition of existing roads prior to expending limited capital resources to build additional infrastructure. Road maintenance reforms are to be built on three pillars: improved road maintenance financing, improved road maintenance management capacity and improved execution capacity. Formulation should be undertaken to review the legal and institutional framework for road agencies in Egypt. The purpose of the follow-on work is to:

- Assess the legal and institutional framework under which road agencies operate with a view to identifying some of the common features which may indicate good practice for others to subsequently follow. The task is also to unearth specific approaches taken in some countries which may not as yet have been universally adopted, but which may merit further consideration.

¹ Refer, for example, *Cairo Vision 2050 – The Strategic Urban Development Plan of Greater Cairo Region*, GOPP, Ministry of Housing, Utilities and Urban Communities, 2010 (with updates), for initial considerations in this regard.

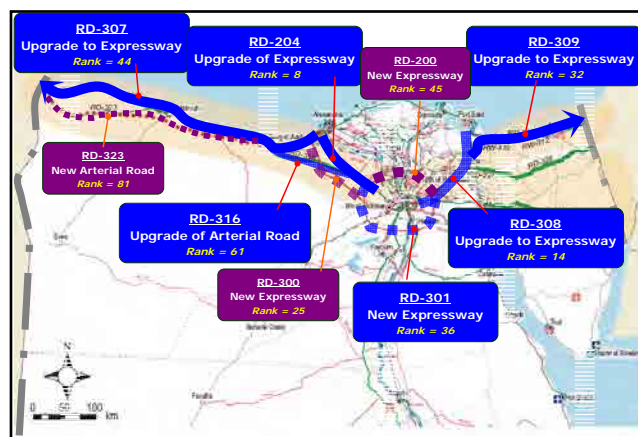
- Assess the performance of road administrations and the impact of the changes in the institutional framework for road maintenance; and
- Provide guidelines to improve performance of road institutions and efficiency of the institutional framework for road maintenance.

It is urged that both SW-4 and HW-3 should be the subject of follow-on reviews and initiatives.

11.4.5 Mediterranean Corridor

Figure 11.4.3 shows the expressway package for establishment of the Mediterranean Corridor network. Costs for high-order roads are estimated at approximately 15 billion LE. The feeder and supporting secondary road network will require an additional outlay of 11.4 billion LE.

The corridor is seen as fulfilling a number of domestic functions, including services to planned new settlements and contributing to the alleviation of current congestion in the Nile Delta. The corridor includes realization of key links of the Cairo Outer Ring Road. The international linkages of the corridor will provide a strong foundation for realization of the Republic's regional international aspirations. The core road network consists of expressways; hence exhibits considerable potential for private sector participation.

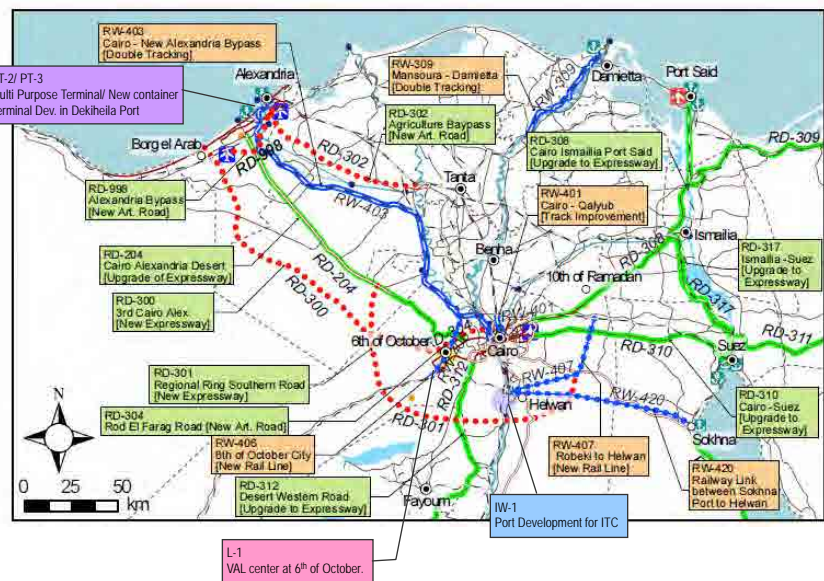
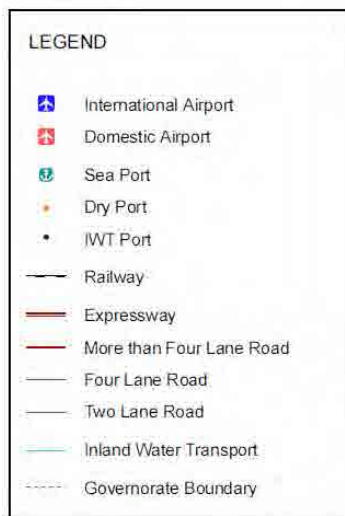
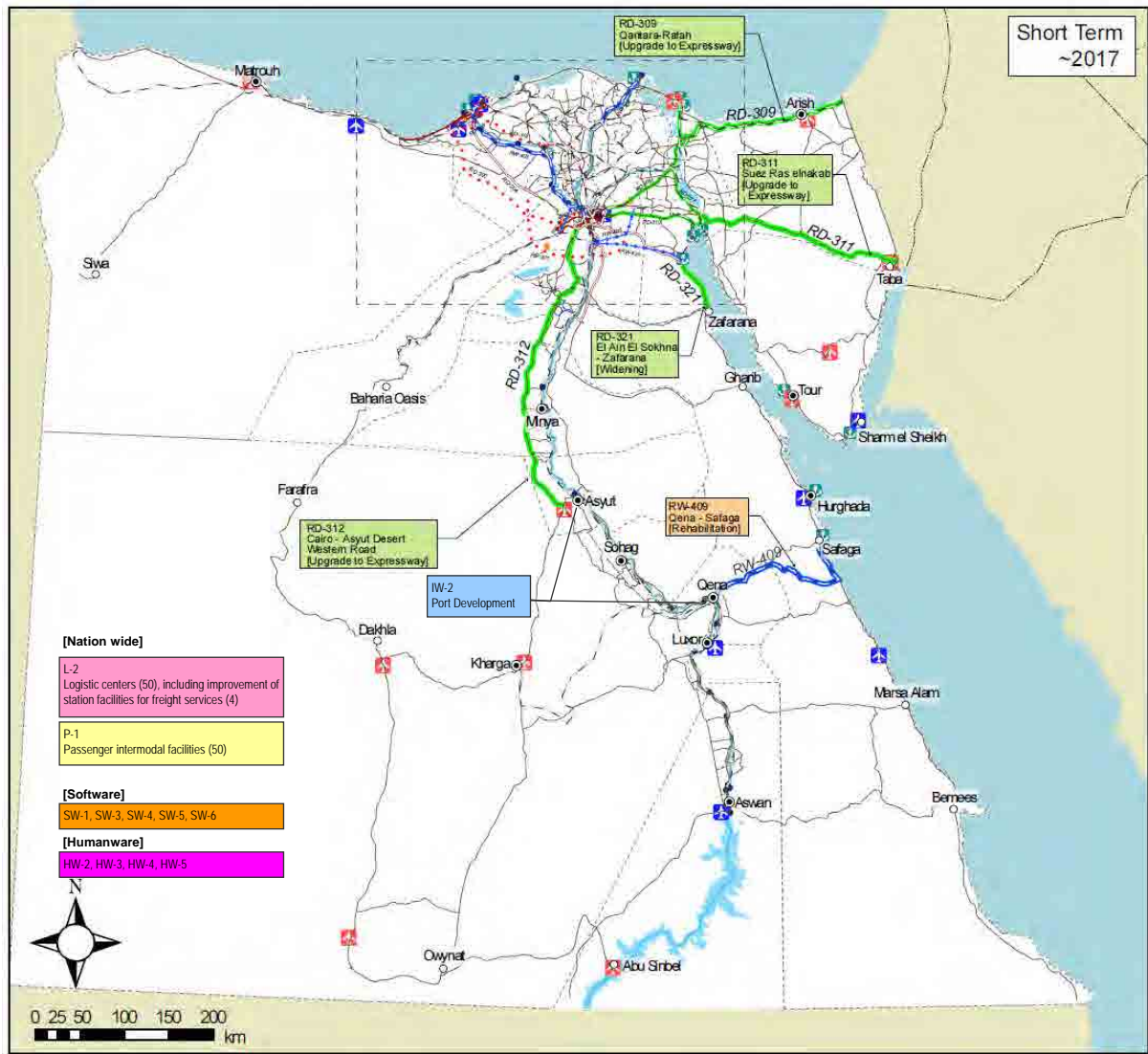


Source: JICA Study Team

Figure 11.4.3 Mediterranean Corridor Projects Grouping

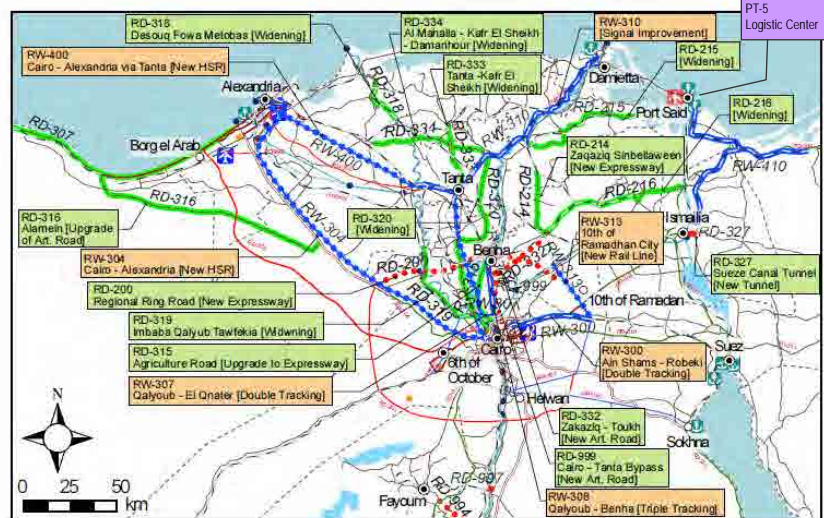
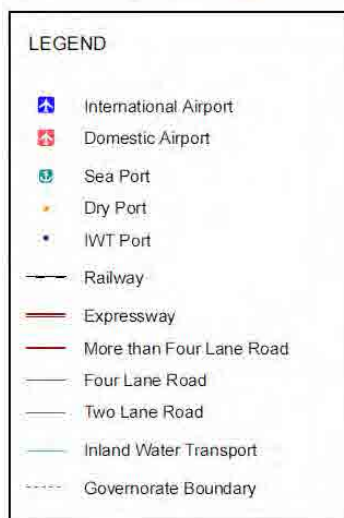
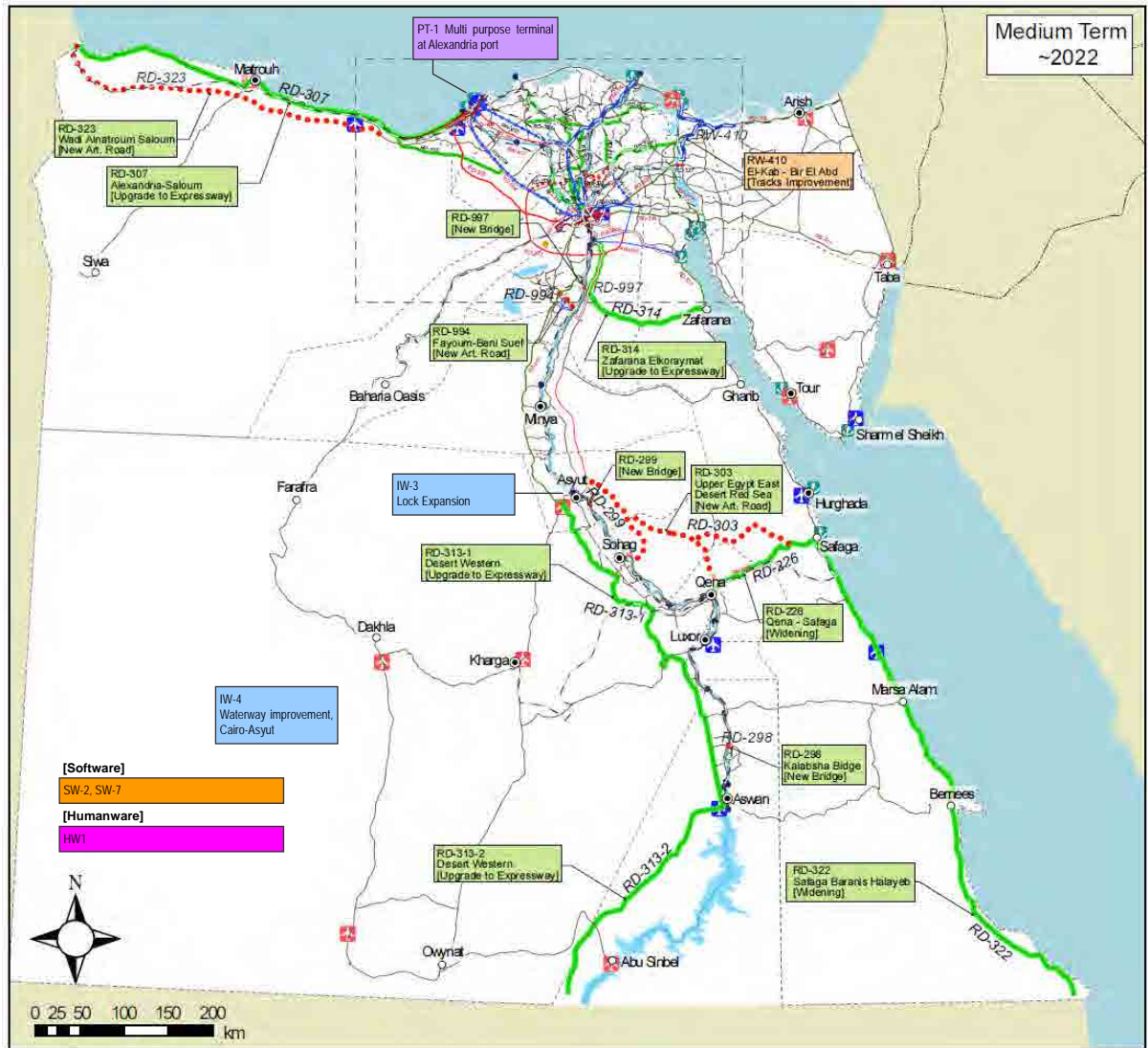
It is recommended that the Mediterranean Corridor projects grouping proceed to further feasibility study. Efforts should include the definition of more precise alignments, and cost implications arising therefrom. External issues such as the Qattara Depression, more precise locations of new settlements, World War II minefields, and soil conditions must be considered. International land transport implications within both the Libyan and Palestinian context must be considered, as well as the broader Mediterranean road network building program (such as the MEDA network). The feasibility review should also offer opportunity for more precise and numeric indicators involving possible PPP activities.

Annex 1: Short-Term Projects [Hardware, Software and Humanware Projects]



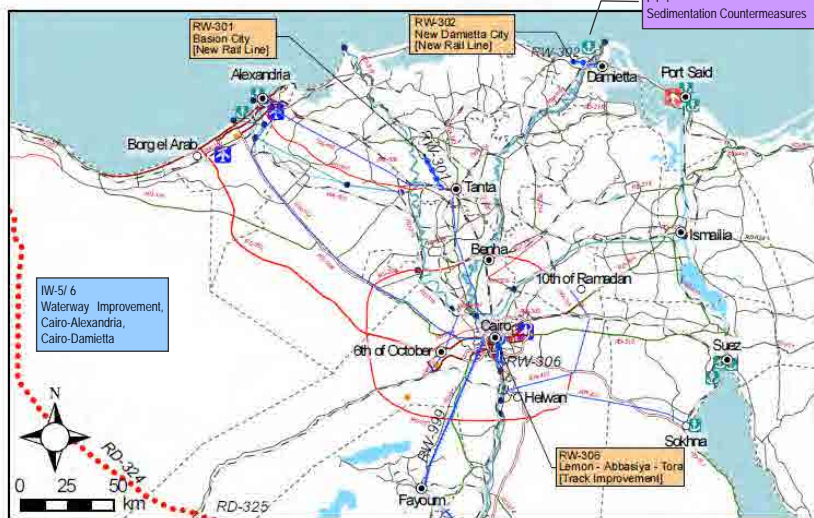
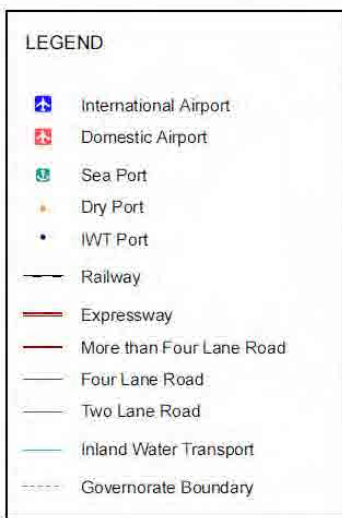
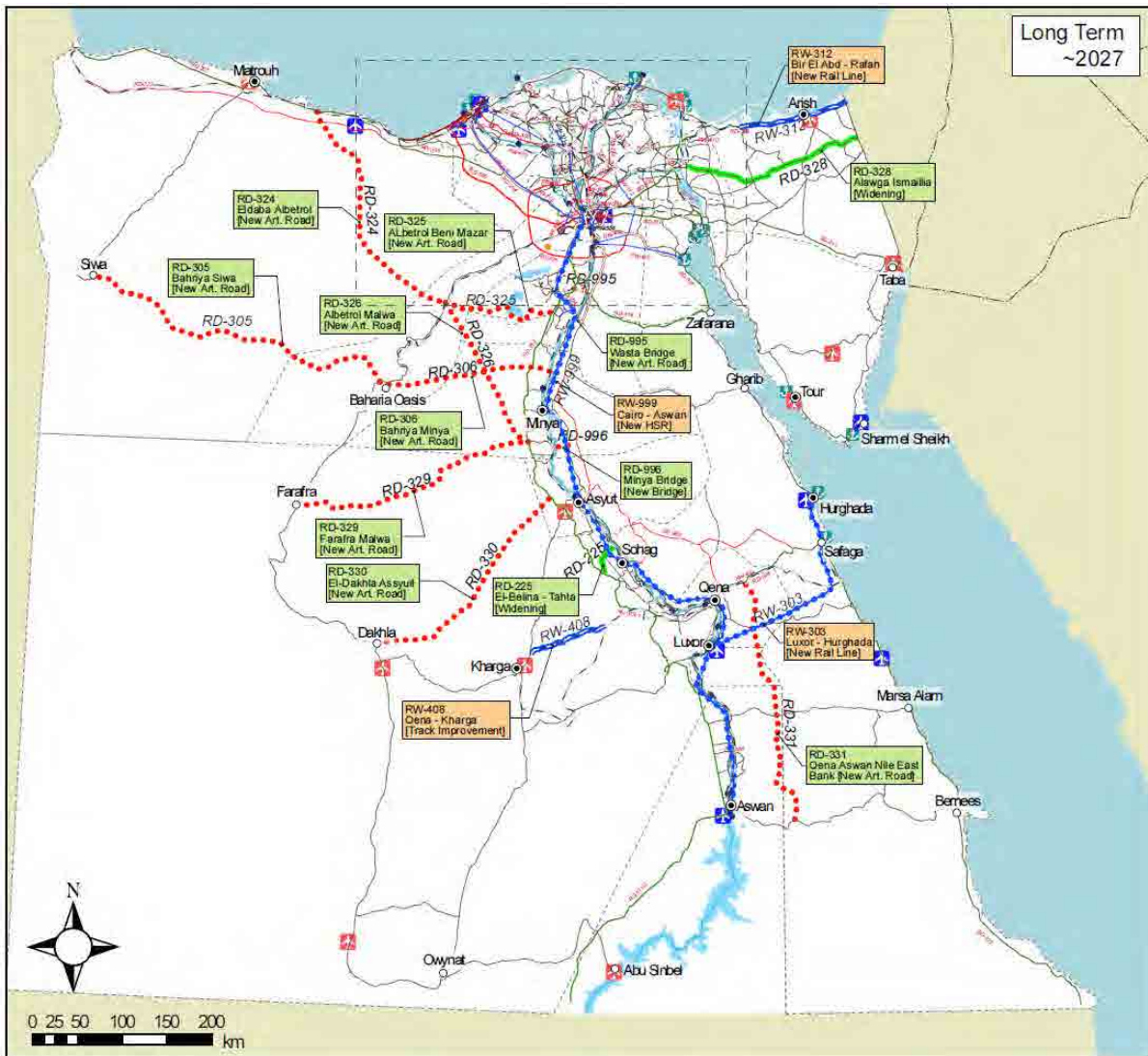
Note: Project details can be referred by project code number in chapter 6, Hardware opportunities, chapter 7, Humanware opportunities and chapter 8, Software opportunities.

Annex 2: Mid-Term Projects [Hardware, Software and Humanware Projects]



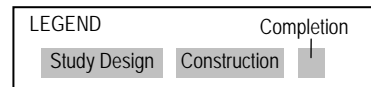
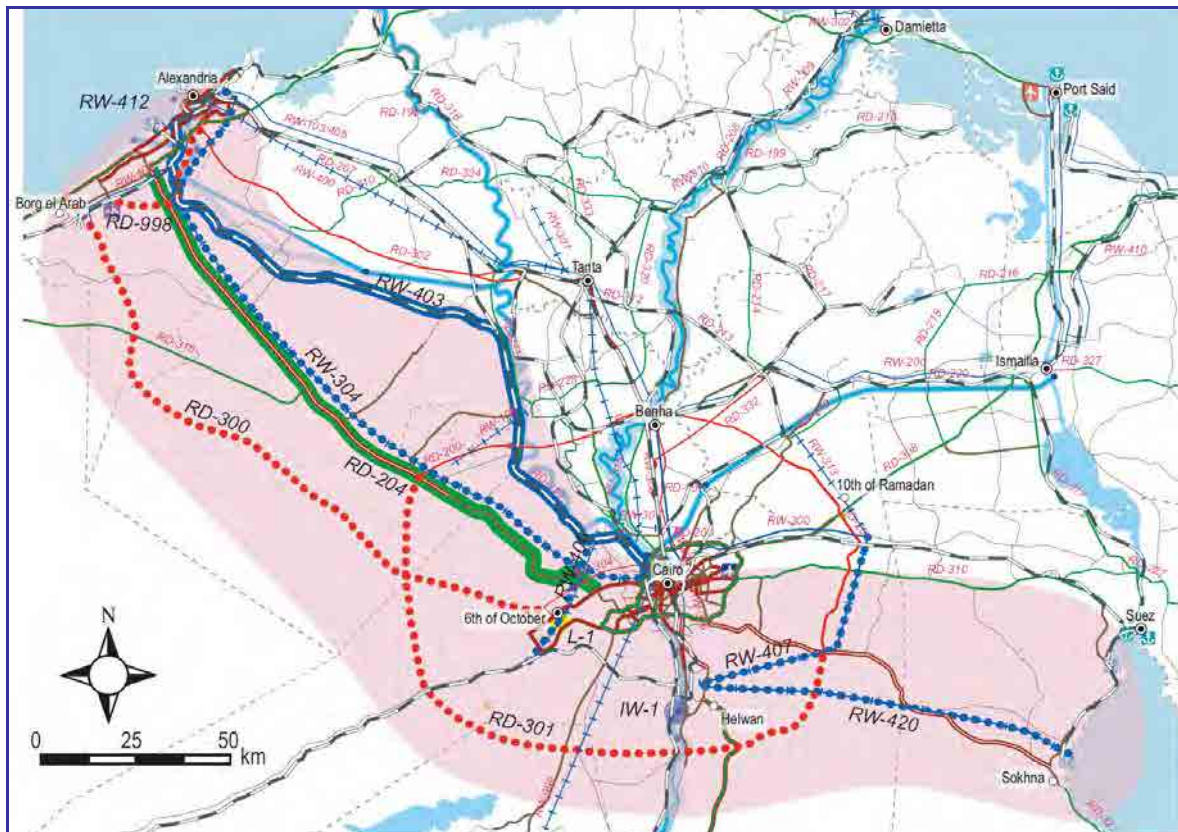
Note: Project details can be referred by project code number in chapter 6, Hardware opportunities, chapter 7, Humanware opportunities and chapter 8, Software opportunities.

Annex 3: Long-Term Projects [Hardware Projects]



Note: Project details can be referred by project code number in chapter 6, Hardware opportunities.

Annex 4: Master Plan for "Intermodal Transport Corridor"



ID	NAME	Master Plan		
		Short	Mid	Long
RD-300	3rd Cairo Alex Expressway	■■■■■		
RD-204	Cairo Alexandria Desert Expressway (Upgrade to 8-lanes)	■■■■■		
RD-301	3rd Stage Regional Ring Road (Southern Part of Expressway)	■■■■■		
RD-998	Alexandria Bypass	■■■■■		
RW-403	Double Tracking of Bypass Line for Cairo - New Alexandria	■■■■■		
RW-406	Railway Link for 6th of October City	■■■■■		
RW-407	Railway Link between Robeki to Helwan	■■■■■		
RW-412	Improvement of Station Facilities for Freight Services (2stations)	■■■■■		
RW-420	Railway Link between Sokhna Port to Helwan	■■■■■		
RW-304	High Speed Railway for Cairo - Alexandria [High/Higher speed Alt-1]		■■■■■	
L-1	VAL (Value Added Logistics) Center at 6 th of October City	■■■■■		
IW-1	IWT port for ITC	■■■■■		
IW-5	Waterway Improvement on Cairo - Alexandria			■■■■■
PT-1	Establishment of a Multi Purpose Terminal (Containers and General Cargo) at Alexandria Port		■■■■■	
PT-2	Development of Management and Operation for Multi Purpose Terminal in El Dekheila Port	■■■■■		
PT-3	Dekheira Port: New Container Terminal	■■■■■		

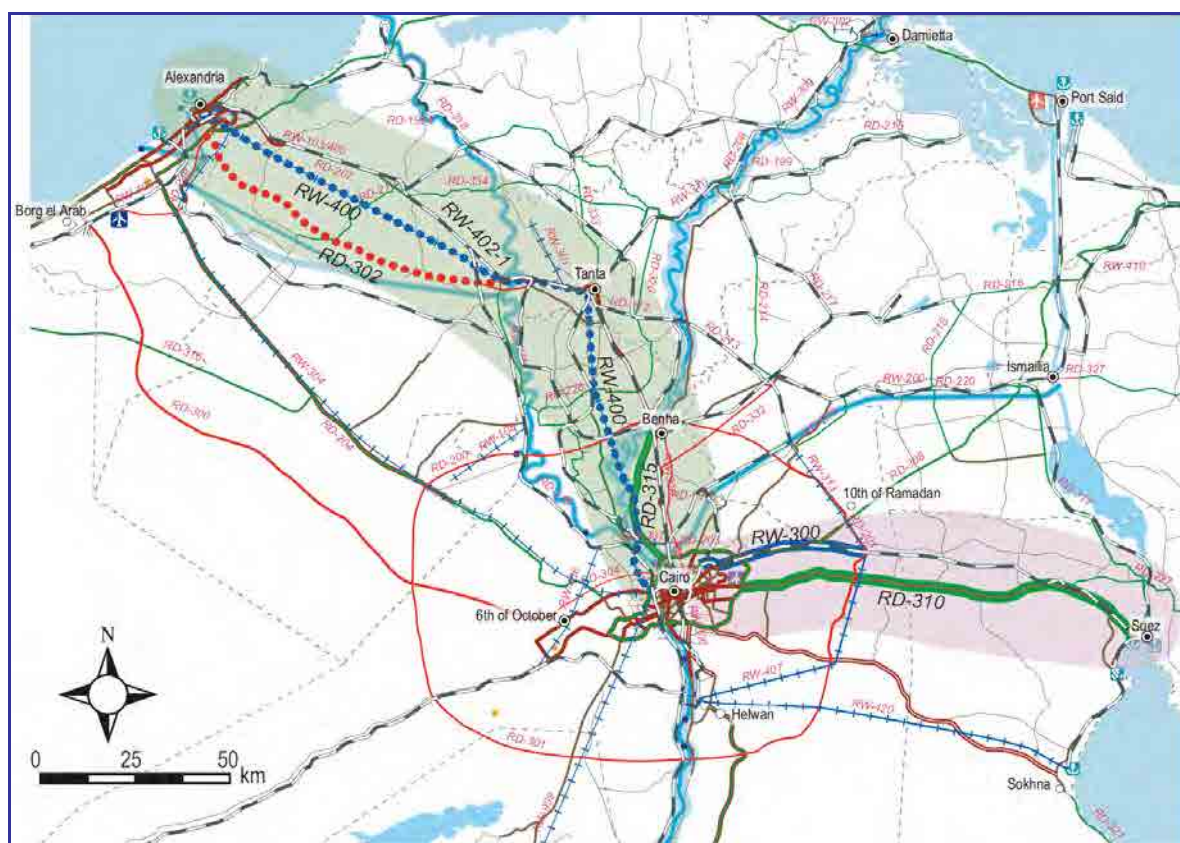
Annex 5: Master Plan for “Cairo-Damietta/Port Said Corridor”



LEGEND		Completion
Study Design	Construction	

ID	NAME	Master Plan		
		Short	Mid	Long
RD-308	Cairo Ismailia Port Said Road (Expressway)	■ ■ ■ ■ ■		
RW-313	Railway Link for 10th of Ramadhan City		■ ■ ■ ■ ■	
RW-302	Single Tracking for Kafr El-Batikh - New Damietta City			■ ■ ■ ■ ■
RW-309	Double Tracking for Mansoura - Damietta	■ ■ ■ ■ ■		
RW-310	Improvement of Signaling System for Increase of Freight Trains		■ ■ ■ ■ ■	
RW-402-2	Improvement of Tracks		■ ■ ■ ■ ■	
IW-6	Waterway Improvement on Cairo - Damietta			■ ■ ■ ■ ■
PT-4	Damietta Port; Study on Sedimentation problem	■		■ ■ ■ ■ ■
PT-5	Port Said East: Logistic Center		■ ■ ■ ■ ■	

Annex 6: Master Plan for "Cairo-Alexandria Corridor and Cairo-Suez Corridor"



LEGEND		Completion
	Study Design	
	Construction	

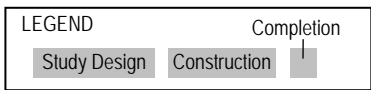
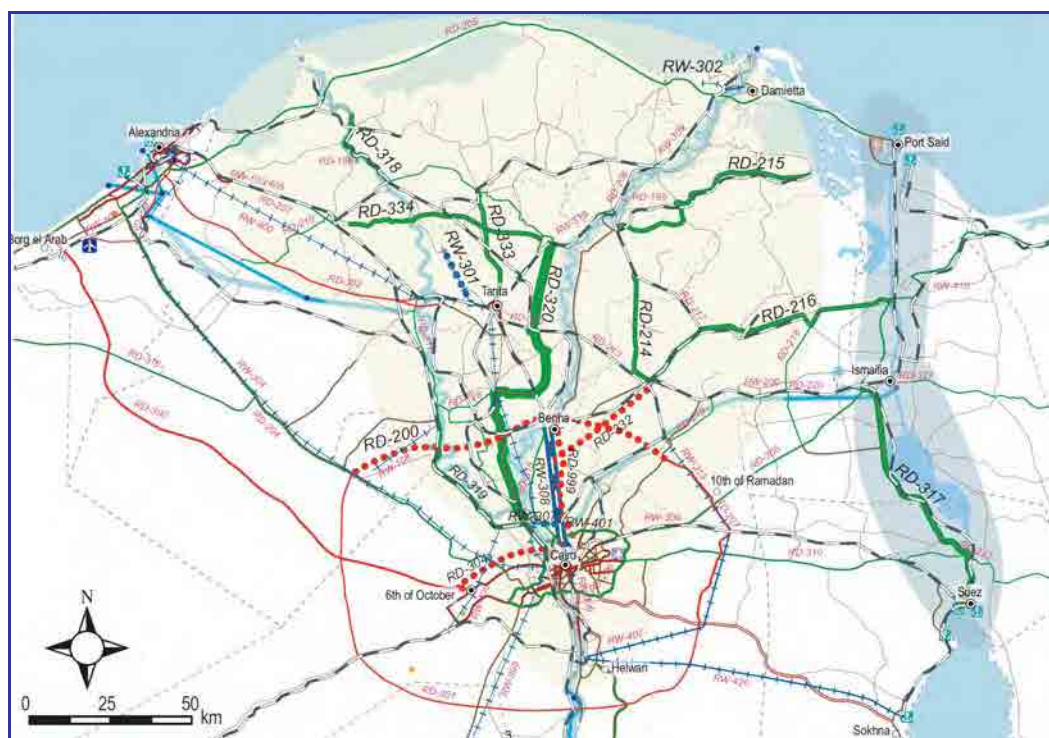
Cairo-Alexandria Corridor

ID	NAME	Short		
		Short	Mid	Long
RD-302	Cairo Alex Agriculture Bypass Kafr El Zayat - Alexandria			
RD-315	Shubra elkhema - Banha Agriculture Road (Expressway)			
RW-402-1	Improvement of Tracks			

Cairo-Suez Corridor

ID	NAME	Master Plan		
		Short	Mid	Long
RD-310	Cairo -Suez Road (Expressway)			
RW-300	Double Tracking for Ain Shams - Robeki			

Annex 7: Master Plan for “Inland Delta and Suez Canal Development Corridor”



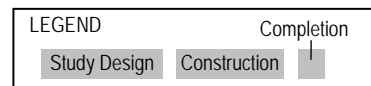
Inland Delta Corridors

ID	NAME	Master Plan		
		Short	Mid	Long
RD-999	Cairo - Tanta Bypass		■ ■ ■ ■ ■	
RD-332	Zakaziq - Toukh		■ ■ ■ ■ ■	
RD-304	Rod El Farag Road	■ ■ ■ ■ ■		
RD-333	Tanta - Kafr El Sheikh		■ ■ ■ ■ ■	
RD-334	Al Mahalla - Kafr El Sheikh - Damanhour		■ ■ ■ ■ ■	
RD-318	Desouq Fowa Metobas Road		■ ■ ■ ■ ■	
RD-319	Imbaba Qalyub Tawfekia Road		■ ■ ■ ■ ■	
RD-320	El-Qanater El-Bagour Shebin El-Koum Tanta Mahalla Matboul Road		■ ■ ■ ■ ■	
RD-200	Belbeis-Banha-El Bagour-El Khatatba Regional Ring Road		■ ■ ■ ■ ■	
RD-214	Zaqaziq Sinbellaween Road		■ ■ ■ ■ ■	
RD-215	Mansoura Talha Dekernes Mataria Road		■ ■ ■ ■ ■	
RD-216	Qantara Salheya Faqous Abu Kbeir Hehya Zaqaziq Road		■ ■ ■ ■ ■	
RW-301	Single Tracking for Basion City			■ ■ ■ ■ ■
RW-307	Double Tracking for Qalyoub - El Qnater			■ ■ ■ ■ ■
RW-308	Triple Tracking for Qalyoub - Benha			■ ■ ■ ■ ■
RW-401	Improvement of Track Arrangement for Cairo - Qalyub	■ ■ ■ ■ ■		

Suez Canal Development Corridor

RD-317	Ismailia Suez Road (Expressway)	■ ■ ■ ■ ■		
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Annex 8: Master Plan for “Mediterranean Corridor and Sinai Corridor”



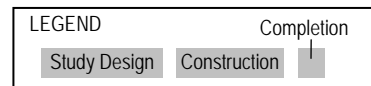
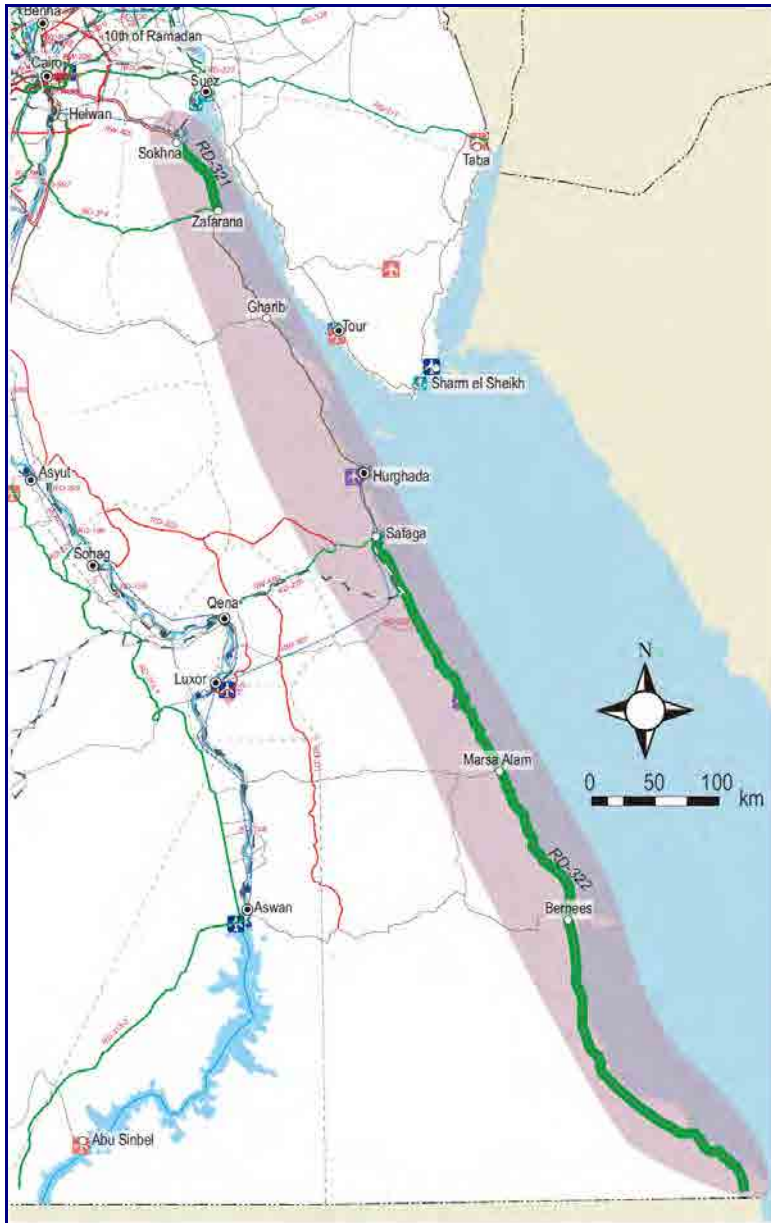
Mediterranean Corridor

ID	NAME	Master Plan		
		Short	Mid	Long
RD-323	Wadi Alnatroum Saloum Road		█	
RD-307	Alexandria-Saloum Road		█	
RD-309	Qantara-Rafah Road	█		
RD-316	Alamein Road		█	
RW-312	Single Tracking for Bir El Abd - Rafah			█
RW-410	Rehabilitation of Tracks for El-Kab - Bir El Abd		█	

Sinai Corridor

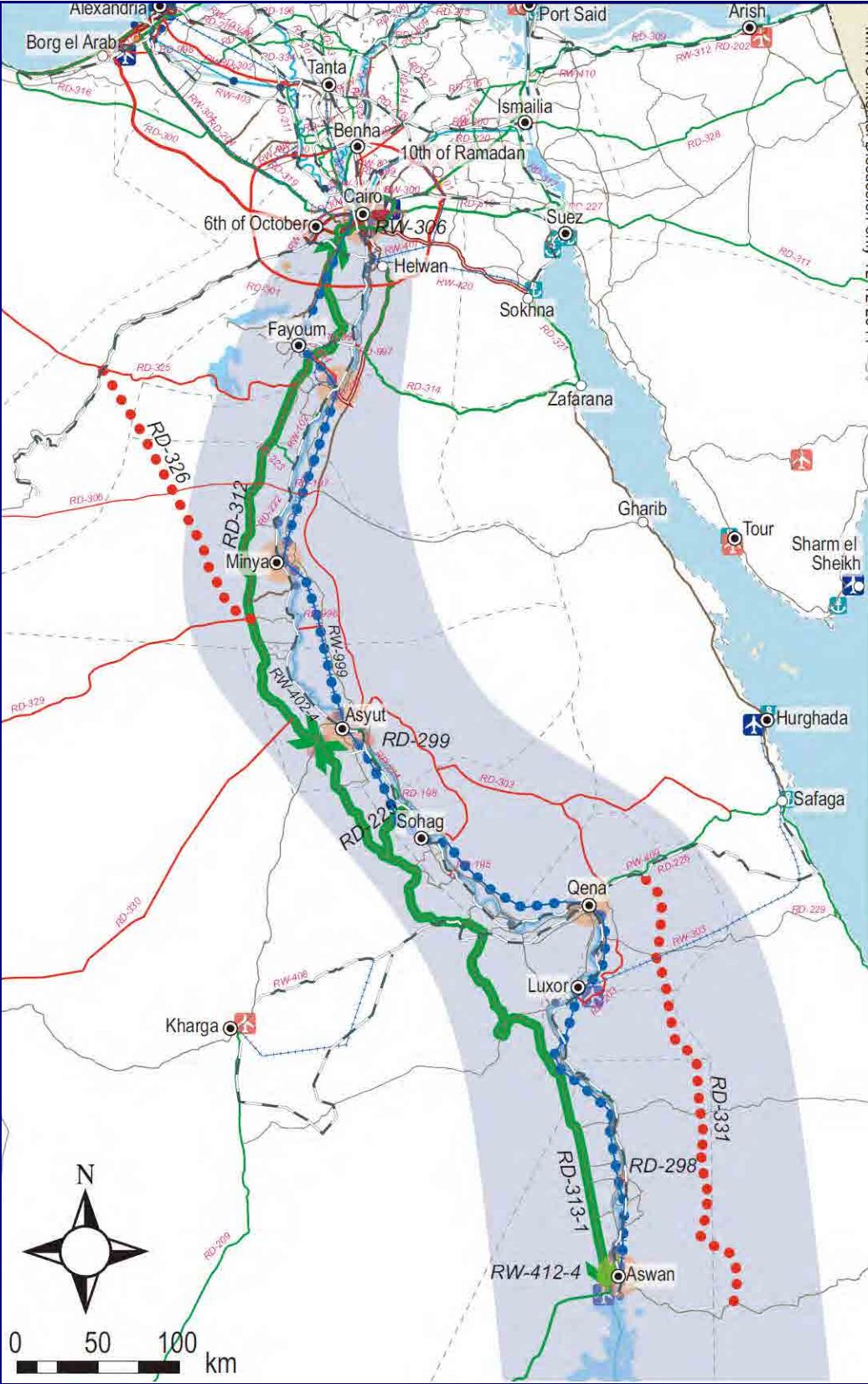
ID	NAME	Master Plan		
		Short	Mid	Long
RD-311	Suez Ras elnakab Road (Expressway)	█		
RD-327	Suez Canal Tunnel Ismailia		█	
RD-328	Alawga Ismailia Road			█

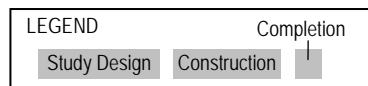
Annex 9: Master Plan for “Red Sea Corridor”



ID	NAME	Master Plan		
		Short	Mid	Long
RD-321	El Ain El Sokhna - Zafarana Road	■■■■■		
RD-322	Safaga Baranis Halayeb Road		■■■■■	

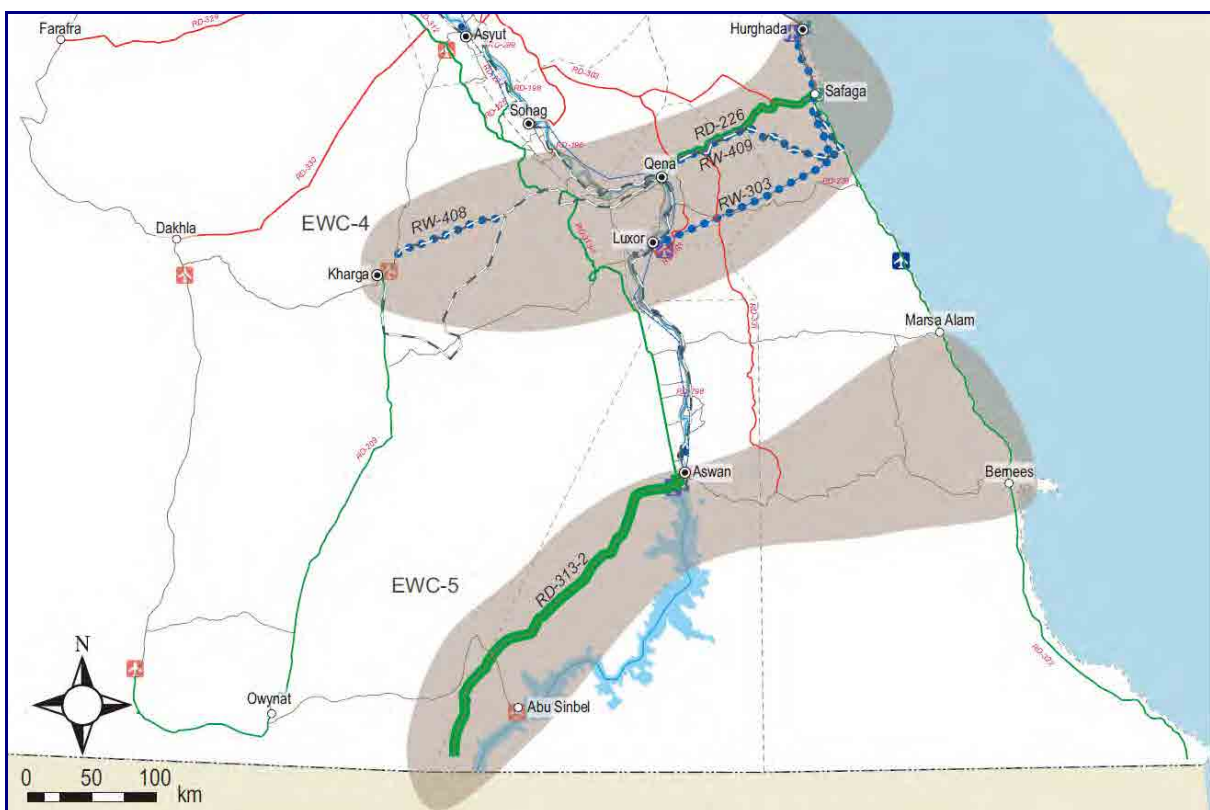
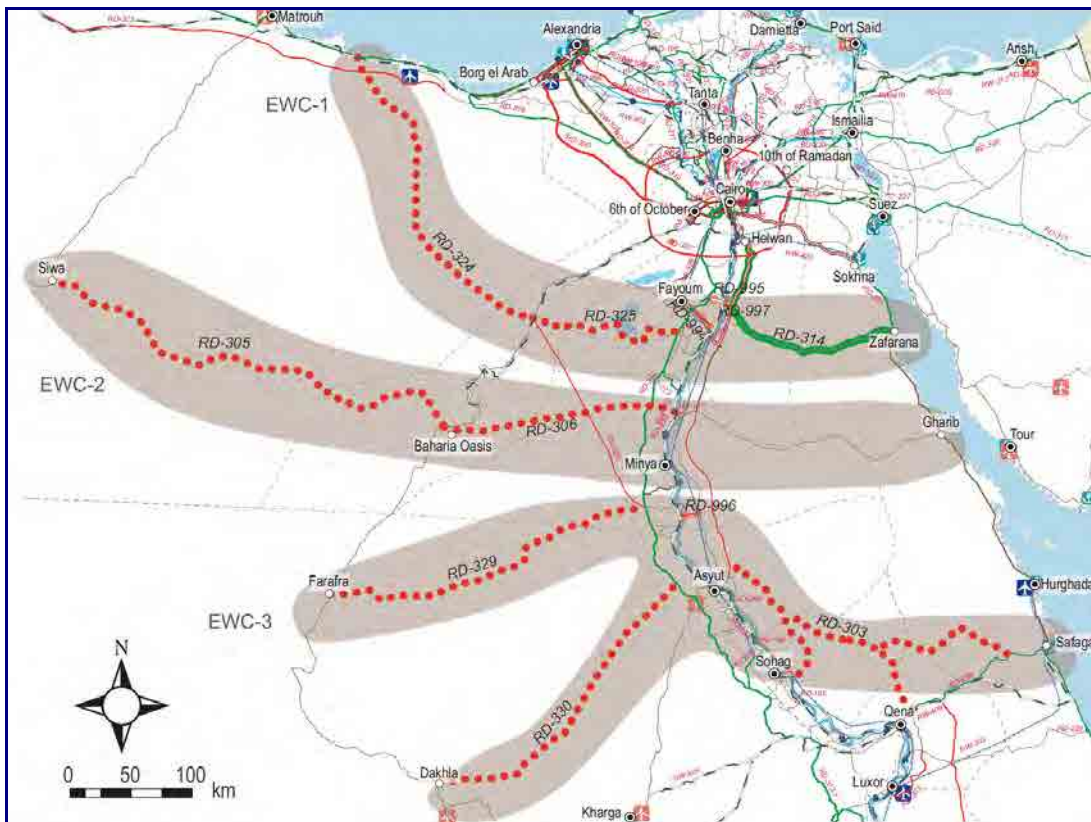
Annex 10: Master Plan for "Upper Egypt Corridor"





ID	NAME	Master Plan		
		Short	Mid	Long
RD-326	Albetrol Malwa Road			
RD-331	Qena Aswan Nile East Bank Road			
RD-312	Cairo - Asyut Desert Western Road (Expressway)			
RD-313-1	Asyut Aswan Abu simble Desert Western Road (Expressway) Asyut to Aswan			
RD-225	El-Belina - Tahta Road			
RD-298	Kalabsha Bridge (Koum Ombo) (Aswan)			
RD-299	Abo Tig Bridge and Selim Coast (Asyut)			
RW-999	High Speed Railway for Cairo - Aswan [Electrificated]			
	Cairo – Asyut			
	Asyut – Luxor			
	Luxor - Aswan			
RW-306	Development of Railway Bridge for Lemon - Abbasiya - Tora			
RW-402-4	Improvement of Tracks			
RW-412-4	Improvement of Station Facilities for Freight Services (6 stations)			
IW-2	IWT port improvement for Upper Egypt			
IW-3	Lock Expansion with Comprehensive Lock Operation Improvement			
IW-4	Waterway Improvement on Cairo - Asyut			

Annex 11: Master Plan for "East-West Corridors"



LEGEND		
Study Design	Construction	Completion

East-West Corridor 1

ID	NAME	Master Plan		
		Short	Mid	Long
RD-324	Eldaba Albetrol Road			
RD-325	ALbetrol Beni Mazar Road			
RD-994	Fayoum-Beni Suef Bypass			
RD-995	Wasta Bridge Connection			
RD-997	Helwan-Beni Suef Bridge			
RD-314	Zafarana Elkoraymat Road (Expressway)			

East-West Corridor 2

RD-305	Bahriya Siwa Road			
RD-306	Bahriya Minya Road			

East-West Corridor 3

RD-996	Minya Bridge			
RD-303	Upper Egypt East Desert Red Sea Road			
RD-329	Farafra Malwa Road			
RD-330	El-Dakhla Assyuit Road			

East-West Corridor 4

RD-226	Qena - Safaga Road			
RW-303	Single Tracking for Luxor - Hurghada [Electrified]			
RW-409	Rehabilitation of Tracks for Qena - Safaga			
RW-408	Rehabilitation of Tracks for Qena - Kharga			

East-West Corridor 5

RD-313-2	Asyut Aswan Abu simble Desert Western Road (Expressway) South part from Aswan			
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