The Programme for Infrastructure Development in Africa:
Transforming Africa through Modern Infrastructure

Programme for Infrastructure Development in Africa

Interconnecting, integrating and transforming a continent

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Africa Transport Sector
Phase III Report

Phase III Report
Transport

ACKNOWLEDGEMENTS

The completion of the Transport Sector Report and the Transport Outlook Report 2040 as part of the Programme for Infrastructure Development in Africa (PIDA) was a major milestone in defining Africa's performance and prospects in the transport sector. This helped to inform on the priority transport projects which are now an integral part of the project investment portfolio of the PIDA Priority Action Plan (PIDA-PAP) for the period up to 2020.

The support and collaboration of the Regional Economic Communities (RECs) and the Member States led not only to the success of PIDA, but also to ensuring that the ownership of PIDA rests with the RECs and Member States who are, ultimately, the drivers of PIDA as well as the beneficiaries.

The African Union Commission (AUC) would like to thank all those who were involved in the PIDA Study in particular, the African Development Bank (AfDB), the NEPAD Planning and Coordinating Agency (NPCA), the United Nations Economic Commission for Africa (UNECA) and Development Partners. Without their contribution and commitment, this landmark study would not have been possible.

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LIST OF ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
AFCAC	African Civil Aviation Commission
AFI	Africa-Indian Ocean
AMU/UMA	Arab Maghreb Union
ARTIN	African Regional Transport Infrastructure
ASEAN	Association of Southeast Asian Nations
ASECNA	Agency for Air Navigation Safety in Africa and Madagascar (Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar)
AUC	African Union Commission
BOT	Build Operate Transfer
CEN-SAD	Community of Sahel Saharan States
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community for West African States
EU	European Union
FESARTA	Federation of East and Southern African Road Transport Associations
GDP	Gross Domestic Product
ICT	Information and Communication Technologies
IFI	International Financial Institution
IGAD	Intergovernmental Authority for Development
JICA	Japan International Cooperation Agency
MoU	Memorandum of Understanding
NAPMA	North African Management Port Association
NEPAD	New Partnership for Africa's Development
NPCA	Nepad Planning and Coordinating Agency
OSBP	One Stop Border Post
PAP	Priority Action Plan
PIDA	Programme for Infrastructure Development in Africa
PMAWCA	Port Management Association of West and Central Africa
PMAESA	Port Management Association of Eastern and Southern Africa
PPP	Public Private Partnership

REC	Regional Economic Community
SADC	Southern African Development Community
SARA	Southern African Railway Association
TAH	TransAfrican Highway
TEU	Twenty-Foot Equivalent Unit
TGV	High Speed Train (Train à Grande Vitesse)
ToRs	Terms of Reference
UAR	Union of African Railways
UNECA	United Nations Economic Commission for Africa
WAEMU	West African Economic and Monetary Union
WARSO	West African Road Safety Organisation
YD	Yamoussoukro Decision

INTRODUCTION AND SCOPE OF THE REPORT

This is Phase III of the PIDA Study. The aim of Phase III is to present the findings of the PIDA Study in the transport sector.

The report covers four modes: road, rail, river and air. It was prepared at the continental and regional (REC) levels.

This Phase III Report builds on the Phase I and Phase 2 Reports and comprises:

- The Africa Transport Outlook 2040 (Chapter 1)
- The Strategic Framework for Transport (Chapter 2)
- The Infrastructure Development Programme with a Priority Action Plan 2012-2020 (Chapter 3)
- The Implementation Strategy and Processes (Chapter 4)

This Report was prepared taking into account the findings of the Africa Transport Outlook 2040, the conclusions of the workshop for discussion of the Transport Sector Brief held in Tunis on July 7-8, 2011 and the recommendation made during the four regional workshops held in September-October 2011.

1. KEY FINDINGS FROM AFRICA TRANSPORT OUTLOOK 2040

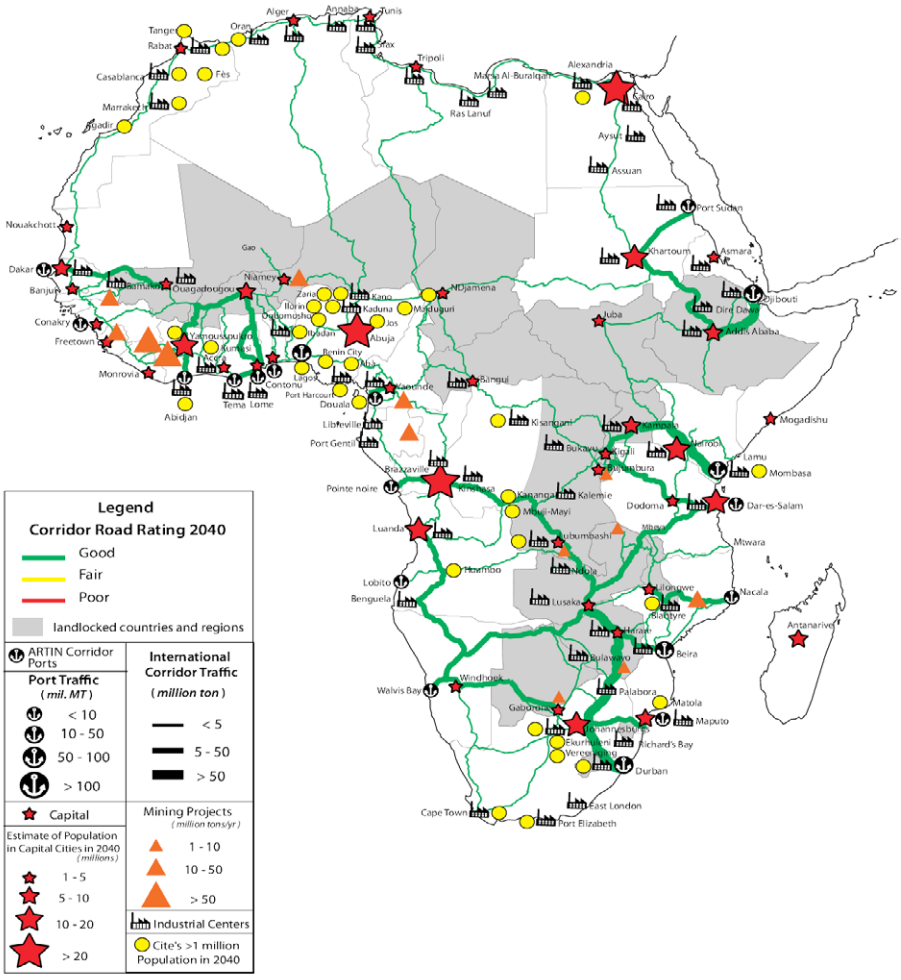
1.1 Africa Transport Outlook 2040

The Africa Transport Sector Outlook 2040 forecasts Africa's regional and continental transport demand in the short, medium and long term and identified the potential infrastructure gaps in the transport system. These forecasts took into account all policies affecting regional and continental transport, the existing infrastructure status and efficiency, planned improvements and the potential for efficiency gains.

1.1.1 African Regional Transport Infrastructure Network

The Africa Regional Transport Infrastructure Network (ARTIN) is a core network that serves the existing and future development poles of Africa, as shown in Figure 1. ARTIN's purpose is to link large African centers of consumption and production (large cities, mining centres, large agriculture production projects, and so on) with the rest of the world via modern and efficient regional transport infrastructure networks and gateways. It includes gateway corridors and airports serving the different regions with all modes (road, rail, river and lake – see Figure 2) that will be more and more utilized for regional integration as Africa develops according to the Abuja Treaty vision of a growing, self-sustained, competitive and regionally-integrated continent.

Figure 1: Relationship of ARTIN to Socio-Economic Development Poles



1.1.2 Drivers of Future Socio-Economic Demand for Transport

The PIDA Transport Outlook identified the drivers of transport demand as:

- Long-term, sustained GDP growth averaging 6.2% per year, resulting in a GDP of 5 to 6 times current GDP by 2040[1]
- Continued population growth averaging 2% per year leading to a total population of 1.8 billion by 2040
- Continuing rapid urbanization leading to the concentration of 55% of the continent's population in urban centers by 2040
- Increasing development of value-added industries replacing goods and services imported from overseas
- Greater regional integration as regional trade and transport shifts from overseas partners to regional partners and the effects of new customs unions are felt
- International trade volumes increasing at growth rates of 6-8% per year with higher growth rates for container traffic
- Increasing number of passenger trips (by land and air) as per capita incomes increase, and
- Increased efficiency of the ARTIN leading to the realization of suppressed demand

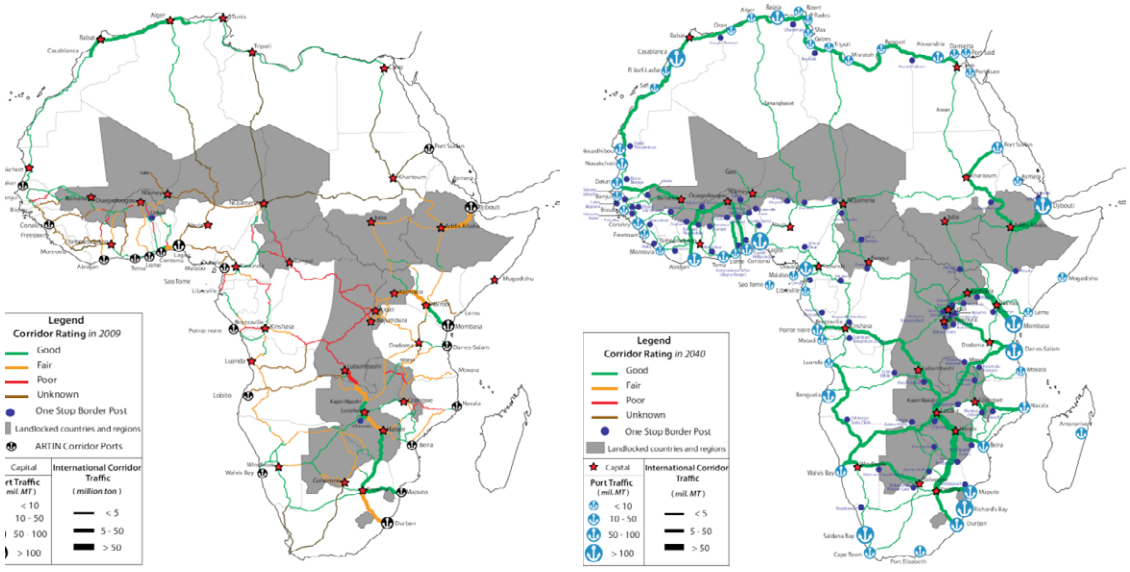
1.1.3 Demand for Transport Infrastructure through 2040

Due to these drivers: growth in Africa's population, economic output, and trade flows will combine through 2040 to raise demand at the regional and continental levels for freight transport, port facilities, and air passenger transport. In order to meet rising demands, it is necessary for:

- ARTIN corridors to achieve good efficiency and facilitate traffic migration to the most efficient corridors and modes, and
- ARTIN network owners and operators to adopt best practices from Africa and other regions of the world to reduce costs and increase service levels.

This is illustrated in Figure 2.

Figure 2: The ARTIN Corridors in 2009 and 2040



a. 2009 b. 2040

Source: Africa Transport Outlook 2040,

Over the next three decades, Africa's transport planners will have to deal with important changes in the transport environment. Demand presently suppressed by inefficiencies in the transport system will be unlocked by improvements in the system. Steady advances in regional integration will cause a shift from overseas trade to trade between/among countries within the same REC. Structural change in African economies will foster more value-added industries, changing the profile of goods traded and increasing regional integration. Also greater demand for intra-regional and inter-regional air travel will change future patterns of air transport demand.

1.1.4 Forecast Demand for Transport

Future freight transport demand in Africa is tied to growth in trade, which is expected to grow seven-fold (to 3.6 billion metric tons) over the next 30 years

[1] In terms of purchasing power parity (PPP).

(Table 1) as countries increase the value added of their exports through processing, consumers with rising incomes import more-expensive goods, and manufacturing and mining businesses import more expensive processing equipment.

Future port tonnage is expected to grow at 6% to 6.8% per year, excluding large new mining projects and crude oil, and at 6.8 to 7.8% per year including new mining projects.

Growth in container traffic is expected to outpace that of total tonnage. Container growth will average 10.6% per year to 2020 (including some suppressed demand released by corridor improvements) and 7.9% from 2020 to 2040 on a sustained basis (with all suppressed demand released). The net result will be an increase in container traffic to 38 million 20-foot equivalent units (TEUs) by 2020 and 176 million TEUs by 2040, a 14-fold increase.

Bulk traffic growth will depend on mineral development, such as iron ore and bauxite exploitation. New coal shipments are also expected in ARTIN corridors, as well as more copper metal from the Copper Belt countries, but at lower tonnages than for iron ore and bauxite, which will utilize special purpose-built transport facilities.

Table 1: Trade forecasts by region (millions of metric tons)

Region	2009	2020		2030		2040	
		Volume	Avg. growth (%)	Volume	Avg. growth (%)	Volume	Avg. growth (%)
North Africa	20	235	6.3	410	6.3	760	6.4
West Africa	7	176	6.7	300	6.0	556	6.3
Central Africa	21	43	6.8	77	6.4	145	6.5
East Africa	45	96	7.1	181	7.1	360	7.1
Southern Africa	240	408	4.9	617	4.7	1,001	5.0
Total Africa Base	**333**	**958**	5.8	**1,585**	5.7	**2,823**	5.9
With suppressed demand	**513**	**1,056**	6.3	**1,822**	6.1	**3,397**	6.4
With new minerals	**513**	**1,175**	7.8	**1,998**	5.5	**3,630**	6.2

Source: Africa Transport Outlook 2040, excluding crude oil.

Although the trade increases vary across countries, with the poorer countries growing faster from a small base, future trade will still be dominated by five large countries (Algeria, Egypt, Morocco, Nigeria, and South Africa), which account for more than half of total African trade by volume.

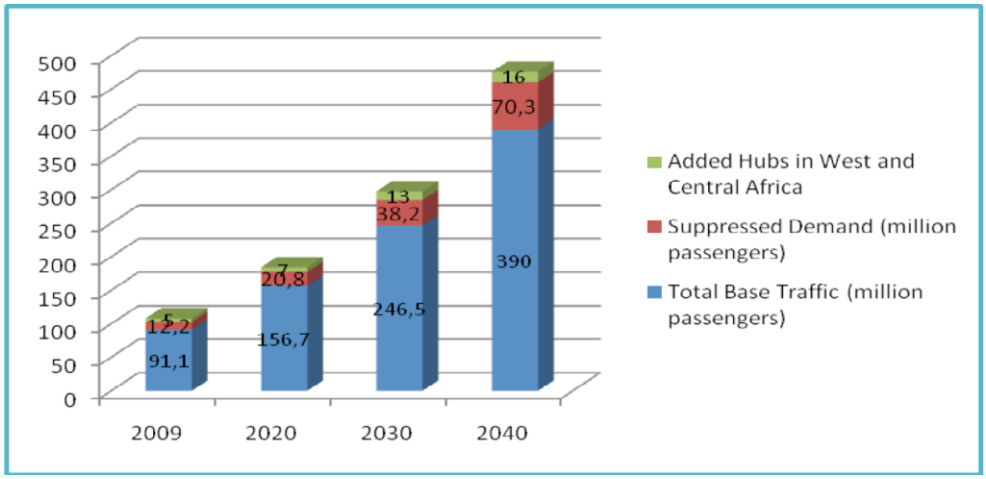
For the five regions, trade forecasts show some variation in expected growth, with East Africa growing the fastest and Southern Africa growing slightly slower (from a larger base).

Transit traffic from landlocked countries is expected to increase 10–14 times over the next 30 years. In West Africa, this transit traffic will rise from 6 million tons to 65 million tons in 2040. For southern Africa, it will increase from 13 million to 148 million tons; and in East Africa from 10 million tons to 149 million tons as Southern Sudan exports through this region. Djibouti will face transit traffic increases from 9 million tons to 76 million tons. 2030 forecasts amount to a third to a half of the 2040 tonnages, but are still 4–5 times current traffic levels. Trade in ARTIN corridors is expected to grow faster than overall trade, expanding from 13% in 2009 to 18% of total trade in 2040.

1.1.5 Future Demand for Air Passenger Transport

International air passenger flows are forecast to increase 40–90% by 2020 and by factors of 2.5 to 6 by 2040, including suppressed demand (Figure 3). Air passenger flows increase for all countries and RECs but will continue to be dominated by nine countries that are major tourist destinations and major regional air transport hubs. Demand for transport to Europe will be substantial for all RECs, with demand for transport to the Middle East strong for several RECs and to Asia and North America for a few.

Figure 3: Forecast air passenger traffic through 2040



Source: Africa Transport Outlook 2040

If two additional regional air traffic hubs are established, one in West Africa and one in Central Africa, air passenger demand in these regions would increase substantially as regional hubbing increases regional air travel and more efficient connections to other regions inflate inter-REC and intercontinental air travel.

1.1.6 Economic Costs of Transport Inefficiencies

The Outlook Report concluded that the economic cost of transport inefficiencies in the ARTIN is over US$ 170 billion per year at the present time. These inefficiencies are primarily due to :

- Non-implementation of trade facilitation measures along the ARTIN corridors (including ports and border posts)
- Transport sector policies leading to inefficient and high cost road transport and poor road condition in many countries
- Transport sector and economic policies that prevent efficient operation and expansion of the rail system, and
- Air transport sector and economic policies that prevent the establishment of regional air hubs, leading to higher air fares.

The relative size of these economic costs is shown below:

Table 2: **Summary of economic cost of inefficiencies in ARTIN 2009**

Type of Cost	Amount (US$ billion)	%
Total ARTIN Corridor Inefficiency Costs	75	43
Total ARTIN Air Transport Inefficiency Costs	25	15
Total Value of Suppressed Freight Demand	65	38
Total Value of Suppressed Air Transport Demand	7	4
ARTIN total	**172**	**100**

The elimination of these costs represents an opportunity for the identification of programmes and projects with real impact on the economy.

1.1.7 Anticipated Gaps in Transport Infrastructure through 2040

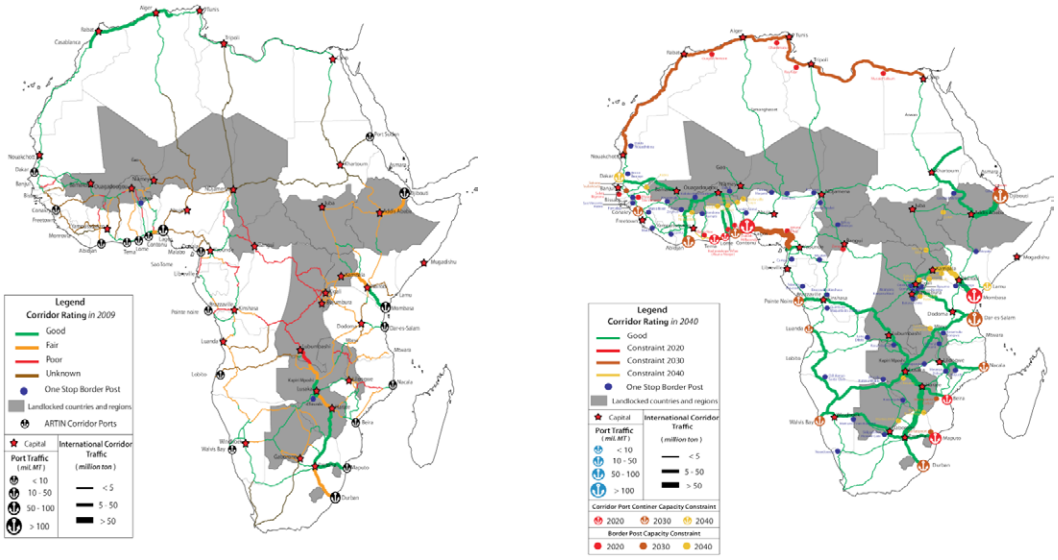
Forecast demand is expected to exceed capacity in all areas of the ARTIN corridors by 2040, even with the completion of planned improvement projects (Figure 4). These gaps have been identified in each mode of transport along the ARTIN corridors, including road, rail, river, lake and ports. Some gaps will appear as early as 2020. North Africa will be less affected than the rest of the continent, because transit corridors are less a factor in that region (see further discussion of specific gaps by region in Chapter 3 below).

The two maps below summarize these findings and show that forecasted demand will exceed capacity in all regions and on all modes of the ARTIN corridors by 2040. There will be a number of short-term gaps by 2020 in some corridors, despite the added capacity provided by planned projects and even if the corridor infrastructure is operating at its highest efficiency level.

These gaps need to be addressed by infrastructure and service improvements as part of the PIDA

programme. The proposed programme will also include improvements in policies, institutional practices, and IT systems, which also have the potential to greatly increase the efficiency and capacity of border posts, ports, railways, and airports.

Figure 4: ARTIN corridor condition in 2009 and capacity gaps by 2040



Source: PIDA Transport Outlook 2040.

2. STRATEGIC FRAMEWORK

The development and modernization of the ARTIN network is necessary for the achievement of economic growth and regional integration as described in the long-term objectives for Africa by AUC and NPCA. This requires a vision for the transport sector, the identification of clear goals and objectives and the definition of a strategic framework that supports these macroeconomic development objectives as the transport sector is a key motor for economic development.

2.1 Vision for the Transport Sector

The PIDA vision for the transport sector for Africa in 2040 is as follows:

An integrated African continent wh*ere the transport infrastructure and services enable* the free movement of goods and passengers by providing *efficient, safe, secure, reliable and seamless transport options* and reducing costs *to* support environmentally and economically sustainable *regional development.*

This vision is further elaborated below.

2.2 Sector Goals and Objectives

In order to achieve the above vision, the five main goals for the transport system are to:

- Support a healthy, strong and competitive regional economy
- Maximize access to a modern, safe and efficient transport system that supports regional integration and meets future transport demand in the most cost-effective manner
- Promote improved transport/logistics systems for African businesses and the well-being of the travelling public
- Support a sustainable natural environment, and
- Support synergy with other infrastructure and economic investments

The development and modernization of the ARTIN network is necessary for the achievement of economic growth and regional integration as described in the long-term vision for Africa by the AUC.

These goals are supported by specific objectives:

2.2.1 Goal 1: Support a Healthy, Strong and Competitive Regional Economy

Objective 1.1: Maximize the economic return from the region's transportation investments

This would involve (i) focusing transport expenditures on facilities and services that meet a demonstrated need and are cost-efficient, and (ii) targeting new road, rail, port and border post investments that will fill the anticipated capacity gaps or significantly increase the efficiency of existing infrastructure.

Objective 1.2: Optimize utilization of the existing system

This would involve (i) promoting the preservation, rehabilitation and reconstruction of the region's existing infrastructure, and (ii) promoting the safe, effective and efficient management of the region's transportation infrastructure and services, using best practice methods from Africa and other regions.

Objective 1.3: Improve the continent's connections to national, regional and international markets for goods and services

This would involve (i) enhancing and modernizing multimodal transport within the continent, (ii) enhancing connections among the continent's economic centres, (iii) supporting key components of the continent's economy, such as industrial and mineral developments, (iv) eliminating the missing links between these poles, and (v) improving inter-capital connectivity.

2.2.2 Goal 2: Maximize Access to a Modern and Efficient Transport System that supports Regional Integration and meets Future Transport Demand in the most Cost-Effective Manner

Objective 2.1: Improve the availability of modern, safe, and efficient transport systems

This would involve (i) setting standards for modern, safe and efficient systems, (ii) developing pilot projects for the implementation of these systems (using best practice methods from Africa and other regions), and (ii) expanding the most cost-effective pilots to the entire corridors,

Objective 2.2: Expand and modernize the regional corridor and air transport systems to meet future demands

This would involve (i) creating incentives and an enabling environment to attract private sector participation in these activities, (ii) supporting PPP financing where feasible and (ii) supplementing

private investment with public investment where needed to ensure full use of these options.

Objective 2.3: Improve the availability, efficiency and use of rail, river, lake and multimodal transport

This would involve (i) creating incentives and an enabling environment to attract private sector participants in these activities, (ii) supporting PPP financing where feasible and (ii) supplementing private investment with public investment where needed to ensure full use of these options.

2.2.3 Goal 3: Promote Improved Transport/Logistics Systems for African Businesses and the Well-Being of the Travelling Public

Objective 3.1: Use modern technology to improve corridor efficiency and trade facilitation

This would involve (i) promoting trade facilitation improvements along the ARTIN corridors, (ii) implementing smart corridor technology to improve corridor efficiency, cross-border communications and to integrate transport information for all transport system operators and users, and (iii) initiating high-visibility monitoring of corridor efficiency that compares performance with international benchmarks.

Objective 3.2: Improve the efficiency of people and goods' movements

This would involve (i) ensuring the implementation of agreed regional transport policies, and (ii) utilizing PPP agreements wherever they would improve the efficient management and operation of the transport system.

Objective 3.3: Increase the safety of the travelling public

This would involve (i) promoting safety improvements along ARTIN corridors in conjunction with modern corridor design, (ii) implementing air transport safety programmes and (iii) using smart corridor systems to track and communicate the location of accidents and options to avoid them.

2.2.4 Goal 4: Support a Sustainable, Quality Natural Environment

Objective 4.1: Improve the planning of transport infrastructure in relation to environmental impacts

This would involve (i) setting standards for identification and mitigation of environmental impacts, (ii) creating infrastructure project designs that reduce environmental impacts, (iii) encouraging the use of modes that minimize negative environmental impacts, and (iv) avoiding the placement of transport facilities in environmentally sensitive areas.

Objective 4.2: Introduce the consideration of climate change impacts into the planning and design of transport infrastructure

This would involve (i) setting standards for the inclusion of climate change impacts in planning and implementation of infrastructure projects, and (ii) implementing these standards.

2.2.5 Goal 5: Support Synergy with Other Infrastructure and Economic Investments

Objective 5.1: Improve synergies with energy, water and ICT investments

This would involve (i) identifying and introducing synergies in a joint infrastructure planning stage for ARTIN corridors (e.g. fiber optic cables along corridors), (ii) planning power supplies for border posts and smart corridor components using modern energy options, and (iii) planning and designing ICT aspects of smart corridors with the communications and information sectors.

Objective 5.2: Increase synergies with other economic investments

This would involve (i) taking into account the spatial development aspects of corridor improvements in a joint infrastructure planning process, and (ii) private and public partners working together for corridor investment planning.

2.3 Strategies

To meet these goals and objectives, there are three broad strategies that have been adopted for PIDA in the transport sector:

- Improve the connectivity of African capitals and major centres with modern paved roads
- Satisfy transport demand in the short- medium- and long-term on ARTIN at the least economic cost, in priority for the landlocked countries, while minimizing the environmental impact of transport infrastructure and transport services and improving transport safety, and
- Develop modern ARTIN corridors and air transport services in order to bring ARTIN components' performance up to best world practice in terms of efficiency, cost, reliability and safety

The objectives and the three strategies are linked together as shown in Table 3.

Table 3: Relationship of Strategies to Objectives

Strategy	Objectives to be Satisfied
1. Improve the connectivity of African capitals and major centres with modern paved roads	Objective 1.3: Improve the region's connections to national, sub-regional and international markets for goods and services
	Objective 2.2: Expand and modernize the regional corridor and air transport systems to meet future demands
	Objective 5.2: Increase synergies with other economic investments
2. Satisfy transport demand in the short, medium and long-term on ARTIN at the least economic cost, in priority for the landlocked countries, while minimizing the environmental impact of transport infrastructure and transport services and improving transport safety	Objective 1.1: Maximize the economic return from the region's transportation investments
	Objective 2.1: Improve the availability of modern, safe, efficient transport systems
	Objective 2.2: Expand and modernize the regional corridor and air transport systems to meet future demands
	Objective 2.3: Improve the availability, efficiency and use of rail, river, lake and multimodal transport
	Objective 3.2: Improve the efficiency of people and goods movements
	Objective 3.3: Increase the safety of the travelling public
	Objective 4.1: Improve the planning of transport infrastructure in relation to environmental impacts
	Objective 4.2: Introduce the consideration of climate change impacts into the planning and design of transport infrastructure
	Objective 5.1: Improve synergies with energy, water and ICT investments
	Objective 5.2: Increase synergies with other economic investments
3. Develop modern ARTIN corridors and air transport services in order to bring ARTIN components' performance up to best world practice in terms of efficiency, cost, reliability and safety	Objective 1.1: Maximize the economic return from the region's transportation investments
	Objective 1.2: Optimize utilization of the existing system
	Objective 2.1: Improve the availability of modern, safe, efficient transport systems
	Objective 2.2: Expand and modernize the regional corridor and air transport systems to meet future demands
	Objective 2.3: Improve the availability, efficiency and use of rail, river, lake and multimodal transport
	Objective 3.1: Use modern technology to improve corridor efficiency and trade facilitation
	Objective 3.2: Improve the efficiency of people and goods movements
	Objective 3.3: Increase the safety of the travelling public
	Objective 5.1: Improve synergies with energy, water and ITC investments
	Objective 5.2: Increase synergies with other economic investments

2.4 Strategic Options

Within each broad strategy there are a number of strategic options. A logical framework matrix for assessing the proposed strategic options in the PIDA transport sector is presented in the table below.

Table 4: Relationship of strategies to strategic options

Objectives	**Improve the connectivity of African capitals and major centres with modern paved roads**	***Satisfy transport demand on ARTIN at least economic cost while minimizing the environmental impact and improving safety***	***Develop modern ARTIN corridors and air transport services in order to bring ARTIN components' performance up to world best practice in terms of efficiency, cost, reliability and safety***
Strategic Options	Completing connectivity with TAH	Increasing the share of rail and multi-modal transport	ARTIN corridor efficiency and transport policy harmonization is monitored
	Completing connectivity with African capitals not on TAHs		Improving road corridor efficiency and competitiveness
	Filling short-term and long-term gaps in ARTIN corridor infrastructure		Ensuring private involvement in investment, operation and maintenance of ARTIN components
			Upgrading the Africa air transport system service and infrastructure

2.5 Programme and Project Selection Criteria

The programme and project selection criteria to be used in PIDA were discussed and agreed among stakeholders during the workshop held in Tunis on June 2011. For the transport sector, the agreed criteria and their relative weightings were as follows:

- Economic and Social : 30
- Institutional and policy : 30
- Financing : 15
- Environment : 10
- Technical : 10
- Synergies with other sectors : 5

TOTAL **100 Points**

These criteria can be defined as follows:

Economic and Social: The economic dimension may include the project's capability to increase trade in goods and services, attraction of private investment in production units within the region; and increase competiveness of the regional economy (development impact). The social dimensions will include capability of the project to generate employment and income, improvement of the population's standard of living through access to social services and mobility for inhabitants in the zone of influence.

Institutional and Policy: This criterion assesses the existence of an appropriate legal, policy and institutional framework. The criterion takes into account the regulatory framework and institutional environment and the countries where the project group (corridor project) is located. Political convergence among partner States with respect to policy and regulatory framework etc.

Financing: Assesses the attractiveness to private investors and/or public-private partnerships to fund the implementation and operation of the project.

Environment: Capability of the project to contribute to a more rational use of natural resources; capability with the characteristics of the ecosystem in the area of the influence; and capability of the project to improve or maintain environmental quality of water resources, the soil, and the air in its area of influence; and environmental risk mitigation possibilities.

Technical: Consistency of current and future demand that justify the project; execution and operation conditions regarding technology, equipment, construction process and conditions related to the implementation and operation. A size and readiness sub-criteria, by taking into account the dimension and the speed for the infrastructure to be operational, will help rate more precisely the technical criteria.

Synergies with other sectors: The project being a set of interdependent projects in the REC concerned and having synergetic effects upon the sustainable development of the region. This leads to the optimization of benefits.

These criteria were then used to select PIDA programmes and projects as described in the following chapter.

3. INFRASTRUCTURE DEVELOPMENT PROGRAMMME: PIDA

The PIDA programme is built on the conclusions of the Transport Outlook 2040 and the general strategic options outlined above. The logic of PIDA programme development is summarized below.

3.1 Increases in Transport Demand Identified in the Outlook 2040

As noted in Chapter 1, the main drivers of transport demand identified in the Outlook are:

- Long-term sustained GDP growth averaging 6.2% per year resulting in a GDP of 5 to 6 times current GDP by 2040[2]
- Continued population growth averaging 2% per year leading to a total population of 1.8 billion by 2040
- Continuing rapid urbanization leading to the concentration of 55% of the continent's population in urban centres by 2040
- Increasing development of value-added industries replacing goods and services imported from overseas
- Greater regional integration as regional trade and transport shift from overseas partners to regional partners
- International trade volumes increasing at growth rates of 6-8% per year with higher growth rates for container traffic
- Increasing number of passenger trips (by land and air) as per capita incomes increase, and
- Increased efficiency of the ARTIN leading to the realization of suppressed demand

This leads to major increases in transport demand, most notably:

- Total regional freight traffic in 2040 will be multiplied by 6 for the coastal countries and by close to 14 times for some landlocked countries, including suppressed demand
- Future port tonnage is expected to grow at 6% to 7% per year, excluding large new mining projects and crude oil, and at 6% to 8% per year including new mining projects
- Growth in container traffic is expected to outpace total tonnage. Container growth will average 11% per year until 2020 and 8% from 2020 to 2040 on a sustained basis (with all suppressed demand released). The net result will be an increase in container traffic to 38 TEUs by 2020 and 176 million TEUs by 2040, a 14-fold increase
- Bulk traffic growth will depend on mineral development, particularly iron ore and bauxite exploitation. New coal shipments are also expected in the ARTIN corridors, as well as more copper metal from the Copper Belt countries, but at lower tonnages than for iron ore and bauxite, which will utilize special purpose-built transport facilities
- International air passenger flows are forecast to increase 40–90% by 2020 and by factors of 2.5 to 6 by 2040, including suppressed demand.

3.2 Key Conclusions from the Outlook 2040

3.2.1 Conclusions on Connectivity

- In order to speed up regional integration, it is necessary to complete the missing links in the Trans-African Highway (TAH) network as quickly as possible.
- Some African capitals, in particular in Central Africa are not currently connected by paved roads. As part of the regional integration process, these capitals should be rapidly interconnected and connected to the TAH network.

3.2.2 Conclusions on Expanding Capacity to meet Future Gaps

- The ARTIN corridors, the TAHs and the links between African capitals should be upgraded to modern and harmonized norms and standards and capacity increased by the construction of urban bypasses, climbing lanes and/or four-lane motorways when justified by traffic volume
- Modernized rail services with expanded capacities are needed in those corridors where there are substantial increases expected in long distance freight volumes and mineral development
- For both environmental and transport efficiency reasons, multi-modal transportation should be encouraged and the role of rail, river and lake transport should be substantially developed in the future
- Overall port capacity should be increased and selected ports should be used as regional hubs and designed to handle the very large Post-

[2] In terms of purchasing power parity (PPP).

Panamax container vessels, which are now being deployed
- Regional air hubs should be added in two regions (West and Central Africa) where there is a gap in air transport service and high air fares, and airport capacity expanded to meet future demand
- The continental air navigation system should be upgraded to meet future air transport needs.

3.2.3 Conclusions on Improving the Efficiency of the ARTIN

- Major increases in corridor efficiency are needed to handle future traffic flows. This could be partly achieved through high-visibility corridor efficiency monitoring and modern corridor design, accompanied by the implementation of smart corridor systems and one-stop border posts (OSBPs) along ARTIN corridors.
- Key transport policy actions are needed to improve ARTIN efficiency, namely:
  - For ports and multimodal facilities, eliminate constraints on containers for inland use and reduce stripping of containers in ports or inland depots
  - For roads, complete harmonization of axle load policies and enforcement, develop modern corridor design standards, and adopt smart corridor information systems for road transport
  - For railways, restructure concession agreements to provide public funding for track improvement and rehabilitation and provide for modernized services, equipment and information systems
  - For border posts, support single window, integrated border management and smart corridor technology to reduce border times, and
  - For air transport, creating an enabling environment for the development of regional air hubs and developing a new means of financing for a continental satellite-based air navigation system.

3.3 PIDA Transport Programmes and Projects

3.3.1 Introduction to PIDA and PAP

The overall PIDA programme is comprised of a set of high-priority projects, policy actions and capacity-building actions. Investment or construction projects are called “hard projects” and policy or capacity-building actions are called “soft projects”.

This PIDA programme is designed to cover the short and long-term, where short-term is to 2020, and long-term is up to 2040. The PIDA short-term programme is called the Priority Action Plan or PAP. The PIDA PAP is designed to be a rolling set of priority projects and programmes, which are redefined every 4-5 years, with new projects added as initial projects are completed.

The following sections explain how the proposed PIDA programme has been prepared and detailed for each region.

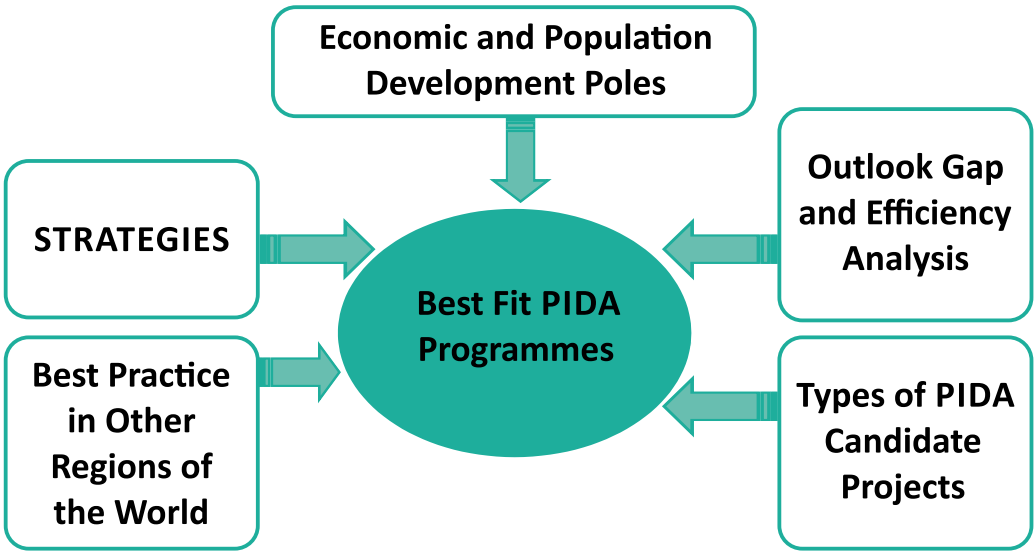
3.3.2 Identification of PIDA Strategic Activities

The PIDA transport programme is articulated around the following three basic strategies already described above:

- Improve the connectivity of African capitals and major centres with modern paved roads
- Satisfy transport demand in the short- and long-term on ARTIN at the least economic cost, in priority for the landlocked countries, while minimizing the environmental impact of transport infrastructure and transport services and improving transport safety, and
- Develop modern ARTIN Corridors and air transport services in order to bring ARTIN components’ performance up to world best practice in terms of efficiency, cost, reliability and safety

The PIDA programme also takes into consideration the patterns of development poles expected in the future with accelerated regional integration, capacity gaps identified in the Outlook 2040, best practices in other regions of the world, and the types of candidate projects identified by the RECs in the different regions.

Figure 5: Inputs to identification of PIDA projects and programmes



3.4 PIDA Long-Term Programme

The overall PIDA long-term programme was derived for each region using the three long-term strategies noted above, taking into account the future capacity gaps for each region, corridor priorities, air transport system priorities, existing highly-ranked projects and opportunities for introducing best practices for increasing the capacity and efficiency of the ARTIN.

The long-term programme is summarized below under each strategy for Africa as a whole, followed by the long-term programme for each region as presented in graphic form below in Figures 6 to 8.

3.5 Summary of PIDA Long-Term Strategies for Africa

3.5.1 PIDA Vision of the Future Transport System for Africa

As stated in Chapter 2, PIDA envisions an integrated African continent where the transport infrastructure and services enable the free movement of goods and passengers by providing efficient, safe, secure, reliable and seamless transport options and reducing costs to support environmentally and economically sustainable regional development.

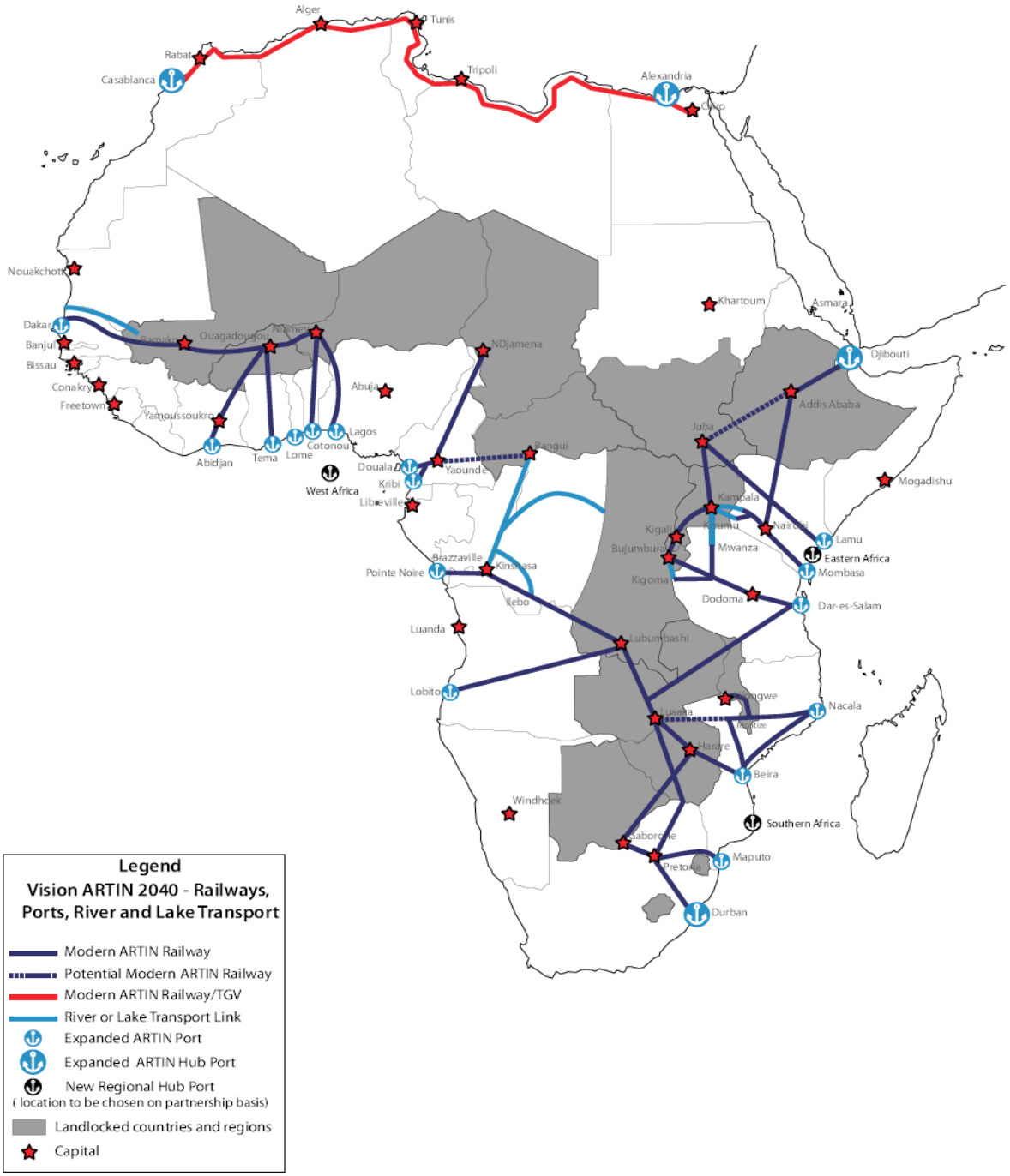
In order to implement this vision, the future transport system in 2040 would need sufficient capacity to meet 2040 demand, and the following characteristics:

- A connected, continental system of ARTIN road corridors with modern design standards and smart corridor technology for monitoring corridor efficiency
- A set of modernized railway lines that serve ARTIN corridors and major mineral developments
- Expanded ARTIN port facilities with new regional hub ports
- A continental satellite-based air navigation system
- Expanded airports with new air hubs in West and Central Africa

This vision is illustrated in Figures 6, 7 and 8, which show the future railway and port vision, the future highway, port and border post vision and the future air transport system vision.

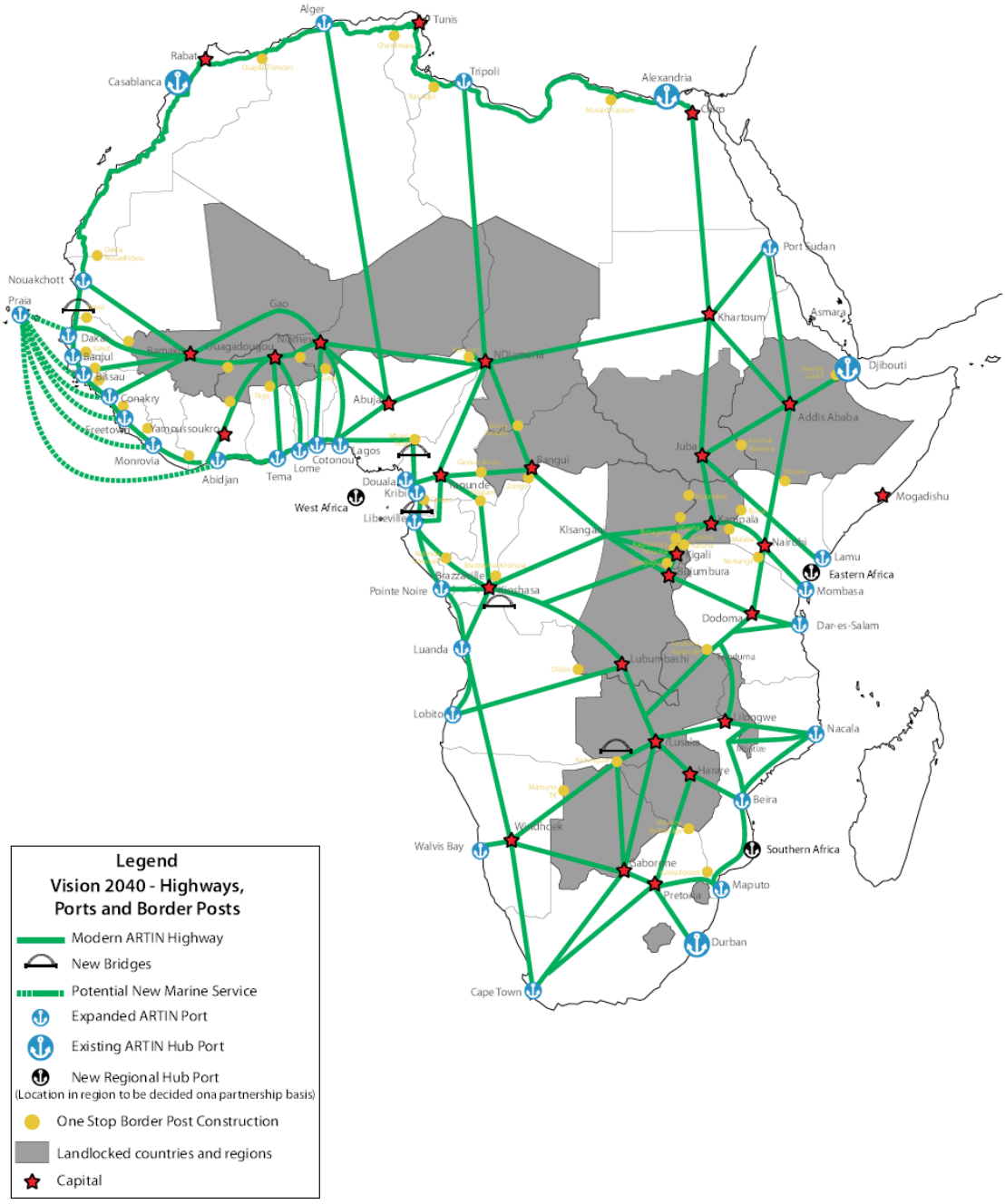
The strategies and related activities needed to achieve this vision are described below, along with the implications for each region.

Figure 6: Vision ARTIN 2040 - Railways and Ports



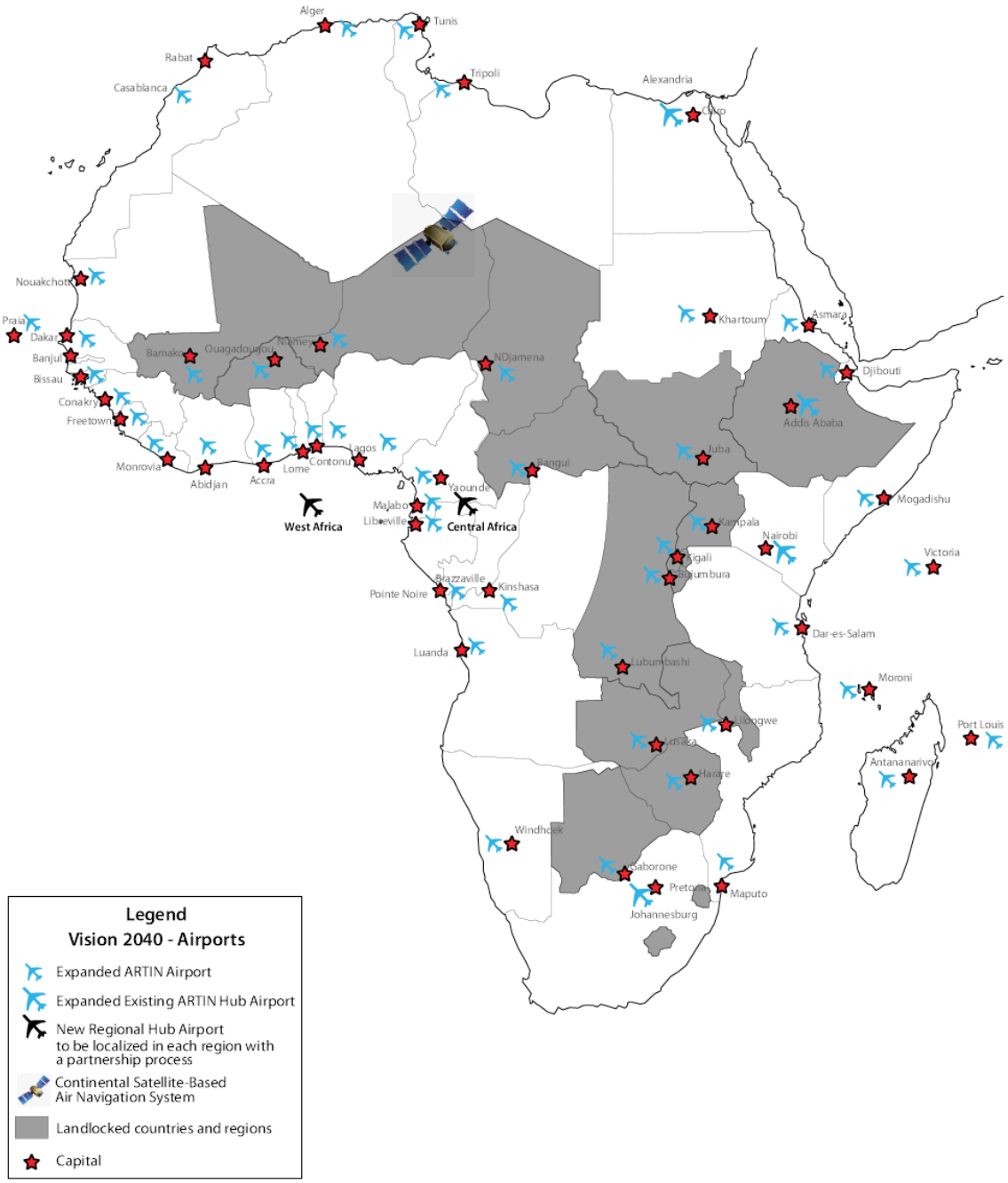
Note: New regional hub port locations are to be determined by technical and consensual agreements on a regional partnership basis.

Figure 7: Vision ARTIN 2040 – Highways, Ports and Border Posts



Note1: When the African Customs Union is implemented, the border posts shown on the map would cease to have customs functions and their functions would be scaled back to minimum border-crossing procedures. Note 2: New regional hub port locations are to be determined by technical and consensual agreements on a regional partnership basis.

Figure 8: Vision ARTIN 2040 – Air Transport System



Note: New regional air hub locations are to be determined by technical and consensual agreements on a regional partnership basis, with the participation of potential hub airlines.

3.5.2 PIDA Programmes resulting from Strategy 1: Improve the Connectivity of African Capitals and Major Centres with Modern Paved Roads

The provision of new roads is essential for the development of new economic centres and for speeding up regional integration. Today there are several countries in Africa which are still isolated with limited access to commercial centres and to international gateways.

The connectivity of African capitals and major centres will be largely accomplished through two programmes (i) the completion of the Trans-African Highways and (ii) the connection of capitals in selected regions where the connectivity is currently incomplete.

Trans-African Highways (TAH)

Today there are 9 Trans African Highways totalling about 59,000 km of which about 12,000 km of missing links are still to be constructed. The majority of these missing links are located in the Sahelian zone of West Africa and in Central Africa (see Figure 9).

The situation is particularly problematic in Central Africa where there are six inter-capital connections that are not on Trans-African highways that remain to be completed.

To ease this lack of road connectivity, the AUC has started feasibility studies for:

- A new African Djibouti-Libreville link via Nairobi-Kampala-Kananga and Kinshasa. (This connection could become the 10th TAH).
- TAH 8 (Mombasa-Lagos) and part of the TAH 3 (Tripoli-Windhoek-Cape Town), and
- ECCAS has prepared an investment plan aiming at completing the missing roads that link capital cities. This plan is divided into three levels of priorities and covers both the links that are part of the TAHs and the inter-capital links not included in the TAHs.

The PIDA programme includes the completion of all the missing links of the TAH that involves the construction of 12,000 km of roads to bitumen standards.

Inter-capital connectors

The PIDA programme would also complete the missing links of the following five ECCAS corridors (which are not part of TAHs):

- CD3 Yaoundé-Bata (variation via Douala and Kribi)
- CD4 Yaoundé-Libreville
- CD5 Libreville-Brazzaville (also part of the new proposed TAH for Djibouti-Libreville)
- CD12 Lobito-Lubumbashi (also known as the Benguela corridor) and
- CD13 Kinshasa-Bangui-N'Djamena

These inter-capital connectors and TAH completion projects are shown in Figure 9.

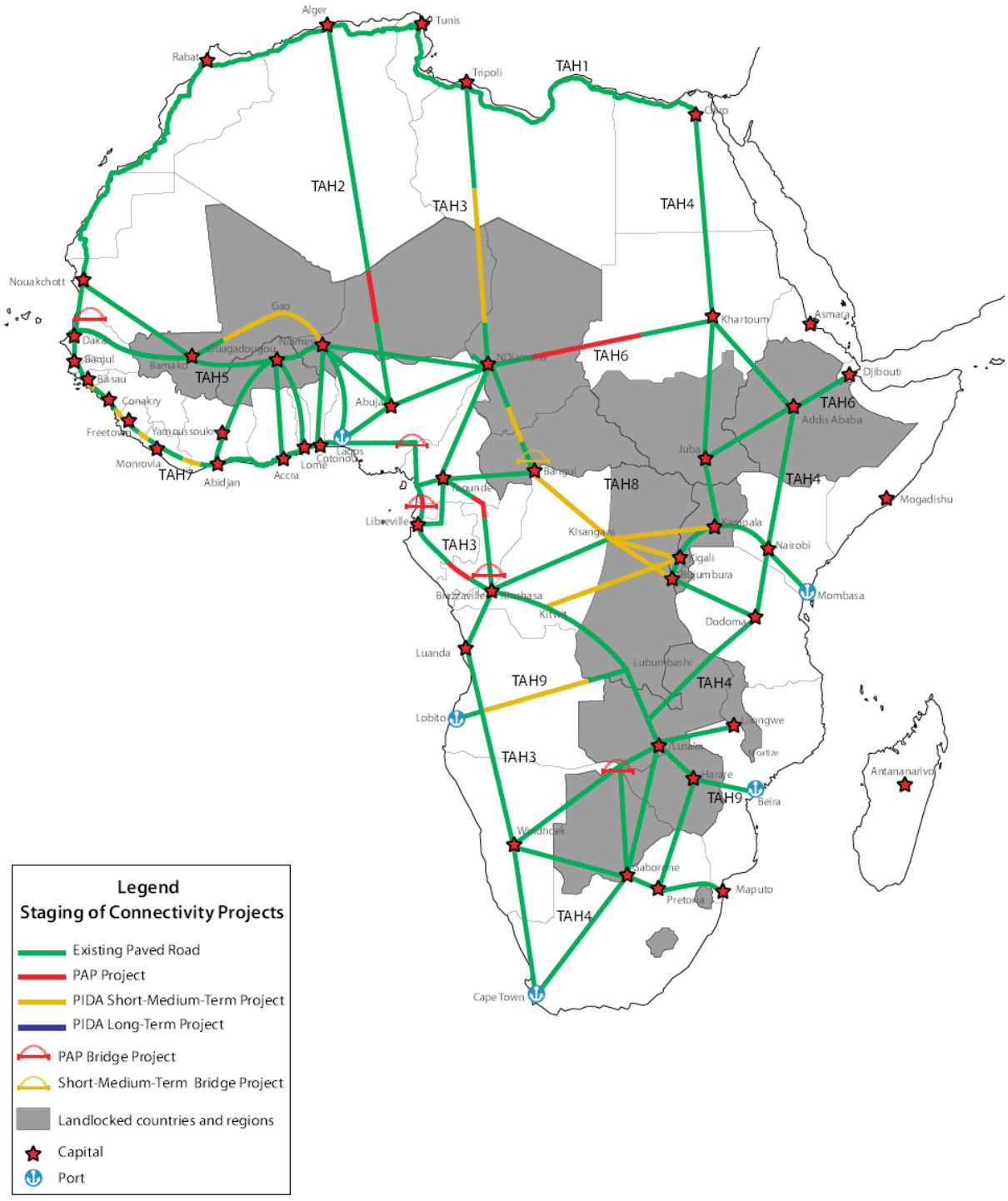
Table 5: Summary of connectivity programme indicators

Kilometres of road to be built

Region	TAH (km)	Inter-Capital (km)
North Africa	2,700	-
West Africa	3,800	-
Central Africa	3,900	1,900
Eastern Africa	1,100	-
Southern Africa	400	-
Continental	-	-
Total	**11,900**	**1,900**

The total investment for TAH missing links is estimated at US$ 5-7 billion, and the inter-capital missing link programme is estimated at US$ 1 billion for a total of US$ 6-7 billion.

Figure 9: PIDA connectivity projects for short-, medium- and long-term



Trans African Highway 1: Cairo-Dakar
Trans African Highway 2: Algiers-Lagos
Trans African Highway 3: Tripoli-Cape Town
Trans African Highway 4 Cairo-Cape Town
Trans African Highway 5: Dakar-N'djamena
Trans African Highway 6: N'djamena-Djibouti
Trans African Highway 7: Dakar-Lagos
Trans African Highway 8: Lagos Mombasa
Trans African Highway 9: Beira-Lobito

3.5.3 PIDA Programme Resulting from Strategy 2: Satisfy Transport Demand in the Short-, Medium- and Long-Term on the ARTIN at the Least Economic Cost, in Priority for the Landlocked Countries, while Minimizing the Environmental Impact of Transport Infrastructure and Transport Services and Improving Transport Safety

This strategy is specifically designed to fill the anticipated forecast capacity gaps identified in the Transport Outlook 2040. These gaps for each mode are described below.

In order to minimize costs and limit the impact of transport services on the environment, the recommended strategy to fill these gaps is to use the most appropriate transport mode. In particular, it is expected that when long distance traffic (over 500 km) reaches yearly volumes of 5 million tons along a corridor, preference should be given to rail over road traffic. This strategy will speed up the development of railways and slow down some road expansion projects.

Filling port capacity gaps

The Transport Outlook 2040 forecasts show that the lack of port capacity will be one of the major bottlenecks in Africa in the short- and long-term. This is particularly important for container traffic to and from landlocked countries which could see their economic development significantly slowed if enough port capacity is not provided on time by the coastal countries, which will have difficulties in providing enough port capacity to handle their own national traffic (see Table 6 for forecasts by region).

Table 6: Port traffic forecast by region

African regions	2009 Traffic	2040 Traffic	Increase Factor
North Africa (Algiers, Alexandria, Casablanca, Tunis)	92 million tons	571 million tons	6
West Africa (Abidjan, Cotonou, Tema, Lagos, Dakar, Lome)	32 million tons	490 million tons	15
Central Africa (Lobito, Douala, Pointe Noire)	15 million tons	84 million tons	5.5
Eastern Africa (Djibouti, Mombasa, Port Sudan, Dar es Salam)	34 million tons	364 million tons	11
Southern Africa (Beira, Maputo, Durban, Walvis Bay)	92 million tons	500 million tons	5

Six ARTIN corridors face short-term port container capacity gaps by 2020 even after currently planned port and terminal expansion projects are completed in West Africa (Tema and Lagos), East Africa (Mombasa), and Southern Africa (all Mozambique ports).

In two of the three cases (East and West Africa), growth in domestic demand for port capacity will leave no room to meet the demand for transit traffic to and from landlocked countries. In the third case (Southern Africa) domestic demand plus transit traffic will exceed available capacity in 2030, despite a major port expansion in Durban. By 2040, these three regions will have much larger gaps that will require both additional port expansion and new port development.

The PIDA programme includes the extension of African port capacities to 2.2 billion tons to satisfy long-term transport demand.

Planning and implementing additional port capacity on time is one of the highest priorities of the PIDA programme. This port capacity increase can be done by expanding and modernizing the capacity of existing ports or by building completely new port facilities. Although currently the planning of port extensions is done at country level, it is recommended that the planning of port capacity expansion be done on a partnership basis at regional level in order to deal with the requirements of the landlocked countries, and to resolve issues of competition between regional ports.

In all regions, there are projects to extend existing ports. Some new ports are also being studied such as the Lamu port in Kenya, where the Government is about to begin construction of the first berths. However, even with the full development of Lamu Port and the planned expansion of other ports, the total demand in Eastern Africa will exceed

available capacity by 2030. The same is true for West Africa and to a lesser extent in other regions.

In planning port expansion, each region should consider:

- The need to have at least one port in each region able to accommodate the large new Post-Panamax container vessels which are now being deployed
- The need to minimize land transport costs from and to landlocked countries by, when feasible, considering the building of new, modern railway lines

The best locations to implement new ports or extend existing ports should be studied in the context of regional port master plans. This will require a high level of cooperation between countries and possibly a compensation plan (see discussion on implementation issues).

Table 7: Estimated size of the PIDA Port Programme for ARTIN

Region	Ports* (no.)
North Africa	*
West Africa	10
Central Africa	6
Eastern Africa	7
Southern Africa	12
Continental	-
Total	**35**

* Only ARTIN corridor ports serving landlocked countries are shown here. There are no ARTIN corridor ports in North Africa serving landlocked countries.

The PIDA programme proposes to extend the port capacities in Africa by a total of 1.7 billion tons covering a total of thirty five ports at a cost of about US$ 46 billion.

Filling railway infrastructure gaps

In preparing the long-term PIDA programme for rail transport the following points have been taken into consideration:

- Rail transport has a beneficial economic and environmental impact compared to road transport since it consumes about a third of the energy per ton. It is also much safer than road transport (in terms of damage to freight and harm to passengers from accidents).
- Rail transport is usually slower than road transport but for long haul traffic, bulk or container transport, it is much cheaper per ton/km, and, in some cases, more reliable.
- For many cases of mineral transport, rail may be the only viable transport mode (although road transport is used extensively for copper metal transport in Southern Africa).
- Due to the significant infrastructure investment cost, there is a minimum level of traffic needed to justify the construction of a new railway. These volumes vary depending on the type of terrain (flat, hilly or mountainous) and on other technical parameters, (such as the number of river crossings, etc.)
- The analysis of these factors indicates that for haul distances greater than 500 km, the modernization of an existing rail line can be economically feasible for traffic of 4 million net tons per year in relatively flat terrain and 6 million net tons in hilly terrain. For a new railway, these thresholds increase to 5 and 8 million net tons respectively.

The PIDA analysis of freight rail capacity on cross-border railway lines reveals that seven of the eleven ARTIN rail lines will need physical expansion by 2020, if their operation and equipments have been improved to reach good modern efficiency and they can attract a significantly greater share of traffic from the road transport sector.[3]

North Africa faces a second type of railway gap efficient interconnections across borders. North Africa has been planning for connectivity across the region (and even for a high-speed rail link to Europe), but it has not been achieved.

The PIDA programme recommends the immediate modernization of existing railway lines and the construction of new, modern rail lines in nine of the eleven corridors, where demand by 2040 is expected to exceed 10 million net tons. This would also allow for the introduction of standard gauge, where this could be efficiently done without major interruptions to existing train services. It is forecasted that the railways will run as efficiently as Transnet railways in South Africa, which already has modernized operations.

Regional rail master planning should play an important role as some railways compete for the same traffic within a region. Also new railway demand must be linked to new and expanded port development, particularly where the expanded port will operate as a regional port with significantly larger traffic flows. This approach applies in the Nacala, Lamu, and Lome-Ouagadougou/Niamey corridors.

Considering the long-term traffic forecasts on ARTIN corridors, and with the implementation of regional railway master plans of the appropriate scope, the following new railway lines could be built under PIDA:

- In Western Africa to link Mali, Burkina Faso and Niger to the sea (through one or two rail lines to be linked to the additional port capacities
- In Central Africa to link Kinshasa to Ilebo and potentially to extend the Cameroon railways to Chad and Central African Republic
- In Eastern Africa to link:
  - Rwanda, Burundi, Uganda, East of Democratic Republic of Congo and Southern Sudan to the sea (including the possibility of a new rail line from Bujumbura to Dar es Salam, a new/upgraded rail line to Mombasa and/or a new rail line to the Port of Lamu)
  - Addis Ababa with the port of Djibouti (and possible extension to Juba)
- In Southern Africa to link production/consumption centres in landlocked countries to the pacific (Durban, Maputo or other ports) and/or to the Atlantic (Walvis Bay)

The existing rail master plans in these regions would need to be updated to take into account future regional port expansion and the location of new hub ports which will generate major new traffic flows.

[3] The forecast demand by corridor assumes shifts from 2009 corridor share to the most efficient corridor shares, assuming that railways and highways are operating with good efficiency, civil strife is resolved in Cote d'Ivoire and DRC and Southern Sudan acts as an independent country, using Djibouti and Mombasa ports (and possibly Lamu). This also means that Abidjan will pick up a greater share of transit traffic from Mali, and the Central and Dar es Salam corridors will increase their shares of regional transit flows. Similarly, traffic shares for railways in Northern, Central and Dar es Salam corridors will increase to levels similar to those realized by Transnet at its most efficient (50% for medium distance international traffic-e.g., Burundi, and 60% for very long distance traffic-e.g., DR C. Also the Beira Corridor is expected to increase its traffic with a rail share returning to historical levels of 50% of total traffic, compared with 10% in 2009. The Nacala corridor is expected to accommodate the Moatize coal developments (although this could also be handled by the Beira rail line, if the financial conditions are made attractive, and the port is expanded accordingly.) The Maputo Corridor rail share is expected to rise to levels similar to those found for long distance traffic in South Africa, and North-South corridor rail is expected to increase its share of copper metal shipments

Table 8: Estimated size of rail construction and modernization programme

Region	Rail Construction (km)	Rail Modernization (km)
North Africa	500	8,100
West Africa	3,000	2,400
Central Africa	3,000	800
Eastern Africa	2,500	1,800
Southern Africa	4,000	4,100
Continental	-	-
Total	**12,000**	**17,200**

It is estimated that about 12,000 km of new rail lines would be built under the PIDA programme at a cost of about US$ 36 billion and 17 200 km of existing railway line modernized at a cost of US$ 7 billion.

Filling road infrastructure gaps

Priority being given to rail traffic, it is expected that part of the truck traffic will be diverted to rail. On this basis, it is anticipated road capacity constraints primarily in the high-traffic coastal corridors of North African and West Africa, as well as key sections of the most heavily trafficked corridors serving landlocked countries.

Four corridors will face demand of more than 15,000 vehicles per day already by 2030, and will require the construction of modern four-lane motorways:[4]

- Trans-Maghreb Corridor
- Abidjan-Lagos Corridor
- Lagos-Douala Corridor, and
- Maputo Corridor

In addition other corridors will need to have some sections upgraded by adding capacity through urban bypasses, climbing lanes and additional lanes in key sections by 2020 and the rest by 2030. The Central Corridor in East Africa is a good example of this.

These corridors are:

- Djibouti-Addis Corridor (before 2020)
- Central Corridor (before 2020)
- Northern Corridor (before 2040)
- Dakar-Bamako (before 2040)
- Abidjan-Ouagadougou (before 2040)
- Tema-Ouagadougou (before 2040)
- Dar es Salam Corridor (before 2040)
- Beira Corridor (before 2040), and
- Trans-Caprivi Corridor (before 2040)

These upgrading (four-lane highways and other civil works aiming at increasing capacity) totalled 15,200 km under the PIDA programme is split by region as follows:

Table 9: Estimated size of PIDA road upgrading programme

Kilometres of Road to be up graded

Region	Road (km)
North Africa	800
West Africa	5,800
Central Africa	1,100
Eastern Africa	3,600
Southern Africa	3,900
Continental	-
Total	**15,200**

The total investment expected under the PIDA road upgrading programme for ARTIN corridors is about US$ 16-26 billion over a 30-year period for 15,200 km of construction, (of which 20-30% could be provided by the private sector).

Filling lake and river transport infrastructure gaps

River and lake transport are much less polluting than road transport, consume much less energy per ton-km and are less expensive. However, they are slower and often require one or more intermodal transfers, thus causing delays and increasing the cost. This means that these solutions have been favored only for corridors where traffic is concentrated and efficiencies can be gained without reducing corridor competitiveness for shippers and passengers (e.g., rail ferry service between Kisumu and Port Bell, which may be revived by Rift Valley Railways, improvement of lake traffic on Lake Tanganyika or on the Congo River and its tributaries).

Lake and river ports and navigation infrastructure have been neglected over the past 10 years. However, various investment programmes are under study, particularly in the Lake Victoria region.

The Transport Outlook 2040 showed that lake and river transport should be developed for general cargo and container transport, in particular on Lakes Victoria and Tanganyika and on the Congo River system. There is also some potential along

[4] Note that the PIDA analysis focuses on links which have a high proportion of international traffic. Capacity gaps on other links in ARTIN corridors are considered national planning issues.

the Senegal, Niger and Zambezi Rivers and on Lake Malawi. These latter systems could be linked to mineral developments with private sector participation.

New port facilities, efficient navigation systems and dredging projects are needed as priority projects. Particular attention should be given to multimodal nodes (lake/river linked to rail transport, and lake/river linked to road transport).

This component of PIDA also includes a proposed new marine service from Praia to West African ports as part of a multi-modal corridor project.

It is estimated that investment totalling about US$ 100 million would be required for lake ports and vessels under the PIDA programme, of which 70-80% would come from the private sector.

Filling gaps in the ARTIN air transport system

Surging demand will expose gaps in the ARTIN air transport system in the areas of air passenger service, air navigation systems, and airport capacity. All the 50 airports of ARTIN will need to be extended or supplemented by additional airports under the PIDA programme in order to handle the anticipated growth in air traffic (350% to 600% over current air passenger levels).

Seven airports face demand of more than 3 million air passengers per year by 2040 (over 2 million by 2030). They will need to be expanded. Two of these (Johannesburg and Cairo) may reach over 10 million passengers by 2040.

The capacity of 16 airports will be exceeded by 2020 under base case forecasts. Four are already programmed for expansion.

The high-level air traffic control system will reach saturation between 2020 and 2030 and will need to be replaced with a satellite-based air traffic control system. Gaps in the communications systems at and between airports in many areas of the continent will have to be filled in to provide full safety and security. All these gaps could be addressed through the creation of an African-based satellite navigation system, and the implementation of regional air safety programmes.

The total cost to modernize and expand the 50 airports is estimated at US$4.5 billion. The estimated cost of implementing the high level air traffic control system is estimated to be about US$500 million.

The staging of projects in the ARTIN under Strategy 2 is illustrated for highways in Figure 10, for railways in Figure 11 and for airports in Figure 12.

3.5.4 PIDA Programme Resulting from the Strategy 3: Develop Modern ARTIN Corridors and Air Transport Services in order to bring ARTIN Components' Performance up to World Best Practice in terms of Cost, Reliability and Safety

As mentioned in Chapter 1, the costs of the inefficiencies of transport services along the ARTIN corridor are very high and present major bottlenecks to economic development and regional integration in particular for the landlocked countries.

The PIDA programme proposes to develop modern corridors and to bring transport services to world best practice in terms of cost, reliability and safety.

The long-term objectives of this programme are to modernize and upgrade all the ARTIN corridors with well-designed roads, new hub ports, an efficient trade facilitation system with smart corridor technology and one stop border posts (OSBP) and, when relevant, modern and efficient rail, lake and river transport services.

The PIDA corridor programme should be implemented in phases, starting with the corridors having the highest priority.

The PIDA programme considers that all the 40 ARTIN corridors should be modernized step by step before 2040. The programme is comprised of the following components:

- Expanding port capacity
- Implementing modern road corridor design for key sections by using norms and standards to be fixed on a continental basis for the entire ARTIN road network
- Upgrading some road sections with urban bypasses, climbing lanes or the construction of four-lane highways when justified by the traffic
- Modernizing the existing rail system
- Implementing smart corridor systems, and
- Building OSBPs

Road corridor modernization

The modernization of road corridors includes the development of modern corridor design standards in each region on high-priority corridors (potentially with continental coordination of design standards). Once these designs are tested out on the high priority corridors they would serve as pilot designs for other corridors.

One investment-related aspect of road corridor modernization is the design and implementation of by-passes around urban areas and port access roads. These are typical corridor bottlenecks that are being addressed in several corridors, but should be systematically addressed by all corridors. Due to the high-traffic nature of these corridors, they are particularly suitable for the

introduction of PPP financing and management for upgrading and maintenance.

It is estimated that 9,500 kilometres of key sections of corridor roads would be implemented with modern corridor design in ARTIN corridors as part of PIDA road modernization at a cost of US$19 billion.

Railway modernization

The modernization of railways in the ARTIN corridors is a key element to the success of the programme in reducing corridor inefficiencies. This activity involves the upgrading of management, equipment and infrastructure (but not necessarily replacing track) in order to allow a modern railway operation that is competitive with road transport.

The ARTIN railways systems are part public and part publicly-owned with concession agreements for management and PPP financing. In a properly organized PPP concession agreement, there will be investment from both the public and private sectors and this investment will include all aspects of rail modernization. This is the case with Rift Valley railway in the Northern Corridor, where its six year investment plan includes all necessary items including rolling stock, signaling systems and modern management information systems.

The Transnet rail system in South Africa, which is not a PPP, runs like a modern railway and competes successfully with road transport, carrying 45-50% of long distance traffic in the North-South Corridor. However, it is handicapped by the inefficient operations of the railways in Zambia and Democratic Republic of Congo in terms of competing with road for the traffic with those countries.

The modernization of three railways is planned as part of the PIDA programme, and the modernization of all the remaining ARTIN corridor railways by 2040.

It is estimated that 17,200 kilometres of rail lines would be implemented in ARTIN corridors as part of PIDA rail modernization at a cost of US$7 billion.

Border post efficiency improvements

A key part of improving corridor efficiency involves the construction of OSBPs and the improvement of customs, immigration and other border functions to create efficient border-crossing. The traditional border posts are very inefficient and completely disconnected to the national and cross-border information systems that need to function effectively. This has been recognized by the RECs and has led to the generation of many one-stop border post projects of which 27 are on the ARTIN corridors.

The Transport Outlook 2040 indicated that 11 of the 43 most important ARTIN border crossings will experience a capacity constraint by 2020[5]. Thirty additional border crossings will need improvement by 2040.

The PIDA programme recommends that all border posts on ARTIN corridors be converted to one-stop border posts, unless that change is overtaken by the effective implementation of the African Customs Union. The process of improving inter-country coordination at border posts will be valuable even if the customs functions are later phased out as the result of a Customs Union.

The PIDA border post construction and implementation programme is estimated to cost about US$ 2 billion.

Smart corridor technology

The PIDA definition of a smart corridor is a cross-border ICT system for corridors that contains the following modules:

- Single Electronic Window
- Cargo Tracking
- Container Tracking
- Freight Train Tracking
- Commercial Vehicle Tracking (with vehicle weight – similar to CVISN in North America), and
- High-Visibility Corridor Efficiency Monitoring

The introduction of smart corridors is recommended to start with the development of one or more smart corridor models at the continental level (using NPCA as the lead) with implementation in phases on the regional level starting with high-priority corridors and moving to all ARTIN corridors by 2040.

Over the 30-year PIDA period, the modern smart corridor programme would be phased as shown in Table 10 (see Figure 10 for the locations of these corridors).

[5] There is a major push in all RECs to implement one-stop border posts (OSBPs). Presently, only two are operating (Cinkase in Burkina Faso and Chirundu in Zambia), but there are projects to implement 55, of which 27 are in ARTIN corridors.

Table 10: Staging of modern corridor improvements

Network Component	2020 Objectives	2030 Objectives	2040 Objectives
High Priority Corridors (with road and rail transport)	Expanded port capacity	Completion of modern road corridor design	**Complete, modern smart corridor system with new hub ports**
	Modern road corridor design for key sections (with capacity increases)	Increased road and rail capacities	
	Rail modernization	New hub ports	
	Smart corridor systems		
	OSBPs		
	Increased role of PPPs		
Second Priority Corridors	Expanded port capacity	Completion of modern road corridor design	**Complete, modern smart corridor system**
	Modern road corridor design for key sections	Rail modernization	
	Key OSBPs	Increased road and rail capacities	
	Increased role of PPPs	Smart corridor systems	
		Complete OSBPs	
Other Corridors	Expanded port capacity	Modern road corridor design for key sections	**Modern smart corridor system**
	Key OSBPs	Smart corridor systems	
		Complete OSBPs	
		Increased role of PPPs	

Figure 10: PIDA smart corridor projects for short-, medium- and long-term

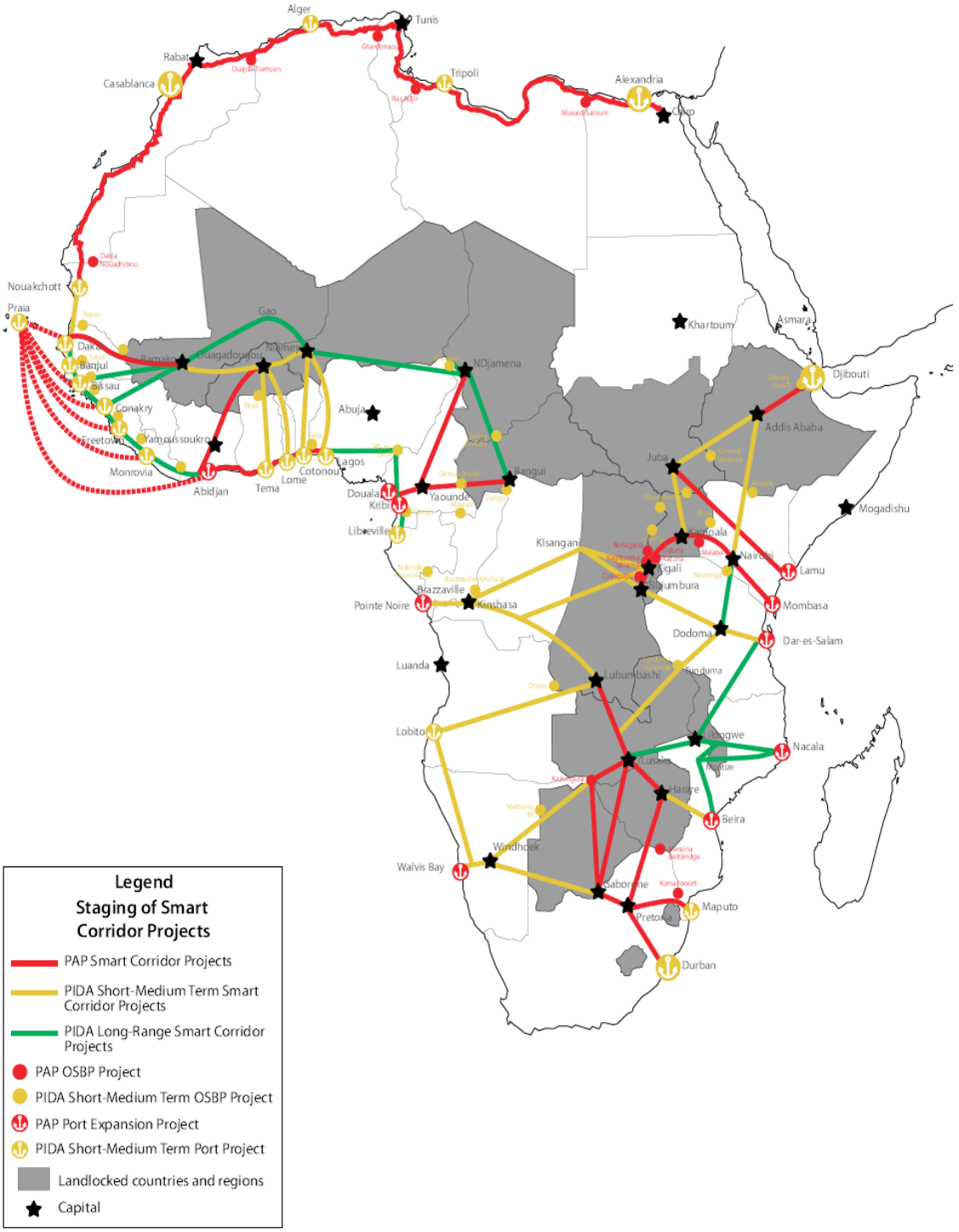


Figure 11: PIDA railway river and port construction and modernization projects, for short-, medium- and long-term

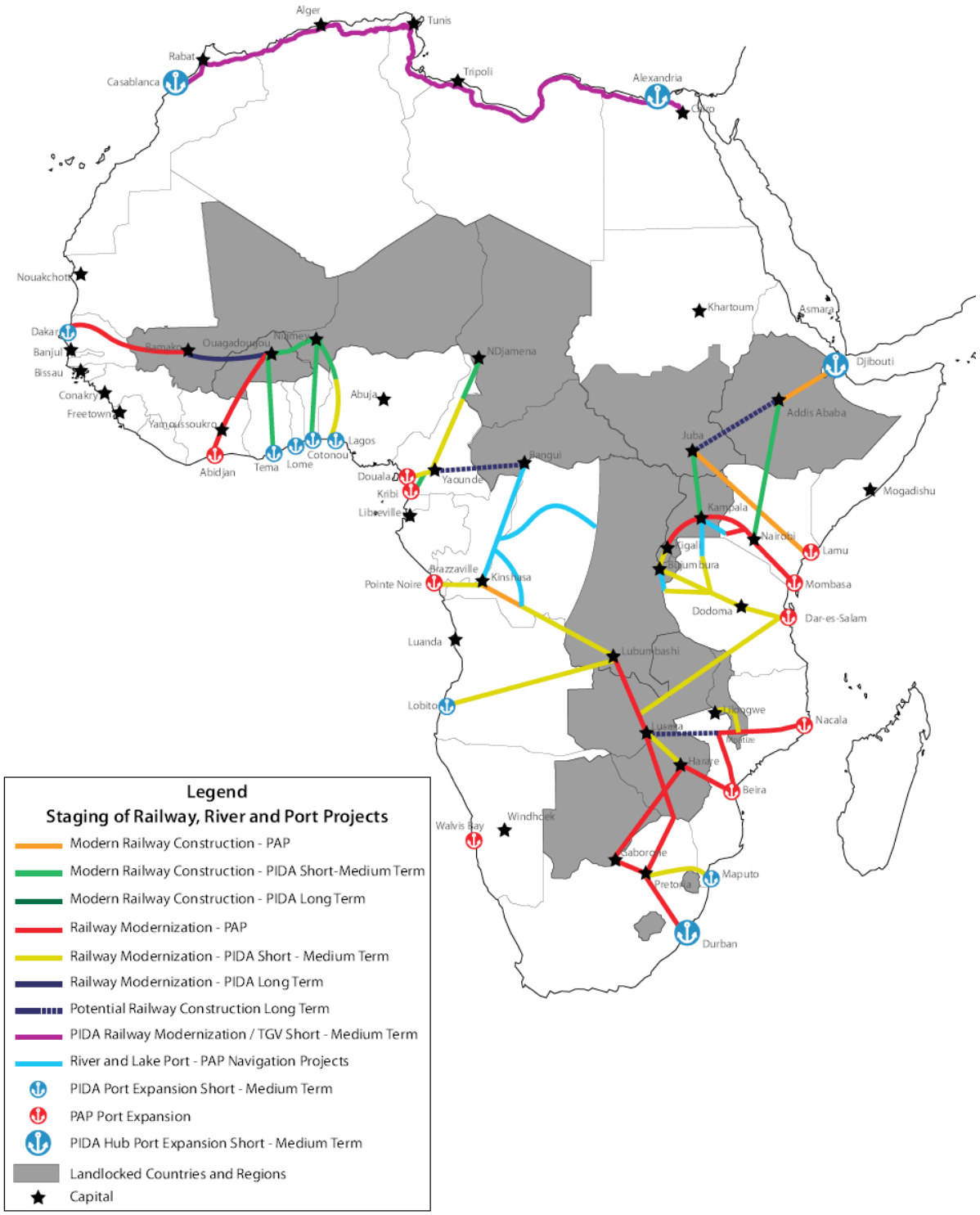
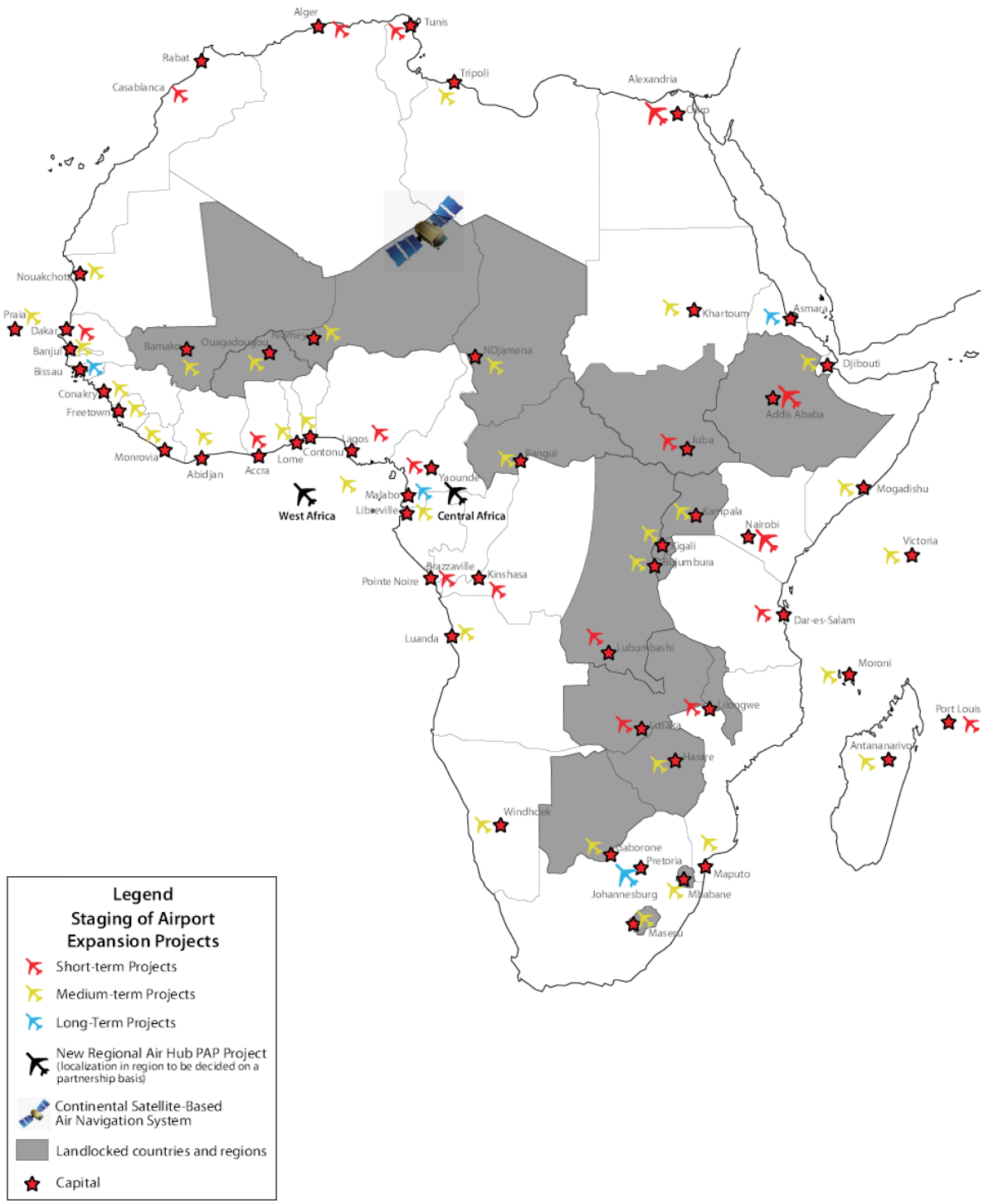


Figure 12: PIDA airport expansion projects for short-, medium- and long-term



3.6 Summary of the PIDA Programme

The total PIDA projects retained to comply with the three basic strategies as described above can be summarized as follows:

ARTIN road network

- **Construction of missing links** — **13 800 km**
- **Upgrading of existing roads** — **15 200 km**
- **Modernization of the 40 corridors** — **9 500 km**

TOTAL — **32 500 km**

ARTIN Railways

- **Construction of new railway lines** — **12 000 km**
- **Modernization of existing railways** — **17 500 km**

TOTAL — **29 500 km**

Ports

- **Extension of existing ports or new ports (35 Ports)** — **1 700 million Tons**

Airports

Extension of existing airports or new airports — **54 Airports**

The total cost of the PIDA Programme is estimated between US$ 112 to 163 billion over a 30- year period. Its components are shown in Table 11 and 12 below.

Table 11: Estimated size of the PIDA Regional and Continental Programme for ARTIN

Region	Connectivity		Filling Gaps				Modernization			
	TAH (km)	Inter-Capital (km)	Ports* (no.)	Road (km)	Rail (km)	Air-ports (no.)	Road (km)	Rail (km)	Air	OSBP (no.)
North Africa	2,700	-	*	800	500**	5	800	8,100	-	5
West Africa	3,800	-	10	5,800	3,000	16	2,000	2,400	-	21
Central Africa	3,900	1,900	6	1,100	3,000	7	1,400	800	-	10
Eastern Africa	1,100	-	7	3,600	2,500	8	2,400	1,800	-	20
Southern Africa	400	-	12	3,900	4,000	14	2,900	4,100	-	17
Continental	-	-	-	-	-	-	-	-	1	-
Total	**11,900**	**1,900**	**35**	**15,200**	**12,000**	**50**	**9,500**	**17,200**	**1**	**73**

* Only ARTIN corridor ports serving landlocked countries are shown here. There are no ARTIN corridor ports in North Africa serving landlocked countries, ** not counting high speed rail construction

Table 12: Estimated costs of the PIDA Regional and Continental Programme for ARTIN (US$ billion)

Region	Connectivity		Filling Gaps				Modernization				Total
	TAH	Inter-Capital	Ports	Road	Rail	Airports	Road	Rail	Air	OSBP	
North Africa	1.4	-	-	0.8	1.0**	0.6	1.7*	4.1**	-	0.2	9.8
West Africa	1.9	-	12.0	4.6	9.0	1.4	4.1*	0.6	-	0.5	34.1
Central Africa	2.0	1.0	7.6	0.8	5.2	0.7	2.8*	0.2	-	0.3	20.6
Eastern Africa	0.6	-	15.4	2.9	9.0	0.8	4.6*	0.4	-	0.5	34.2
Southern Africa	0.2	-	14.0	3.1	12.0	1.0	5.9*	1.5	-	0.5	38.2
Continental	-	-	-	-	-	-	0.1*	-	0.5	-	0.6
Total	**6.1**	**1.0**	**49.0**	**12.2**	**36.2**	**4.5**	**19.2**	**6.8**	**0.5**	**2.0**	**137.5**

* Including smart corridor development, with smart corridor technology models developed at the continental level and smart corridor implementations at the regional level, ** not counting high speed rail construction.

Note: Road modernization includes by-passes and port access roads which also add capacity. All numbers are estimates which should be taken as approximate with +/- 20% accuracy.

3.7 PIDA Long-Term Transport Strategies by Region

The PIDA transport strategies at the continental level and for each region are shown in Figures 13 to 18. The costs of each regional programme by subcomponent are given in Table 12.

3.7.1 Continental

The implementation of the PIDA programme should be controlled and monitored at continental level. The NPCA together with the AUC should also work with all the stakeholders at regional and national level in the design and implementation of the program by playing a role of catalyst. They should monitor the results and inform regularly the Heads of State on the progress achieved and on the difficulties faced by the stakeholders.

Over and above this general monitoring and assistance, the following specific activities should be conducted at continental level:

- Modernization of the transport services along the road corridors
- Modernization of air transport services and
- Completion of the Trans African Highways

Modernization of the transport services along the road corridors

As mentioned above, it is important for Africa, to put in place, during the PIDA period, a network of regional roads with well-defined norms and characteristics and with efficient transport services. The definition of this minimum norms and characteristics should be done at continental level.

It is also important to implement smart corridor systems. The analysis of the different systems of smart corridors, the identification of the most appropriate system for Africa and the testing of some of these systems on specific, selected corridors should be done at continental level.

Modernization of air transports services

The world of aviation is moving and it is imperative, for Africa to develop a new air transport control system. The analysis of the various solutions in order to select the best for Africa and the implementation of the system should be done at continental level.

The implementation of the Yamoussoukro Decision should also be undertaken at continental level in coordination with the regional specialized organization such as AFCAC.

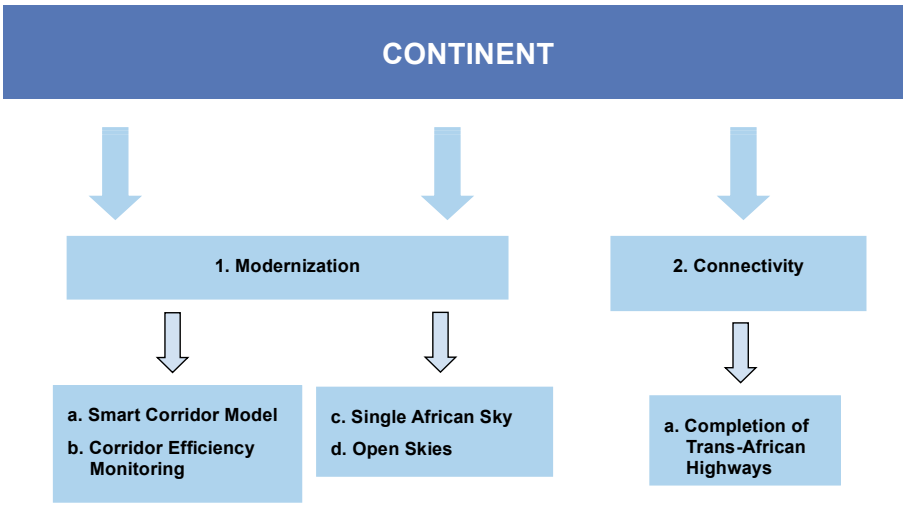
Completion of the Trans African Highways (TAHs)

The PIDA study has identified that 11 900 km of TAH are still missing and need to be built during the PIDA period. The identification of these missing links, the technical studies to complete them and the identification of the best timing to complete each of them should be conducted at continental level, by using an agreed methodology. The search for financing for these civil works should also be done at continental level.

Without taking into account the overall follow up and monitoring of the PIDA program, the PIDA Study has estimated that the costs of these activities would be the following:

Modernization of the road network, including the smart corridor:	US$ 100 Million
Modernization of air transport services	US$ 500 Million
Completion of the TAH (11900 km)	US$ 6 100 Million
TOTAL	US$ **6 600 Million**

Figure 13: PIDA long-term continental strategies



3.7.2 PIDA Long-Term Strategies for North Africa

The North Africa region has a well-designed and quite efficient regional transport system. The recommended long-term strategies proposed by the PIDA Study cover the three basic strategies of the PIDA program that is the modernization of the existing network, filling the gaps to satisfy the expected transport demand and completing the missing links of the TAHs.

Modernization of the existing transport network

- **Roads :**The North Africa region should modernize the Trans Maghreb highways by modernizing about 800 km of roads, by implementing a smart corridor system along the whole infrastructure and by building 5 one stop border posts.
- **Rail:** About 8 100 km of existing rail tracks would also need to be modernized and the implementation of high speed trains should be studied and possibly implemented where feasible.

Filling the gaps

In order to satisfy the estimated transport demand, the Study considers that the following investments should be conducted:

- Improvement of capacity on about 800 km of the Trans Maghreb Highways by the construction of additional lanes
- Construction of 500 km of new rail tracks
- Development of capacity on 5 regional airports

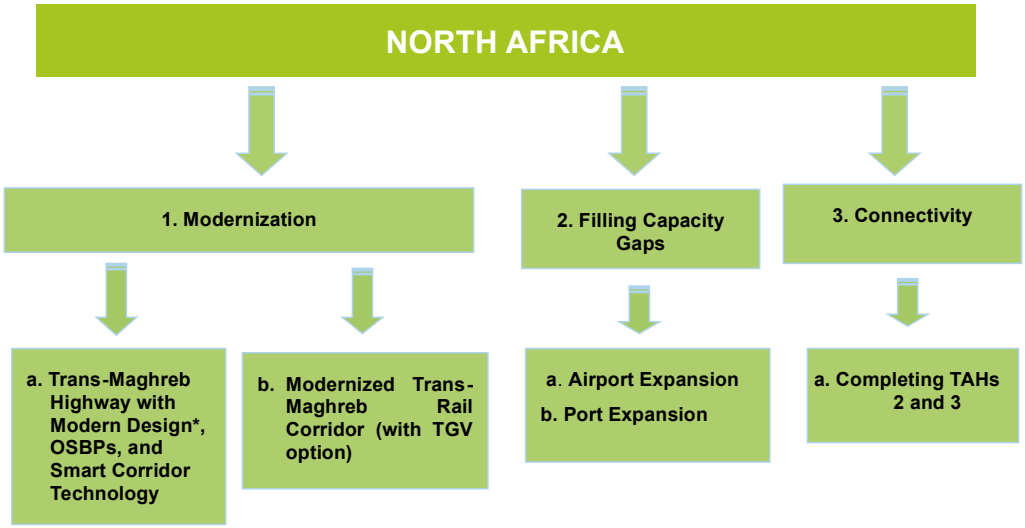
Connectivity

In coordination with the continental level, the two TAHs crossing the region (TAHs 2 and 3) should be completed (about 2 300 km).

The Consultant has estimated the costs of these activities as follows (without including the costs of high speed trains):

Completion of TAHs	PM (see continental projects)
Modernization of the road network (including OSBP)	US$ 1 900 million
Modernization of 8 100 km of rail tracks	US$ 4 100 million
Improving capacity on 800 km of roads	US$ 800 million
Construction of 500 km of new rail tracks	US$ 1 000 million
Improvement of 5 airports	US$ 600 million
Total	US$ **8 400 million**

Figure 14: PIDA long-term strategies for North Africa



3.7.3 PIDA Long-Term Strategies for West Africa

Western Africa under the leadership of ECOWAS and WAEMU (UEMOA) has substantially improved the transport infrastructures and transport services in the region. Modern highways now link the key cities of the region and many ports and airports have been modernised. Despite these commendable efforts, transport services are still very expensive and much is yet to be achieved. As for the other African regions, a large part of the existing networks needs to be modernized and new investments will be required to satisfy the expected transport demand, in particular for the three landlocked countries (Burkina Faso, Mali and Niger) which may see their economic development jeopardized if efficient regional transport systems are not rapidly put in place.

Modernization of the existing network

- **Roads:** The Study highlights that about 2000 km of existing roads need to be modernized with the setting up of smart corridors and the implementation of modern design with harmonized norms and characteristics. Border crossings also need to be improved with the introduction of 21 OSBP.
- **Rail:** Various rail programs are under study to improve and develop the network which for the time being is not interconnected. More than 2 400 km of existing rail tracks would need to be modernized.

Filling the Gaps

The expected economic growth of the region will require a substantial development of the existing infrastructure; in particular port capacity. The PIDA Report's traffic forecasts clearly indicate that port capacity (the existing ones plus the planned or ongoing projects) will barely be sufficient to handle the traffic of the coastal countries and large additional port capacities will be required to handle the traffic from and to the landlocked countries. The recommended strategy is for the regional organization to rapidly elaborate a port master plan that should identify the best locations to develop new capacities and to prepare the relevant projects.

Linked to this port capacity development, the region should continue to analyse the possibility to implement new railway lines, to link the land locked countries to these new ports capacities. The Study proposes the development or extension of capacity of about 10 ports and to build about 3 000 km of new modern railway lines.

The capacity of part of the road networks along the regional corridors would also need to be extended over an estimated 5 800 km by the building of new lanes.

Air transport is particularly inefficient and costly both for regional and intercontinental travel. The Report recommends increasing the capacity of at least eleven airports. In order to improve efficiency and reduce costs, the Consultant also recommends studying the possibility to develop one or two air transport hubs in the region and to implement these hubs if proved feasible.

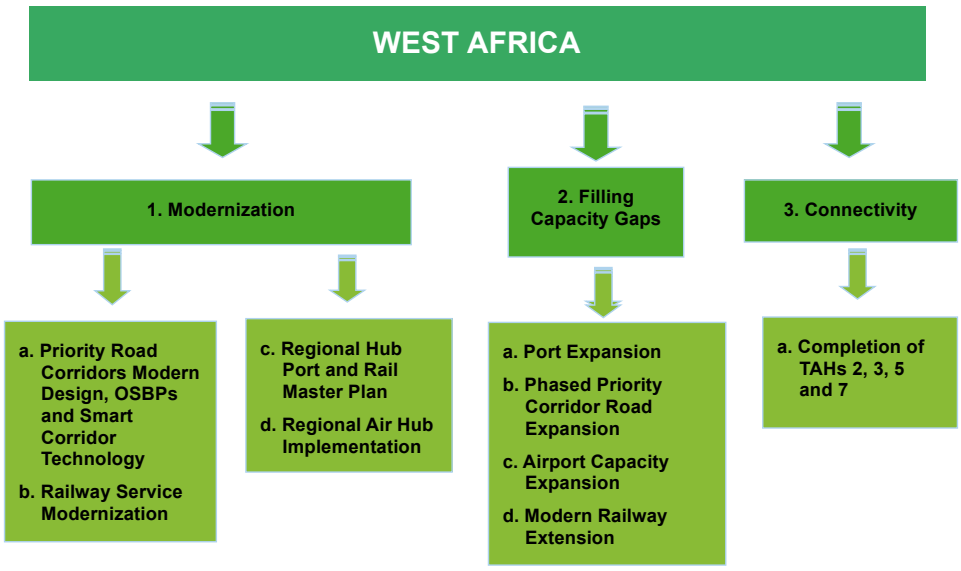
Connectivity

The region, in close coordination with the TAHs continental program, should built about 3 800 km of missing links along the TAHs crossing the region.

The Consultant has estimated the costs of these activities as follows:

Completion of TAHs	PM
Modernization of the road network (including OSBP)	US$ 4,600 million
Modernization of 2 400 km of rail tracks	US$ 600 million
Improving capacity on 5 800 km of roads	US$ 4 600 million
Construction of 3 000 km of new rail tracks	US$ 9 000 million
Improvement of 11 airports	US$ 1 400 million
Development of port capacities	US$ 7 600 million
Total	US$ **29 800 million**

Figure 15: PIDA long-term strategy for West Africa



3.7.4 PIDA Long-term strategies for Central Africa

The transport infrastructures and services are the less developed and extremely costly in the Central Africa region. The equatorial forest, covering a large part of the region makes the construction and maintenance of transport infrastructure extremely difficult and costly and recent conflicts have accelerated the degradation of existing infrastructure. The situation is particularly critical for the two landlocked countries (Chad and Central African Republic) and the Democratic Republic of Congo. The majority of the capitals of the region are not linked by good roads which makes the economic development extremely difficult.

Under the strong leadership of ECCAS, numerous transport projects are under study or under implementation but a very strong effort is essential to endow this region of an acceptable transport system.

As for the other regions, the Study recommends programmes to improve connectivity, modernize the existing network and develop new infrastructure to satisfy the expected transport demand.

Connectivity

The fact that the major cities of the region are not connected by good roads is a major reason for the slow economic development of the region. Not only are about 3 900 km of the TAHs still missing and would need to be built rapidly, but many inter capital links are not located on a TAH and the region should build at least 1900 km of modern roads to fill this gap. Finalizing the missing links of the TAHs and building these additional inter capital links is the highest priority for the region.

Modernization of the existing network

- **Roads:** A modern road system should be put in place along the corridors with the most traffic (smart corridors, modern design and implementation of OSBP). The Study notes that about 1 400 km of roads would require modernization with the construction of 10 OSBP.
- **Rails:** As in Western Africa, the railway network is not interconnected and in very poor condition at least 800 km of rail tracks would require modernization.
- **Rivers:** The Congo River and its tributaries offer a very good potential for transport. As mentioned above, river transport has been neglected during the past ten years and today carries only a portion of its potentiality. An effort should be made to develop and modernize river transport in the region.

Filling capacity gaps

The construction of about 3 000 km of modern rail tracks and the extension of road capacity with the construction of extra lanes over 1 100 km of roads would be required to satisfy the expected transport demand.

As for Western Africa, the extension of the capacity of 7 regional airports would be necessary as well as the study and the implementation of one or two air transport hubs.

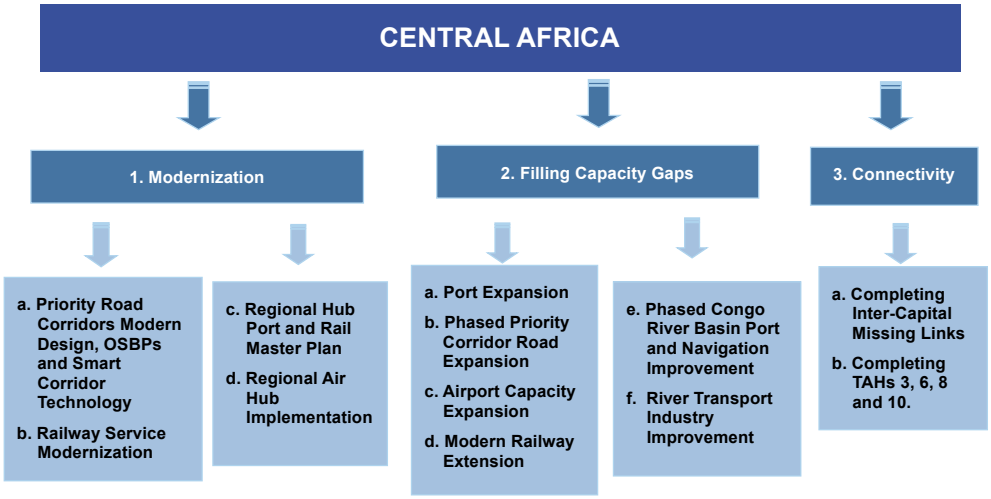
Although less severe than in other regions, the capacity of the ports would be insufficient and would need to be extended. The region has various port projects and the Study recommends the development of a port master plan to identify the best locations to extend the capacity, taking

into account the demands of the landlocked countries. The Consultant considers that at least the capacity of 7 ports (existing or new) would need to be extended.

The PIDA Report estimates the costs of these activities as follows:

Completion of TAHs	PM
Construction of 1900 km of modern roads	US$ 1 000 million
Modernization of the road network (including OSBP)	US$ 3 100 million
Modernization of 800 km of rail tracks	US$ 200 million
Improving capacity on 1 100 km of roads	US$ 1 100 million
Construction of 3 000 km of new rail tracks	US$ 5 200 million
Improvement of 7 airports	US$ 700 million
Development of port capacities	US$ 7 600 million
Total	**US$ 18 900 million**

Figure 16: PIDA long-term strategies for Central Africa



3.7.5 PIDA Long-Term Strategies for Eastern Africa

The regional transport systems are well developed in Eastern Africa with a series of well-run regional corridors that have been in operation for many years (Northern Corridor, Dar es Salam corridor, Central corridor etc.). However, despite substantial efforts to improve transport infrastructure and transport services, the costs of transport, in particular for the landlocked countries are extremely high and efforts are required to modernize the regional transport systems and increase their efficiencies (Figure 18). As with the other regions, the recommended strategies focus on the modernization and on filling the gaps and improving the connectivity by finalizing the missing links of the TAHs

Modernisation of the existing infrastructures networks

- **Roads:** Not only smart corridor systems should be implemented on all the existing corridors but about 2 400 km of roads would need to be modernized with new, harmonized norms and standards. The region would also need to implement twenty one-stop-border-posts (OSBPs) along these corridors.
- **Rail:** The rail network is well developed but has been neglected during the past ten years and about 1 800 km of railway lines would need to be modernized.

Filling the gaps:

As in Western Africa, port capacities represent a major issue in the East Africa region. Existing ports are closed to saturation and additional capacities are urgently required. Large projects such as Lamu are under study but even with the construction of Lamu, the port capacity will be too low to handle the expected traffic, in particular for the containers. It is important, for the region to prepare a comprehensive transport plan that should indicate the major locations to be extended (existing ports or new ports).

The expected traffic forecast, will also require additional rail and road capacities. The PIDA Study recommends an extension of road capacities by building additional lanes on at least 3 600 km of roads along the existing corridors and to build about 2 400 km of new railway lines (the Djibouti-Addis Ababa line and rail connection to the new hub ports).

Air transport will also have to be substantially developed with 8 regional airports requiring extension.

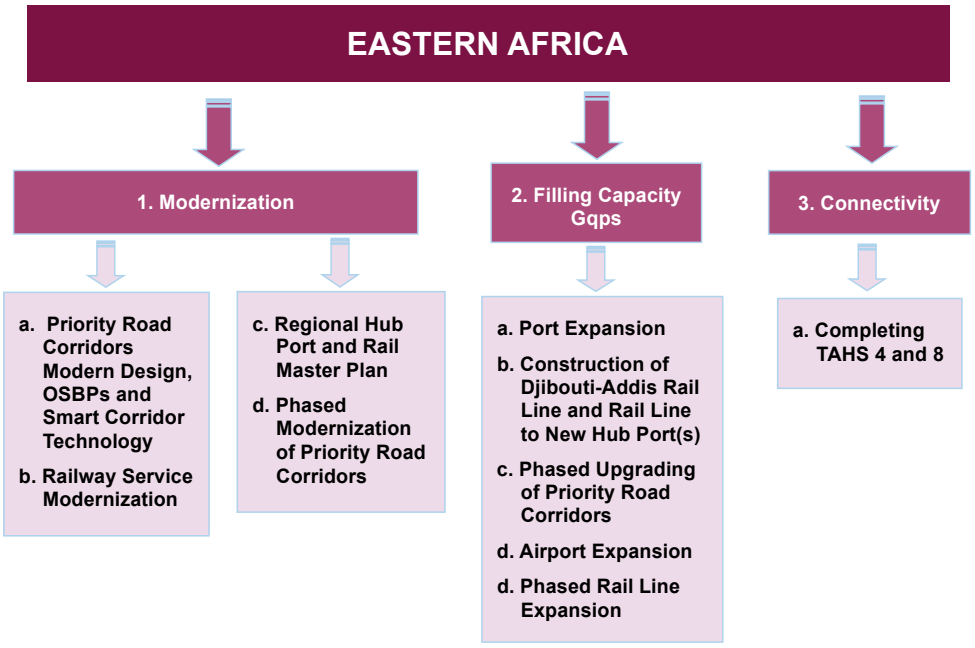
Connectivity

The TAHs crossing the region should be finalized in coordination with the PIDA. This represents the construction/rehabilitation of about 1 100 km of roads.

The Study has estimated the costs of these activities as follows:

Completion of TAHs	PM
Modernization of the road network (including OSBP)	US$ 5 100 million
Modernization of 1 800 km of rail tracks	US$ 400 million
Improving capacity on 3 600 km of roads	US$ 2 900 million
Construction of 2 500 km of new rail tracks	US$ 9 000 million
Improvement of 8 airports	US$800 million
Development of port capacities	US$ 15 400 million
Total	US$ **33 600 million**

Figure 17: PIDA long-term strategies for Eastern Africa



3.7.6 PIDA Long-Term Strategies for Southern Africa

The Southern Africa region has better developed transport infrastructure compared to other regions of Africa. Under the guidance of the SADC and the assistance of regional organization SARA, a modern, efficient regional transport system is being developed with the modernisation of regional corridors such as the North South corridor, the Kaprivi corridor and the Maputo corridor. The TAHs network is fully completed in the region.

The strategy for the transport sector is to modernise part of the existing infrastructure, in particular through the introduction of smart corridor systems along the road and by modernizing some of the existing railway infrastructure and operation in particular along the North- South corridor. The Study proposes the modernization of about 2 900

km of roads and 4 100 km of rail lines and the introduction of 17 OSBP.

As in the other region, Southern Africa will see the regional transport flows rapidly develop to such an extent that the existing transport capacities will not be able to handle the expected traffic forecasts and rapidly will need to be extended. The ports will present the largest problem and the PIDA Study recommends urgently the preparation of a port master plan to identify the best ways to increase port capacity (either by developing existing ports or by building new ones). More than 12 ports would require extension.

The expected traffic would also require the construction of new rail lines, in particular to link the landlocked countries to the new port capacities. The Consultant proposes the construction of 4 000 km of new rail lines.

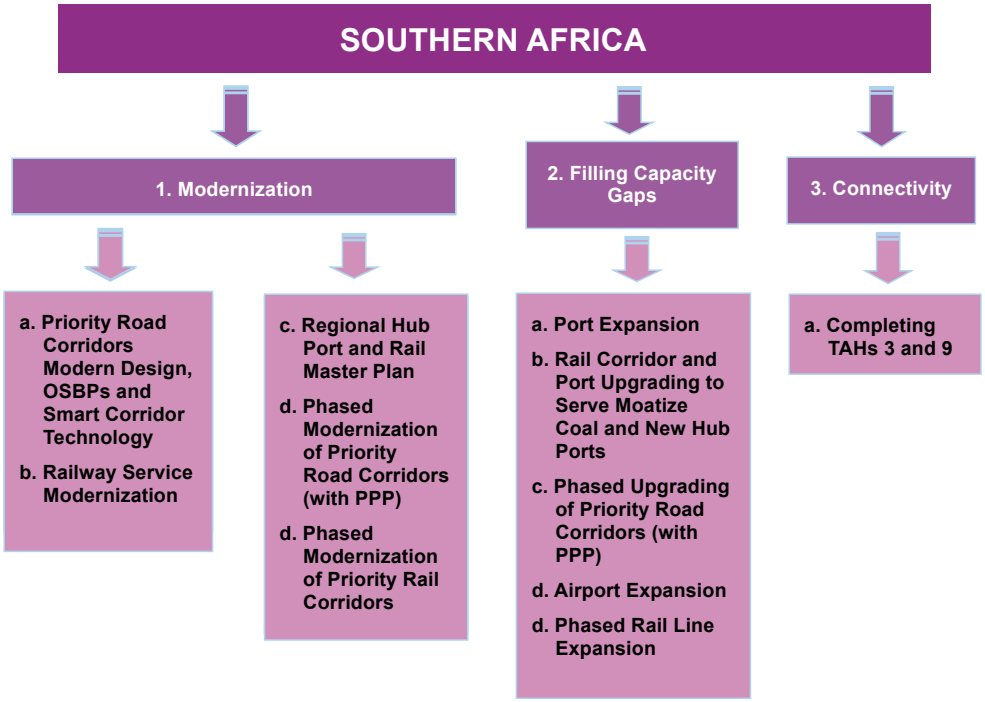
Road capacities will also need to be extended, by the construction of additional lanes on existing roads. The Study recommends the construction/ upgrading of 3 900 km of roads along the corridors.

Finally, existing airports will also be faced with capacity problems and 14 regional airports would need to be extended.

The Consultant has estimated the costs of these activities as follows:

Modernization of the road network (including OSBP)	US$ 6 400 million
Modernization of 1 800 km of rail tracks	US$1 500 million
Improving capacity on 3 600 km of roads	US$3 100 million
Construction of 2 500 km of new rail tracks	US$12 000 million
Improvement of 8 airports	US$ 1 000 million
Development of port capacities	US$ 14 000 million
Total	US$ **38 000 million**

Figure 16: PIDA long-term strategies for Southern Africa



3.8 Identification of the Priority Action Programme (PAP)

3.8.1 Identification and Selection of PAP Projects

PAP projects for corridors and airports were identified from existing project information and selected using the multi-criteria evaluation method, while TAH projects and inter-capital projects were identified on the basis of connectivity criteria, then prioritized using the multi-criteria process

New projects or project preparation activities that are needed to meet short-term PIDA priorities were also identified to supplement existing projects where the existing projects did not fill all the forecast gaps.

PAP Project Identification and Selection Process

The PAP project identification and selection process for corridor and airports followed six steps:

- **Step 1**: Compile the candidate list of projects for ARTIN corridors or airports
- **Step 2**: Determine which of these projects are eligible to the PAP
- **Step 3**: Rank the ARTIN corridors and all eligible projects using multi criteria analysis
- **Step 4**: Select the best ranked corridors and the PAP projects located on the priority corridors
- **Step 5:** Add new ideas for PAP projects from PIDA strategies and PIDA programmes, and
- **Step 6**: Package the projects in terms of PIDA Programmes

Each of these steps is discussed below.

Step1: Compilation of the candidate list of projects

The first set of candidate projects were collected from visits to the RECs in 2010 where the latest investment plans were discussed. This initial set of projects was then discussed with stakeholders in each region (as coordinated by the RECs) during PIDA workshops held in September and October 2011. From the feedback of the RECs during and after these workshops, an additional set of candidate projects were gathered.

More than 300 candidate projects were identified during this process. The list of all candidate projects has been given in the diagnostic report: PHASE I report.

Step 2: Determine PAP project eligibility

PAP project eligibility was determined using different processes for connectivity projects and for other candidate projects.

PAP Process for Connectivity Projects (TAH and Inter-Capital Connectors)

All TAH and inter-capital corridors with missing links were identified for each region. Then the data required for multi-criteria analysis was estimated for each missing link. From this analysis, the missing links with the highest priority were used to select TAH completion projects for the PAP and a similar process was used to identify the high priority inter-capital corridors for the PAP in each region.

A total of 64 connectivity projects were considered eligible.

PAP Process for All Other Projects

All candidate projects other than connectivity projects were screened for eligibility using the size and readiness criteria, which were agreed during the Tunis Workshop of July 2011

A total of 195 non-connectivity projects were considered eligible.

Step 3: Ranking of the ARTIN corridors and all ARTIN projects

The ranking of ARTIN corridors was carried out using the multi-criteria analysis process described in Chapter 2. The results of this evaluation and the ranking of ARTIN corridors are summarized below in Table 13:

Table 13: PIDA Corridor Priority Analysis

ID	Corridor	PIDA Score	Ranking
S4	Maputo	80	1
E3	Northern	76	2
S3	Beira	73	3
E1	Djibouti	67	4
S5	North-South	66	5
W6	Abidjan-Lagos (Coastal)	65	6
W2	Dakar-Bamako-Niamey	63	7
S1	Dar es Salaam	61	8
W1	Nouakchott-Dakar (Coastal)	59	9
C1	Douala-N'Djamena/Bangui	58	10
E4	Central	58	11
S7	Trans-Caprivi	56	12
W5	Abidjan-Ouagadougou/Bamako	54	13
S2	Nacala	53	14
S8	Trans-Cunene	52	15
N1	Trans-Maghreb (Coastal)	51	16
W7	Tema-Ouagadougou	51	17
C3	Pointe Noire-Lubumbashi	49	18
S6	Trans-Kalahari	49	19
W8	Lome-Ouagadougou	47	20
W4	Praia-Dakar-Bissau-Monrovia-Abidjan (Coastal)	45	21
W9	Cotonou-Ouagadougou/Niamey	45	22
C2	Libreville-Brazzaville	43	23
E2	Addis-Tunduma	42	24
W3	Bissau-Bamako Southern	40	25

Note: N= North Africa, W=West Africa, C=Central Africa, E=East Africa, S=Southern Africa

Step 4: Selection of the best ranked corridors

As agreed during the Tunis meeting, the PAP has been focused on key corridors with the highest priority. The following corridors have been retained for the PAP:

- The Northern Corridor (rail/road/lake)
- The Central Corridor (rail/road/lake)
- The North-South Corridor, including extensions to Maputo, Beira and Nacala (rail/road)
- The Addis Ababa-Djibouti Corridor (rail)
- The Abidjan-Lagos Coastal Corridor (road)
- The Dakar-Niamey Corridor (rail/road)
- The Praia-Dakar-Abidjan multimodal corridor (maritime/road)
- The Douala-Bangui-Ndjamena Corridor (rail/road)
- The Brazzavile-Bangui multi-modal corridor
- The Trans-Maghreb Corridor (rail, road)

All the eligible projects located along these 10 corridors and scoring 50 points or more have been retained in the PAP

- In accordance with the PIDA strategies described above, the proposed PAP projects on the priority corridors have two basic components
  - **Increase of efficiency** (modernization of road lay out, harmonization of norms and standards, setting up of smart corridor systems and one stop border posts, modernization of existing railways etc., and
  - **Increase of capacity** (Ports, climbing lanes for heavy vehicles, four lanes highway, by pass of urban centres etc.) All projects located along the corridors scoring 50 points or more have been selected.

The projects included in the PAP for each priority corridor are detailed in Tables 14 and 15 below.

Step 5: Add new project ideas from PIDA strategies

The projects identified for the PAP using the processes described in the previous steps were considered necessary but not sufficient to meet the needs of PIDA for filling future capacity gaps and for modernizing the ARTIN in the short-term and preparing the implementation of the PIDA strategies for the medium- and long-term. Therefore, additional projects and strategic activities were added to the PAP.

Four types of new projects were identified from the PIDA strategies and the results of the analysis in the Transport Outlook 2040 as described earlier on above. These were:

- Ports capacity development and new rail lines construction to link the landlocked countries to these ports. Possibly to set up hub ports in West, East and Southern Africa to serve the increased demand in general and accommodate the needs of the landlocked countries in particular
- Improvement of air transport services, (hub airports in West and Central Africa) and the extension of some existing airports reaching capacity before 2020
- High-level, satellite-based air navigation system, and
- The completion of the first tranche of the missing links of the TAH and other inter capital connectivity.

Step 6: Package projects in terms of PIDA programmes

Finally, the PAP projects were packaged into 24 programmes, which help to define the PAP in a homogeneous manner. A brief description of these programmes is provided in Table 14:

Table 14: Brief description of PAP projects

Region	Programmes	PAP Programmes Components	Type
Continent	1. Single African Sky	▪ Design satellite-based air navigation system and create implementation and financing plan (Phase 1) ▪ Initial implementation of satellite-based air navigation system	Soft Hard
	2. Open Skies	▪ Full implementation of Yamoussoukro Decision	Soft
	3. Model Smart Corridors and Efficiency Monitoring	▪ Design of model smart corridor system(s) and selection of corridors for implementation (Phase 1) ▪ Design and implementation of efficiency monitoring system	Soft Soft
	4. TAH 2 and 6 Missing Links	▪ Construction of Missing Links - TAH 6 Dakar – Ndjamena : 1,582 km of earth track in Chad and Sudan (out of 4,200 km overall length) - TAH 2 Algiers – Lagos: 1,950 km of paved road construction and rehabilitation in Algeria, and Niger (out of 4,500 km)	Hard
North Africa	5. Trans-Maghreb Road Corridor	▪ Develop joint standards for modern road corridor design (8,100 km) (with PPP) ▪ Design and implement smart corridor system and six OSBPs	Soft Soft, Hard
West Africa	6. Abidjan-Lagos Coastal Corridor	▪ Develop joint standards for modern road corridor design (with PPP) ▪ Design and implement smart corridor system and three one-stop border posts ▪ Modernize key road sections (384 km in the PAP, and 288 in medium term) and upgrade the remaining 288 km in medium term (960 km total)	Soft Soft, Hard Soft, Hard

Region	Programmes	PAP Programmes Components	Type
	7. Abidjan-Ouagadougou/Bamako Multimodal Corridor	▪ Develop joint standards for modern corridor road design (with PPP) ▪ Design and implement smart corridor systems and two one-stop border posts ▪ Design and implement road upgrading (500 km out of 1,800 km) ▪ Design and implement modernization of railway between Abidjan and Ouagadougou (1,200 km with modern equipment, signalling and information systems) in coordination with rail master plan	Soft Soft, Hard Soft, Hard Soft, Hard
	8. Dakar-Niamey Multi-modal Corridor	▪ Develop joint standards for modern corridor road design (with PPP) ▪ Design and implement Smart Corridor system and three one-stop border posts ▪ Design and implement road upgrading (500 km out of 1,200 km) ▪ Design and implement modernization of Dakar-Bamako railway (1,200 km with modern equipment, signalling and information systems) in coordination with rail master plan	Soft Soft, Hard Soft, Hard Hard
	9. Praia-Dakar-Abidjan Multi-modal Corridor	▪ Develop standards for modern marine transport infrastructure and operations from Praia to West African ports, based on regional port master plan (with PPP) ▪ Implement marine transport system for operations from Praia to West African ports (with PPP)	Soft Hard
	10. West Africa Hub Port and Rail Programme	▪ Develop Master Plan for regional port capacity and regional rail linkages (Phase 1) ▪ Implement short-term port expansion plans for Dakar, Abidjan, Tema, Lome, Cotonou, including: - Ile Boulay (Abidjan) New Port/Container Terminal Construction	Soft Hard
	11. West Africa Air Transport	▪ Develop joint plan for regional air hub PPP implementation and identify any needed policy reforms then implement plan. ▪ Implement policy reforms ▪ Implement planned expansions at three airports (Ghana, Nigeria, Senegal) (Phase 1) including: - Kotoka International Airport (Accra) Upgrading	Soft Soft Hard
Central Africa	12. Pointe Noire Brazzaville-Kinshasa –Bangui N'Djamena Road/River Corridor	▪ Develop joint standards for modern corridor river transport infrastructure design (with PPP) ▪ Design and implement smart corridor system and three one-stop border posts ▪ Design and implement river port upgrading (4 ports to start with and fifteen others in the medium term) ▪ Design and implement modernization of river transport (with modern equipment, navigation aids and communications and information systems)	Soft Soft, Hard Soft, Hard Hard
	13. Douala-N'Djamena/Douala - Bangui Corridor	▪ Develop joint standards for modern road corridor design (with PPP)	Soft

Region	Programmes	PAP Programmes Components	Type
		▪ Design and implement smart corridor system and three one-stop border posts ▪ Road upgrading (523 km)	Soft, Hard Hard
	14. Central Africa Air Transport	▪ Develop joint plan for regional air hub PPP implementation and identify any needed policy reforms then implement plan. ▪ Implement policy reforms ▪ Implement planned expansions at 2020 gap airports (Cameroon, Congo, DR Congo) (Phase 1)	Soft, Hard Soft Hard
	15. Inter-Capital Connector Missing Links	▪ Construction and paving of missing links in inter-capital connectors not on TAHs (CD3-70km + bridge, CD5-236 km, CD12-855 km)	Hard
	16. Central Africa Hub Port and Rail Programme	▪ Develop Master Plan for regional port capacity and regional rail linkages (Phase 1) ▪ Implement short-term port expansion plans for Dakar, Douala, Kribi, Pointe Noire, Matadi and Banana, including: - Pointe Noire container terminal expansion - Kribi deep water port construction - Banana port construction	Soft Hard
	17. Brazzaville-Kinshasa Bridge. Kinshasa-Ilebo Railway	▪ Construct road/rail bridge (with PPP) ▪ Design and implement one-stop border post ▪ Design and build Modern Railway from Kinshasa to Ilebo (1,015 km)	Hard Hard Soft, Hard
Eastern Africa	18. Djibouti-Addis Ababa Corridor	▪ Develop joint design standards for modern rail transport corridor infrastructure (with PPP) ▪ Design and implement smart corridor system and one one-stop border post ▪ Design and construct Djibouti-Addis Ababa rail line (710 km)	Soft Soft, Hard Soft, Hard
	19. Northern Corridor	▪ Develop joint design standards for modern road corridor infrastructure (with PPP) ▪ Design and implement smart corridor system and six one-stop border posts ▪ Implement three road modernization projects (129 km) ▪ Implement four road upgrading projects (602 km out of 1,900 km of core corridor roads) ▪ Implementation of lake port modernization and navigation aid projects for 6 ports	Soft Soft, Hard Hard Hard Hard
	20. Central Corridor	▪ Develop joint design standards for modern road corridor infrastructure (with PPP) ▪ Design and implement smart corridor system and four one-stop border posts ▪ Implement three road modernization projects (176 km) ▪ Implement seven road upgrading projects (890 km out of 1,600 km of core corridor roads)	Soft Soft, Hard Hard Hard

Region	Programmes	PAP Programmes Components	Type
	21. Lamu Gateway Development and East African Hub Port, Rail	▪ Develop Master Plan for regional port capacity and regional rail linkages (including Lamu Port) (Phase 1) ▪ Implement short-term port expansion plans for Mombasa, Dar-es-Salaam and Ethiopia dry ports including: ▪ Mombasa port extension of capacity ▪ Dry ports at Modjo and Semera construction ▪ Lamu port construction. Design and build road and rail connections from Lamu to Nairobi, Kampala and Juba	Soft Hard Hard Hard Soft, Hard
Southern Africa	22. North-South Multi-modal Corridor	▪ Develop joint design standards for modern road corridor infrastructure (with PPP) ▪ Design and implement smart corridor system and four one-stop border posts ▪ Implement three road modernization projects (176 km) ▪ Implement seven road upgrading projects (890 km out of 1,600 km of core corridor roads) ▪ Develop cooperative master plan for modern North-South Corridor rail development (Phase 1) ▪ Carry out short-term rail modernization programmes for North-South Corridor and Dar Corridor, including: - TAZARA Rail system improvements - SNCC Railway network upgrading - Chingola to Solwezi Railway construction	Soft Hard Hard Hard Soft Hard
	23. Nacala/Beira Multimodal Corridors	▪ Design modern Nacala and Beira Rail systems to support Moatize coal exports with PPP inputs (Phase I) ▪ Carry out short-term rail upgrading of Beira and Nacala Corridor rail lines (Phase 1)	Soft Hard
	24. Southern Africa Port and Rail Programme	▪ Develop Master Plan for regional port capacity and regional rail linkages (Phase 1) ▪ Implement short-term port expansion plans for Nacala, Beira, Maputo, Durban, Walvis Bay, Luanda (Phase 1) including: - New coal terminal at Nacala Port - Nacala Port container terminal expansion - New coal terminal at Beira Port - Beira Port dredging - Maputo and Matola Port rehabilitation and dredging programme - Walvis Bay new container terminal	Soft Hard Hard Hard Hard Hard Hard

Note: In addition to the projects included in this table, it is expected that additional projects will be identified during the next few years which would qualify to be included in the PIDA short-term investment programme and which could significantly increase its size.

The PAP dimension is summarized in Table 16 below.

3.8.2 Cost of PAP Projects

The cost of each component of these programmes is provided in the Table 15 below :

Table 15: PAP programme costs by region, mode and strategy

Prog	Name	Region	Mode	Strategy	Cost (US$ million)
1	Completing TAHs Phase I (TAH 6 and 2)	Continent	Road	Connectivity	2,150
2	Single African Sky Phase 1 (Design and Initial Implementation)	Continent	Air	Modernization (Design)	50
			Air	Modernization (Implement.)	225
3	YD Implementation (Open Skies)	Continent	Air	Modernization (Implement.)	5
4	Smart corridor programme Phase 1 (Design)	Continent	Road/Rail/Port/OSBP	Modernization	100
5	Trans-Maghreb Highway (Smart Corridor System)	AMU	Road/Port/OSBP	Efficiency Improvement	75
6	Abidjan-Lagos Coastal Corridor Phase 1 Modernization	ECOWAS	Road/Port/OSBP	Modernization	50
			Road	Upgrading	240
7	Dakar-Niamey Multimodal Corridor Modernization	ECOWAS	Multi-modal	Modernization	50
			Road	Modernization	250
			Rail	Modernization	290
8	Abidjan-Ouagadougou/ Bamako Multimodal Corridor Modernization	ECOWAS	Multi-modal	Modernization	50
			Road	Modernization	250
			Rail	Modernization	240
9	Praia-Dakar- Abidjan Multimodal Corridor Phase 1 (Design and Equipment)	ECOWAS	Multi-modal	Modernization	50
			Marine	Modernization	100
10	West Africa Hub Port and Rail Programme Phase 1	ECOWAS	Port and Rail	Master Plan	50
			Port	Expansion	1,800
			Rail	Modernization	290
11	West Africa Air Transport Phase 1	ECOWAS	Air	Modernization	20
			Airport	Expansion	400
12	Pointe Noire- Brazzaville-Bangui-N'Djamena Road/River	ECCAS	River/Port	Modernization	100

Prog	Name	Region	Mode	Strategy	Cost (US$ million)
	Modernization		River	Palambo Dam Construction	200
13	Douala-Bangui-Ndjamena Corridor Modernization	ECCAS	Multi-modal	Modernization	50
			Road	Upgrading	240
14	Central African Inter-Capital Connectivity	ECCAS	Road	Connectivity	800
15	Central Africa Air Transport Phase 1	ECCAS	Air	Modernization	20
			Airport	Expansion	400
16	Central Africa Hub Port and Rail Programme Phase 1	ECCAS	Port and Rail	Master Plan	50
			Port	Expansion	1,350
17	Brazzaville-Kinshasa Bridge, Kinshasa-Ilebo Railway	ECCAS	Bridge	Construction	450
			Rail	Construction	1,200
18	Djibouti-Addis Corridor Modernization	EAC+IGA	Rail	Modern Rail Construction	1,000
19	Northern Multi Modal Corridor Phase 1 Modernization	EAC+IGA	Multi-modal	Modernization	75
			Road	Modernization	130
			Road	Upgrading	780
			Lake	Modernization	20
20	Central Corridor Phase 1 Modernization	EAC	Multi-modal	Modernization	50
			Road	Modernization	330
			Road	Upgrading	460
21	Lamu Gateway Development and Eastern African Hub Port-Rail	EAC+IGAD	Multimodal	Master Plan	50
			Port	Expansion	2,000
			Port	Construction	1,000
			Road	Construction	480
			Rail	Construction	2,400
22	North-South Multi-modal Corridor Phase 1 Modernization	SADC	Multi-modal	Modernization	75
			Road	Modernization	150
			Road	Upgrading	800

Prog	Name	Region	Mode	Strategy	Cost (US$ million)
			Rail	Modernization	1,000
			Rail	Construction	300
23	Moatize to Sea Links in Rail/lake/river Corridors (Design and Construction)	SADC	Rail	Upgrade and Modernization	450
24	Southern Africa Hub Port and Rail Programme Phase 1 (Master Plan)	SADC	Port and Rail	Master Plan	50
			Port	Expansion	2,220
Total					25,415

Source: compiled by authors

Table 16: Size of the proposed PAP programme by mode and region (US$ million)

Region	Multi-modal	Road	Rail	Port	Lake, River and Marine	Air	Total
North Africa	75	750	-	-	0	0	825
West Africa	250	1,340	820	1,900	100	420	4,830
Central Africa	100	1,990	1,200	1,350	200	420	5,260
Eastern Africa	175	2,480	3,400	3,000	20	0	9,075
Southern Africa	125	950	1,750	2,220	0	0	5,045
Continental	100	*	0	0	0	280	380
Total	825	7, 510	7,170	8,470	320	1,120	25,415

* TAH projects allocated to regions.

Source: compiled by authors

4.IMPLEMENTATION STRATEGY OF THE PIDA TRANSPORT PAP

The PIDA PAP covers all modes of transport (roads, rails, lakes and rivers, ports, airports and air navigation). For each mode of transport, the PIDA PAP is articulated around three basic strategies:

- Improve connectivity
- Modernize existing transport infrastructure and services to increase efficiency, and
- Upgrade/build transport infrastructure to satisfy expected transport demand

The Transport PIDA PAP should be implemented by the relevant continental, regional and local institutions. There are a number of such institutions. The major ones are highlighted below.

4.1 Relevant Institutions for Implementation

4.1.1 Institutions at the Continental Level

Continental bodies

Transport policies and strategies are part of the overall policy framework for economic and social development in Africa, under the aegis of the African Union Commission (AUC). The AUC has the responsibility for defining policies and strategies for the development of transport infrastructure aimed at increasing regional integration and the competitiveness of African products on the world market.

The NEPAD Planning and Coordinating Agency (NPCA), as a technical body of the AU has been established to facilitate and coordinate the implementation of continental and regional priority programmes and projects and to mobilise resources and partners in support of their implementation .

The UN Economic Commission for Africa's (UNECA) mandate is to promote the economic and social development of its Member States, foster intra-regional integration, and promote international cooperation for Africa's development. UNECA has engaged in various analyses, such as a study of the implementation of the RECs priority program.

Specialized transport organizations

African Ports Associations: Their main purpose is to develop communication, capacity building, and learning experiences among themselves.

Three groupings of ports on the continent are active:

- The PMAWCA – Port Management Association of West and Central Africa
- The PMAESA – Port Management Association of Eastern and Southern Africa
- The NAPMA – North African Port Management Association

These three associations are federated in the Pan African Ports Association. Their role has been very helpful in disseminating ideas and good practices. Another main mandate of the associations is to define and harmonize performance indicators in order to bring costs down and benefit economic development.

The Union of African Railways (UAR) has established a new rail agenda to promote continental and regional integration. At the Conference of Ministers for transport held in Brazzaville (Congo) in 2006, the institutional framework was strengthened, giving the UAR a central role in supporting policies to develop and manage railways in Africa.

Under the new setup, the African Union will have "key leadership" to coordinate and facilitate railway development and integration. The UAR works closely with the AUC program on economic development, supported by NEPAD, as well as with other actors involved, such as the AfDB and the UNECA.

The African Civil Aviation Commission (AFCAC) is an autonomous body, and membership is open to all African States that are members of AUC. It is a consultative body and its conclusions and recommendations are subject to acceptance by each of the Governments. Its major objectives are: (1) to provide the civil aviation authorities with a framework within which to discuss and plan all measures of co-ordination and co-operation for aviation activities, and (2) to promote co-ordination, better utilization and orderly development of African air transport services. AFCAC is strongly involved in the implementation of the Yamoussoukro Decision by its Member States.

4.1.2 Institutions at the Regional Level

Regional Economic Commissions (RECs)

There are eight officially recognized RECs (UMA, ECOWAS, ECCAS, CEN-SAD, IGAD, EAC, COMESA and SADC). African States are sometimes

members of more than one REC. For example, the Democratic Republic of Congo belongs to four different RECs. The overlapping membership creates difficulties for the implementation of different REC policies. There has been an effort toward harmonization and cooperation in East and South Africa with the establishment of the Tripartite (SADC/COMESA/EAC and IGAD as an observer).

All RECs have the mandate to improve trade facilitation and regional transport efficiency, but they have very limited resources to assist Member States in implementing agreed policies.

Regional modal organizations

SADC benefits from the Southern Africa Railways Association (SARA) instituted in 1996. It includes all national railway institutions in SADC (except Madagascar) and works as a lobby to promote investment in railways in the region. SARA has developed several programs to manage railways, run cross-border services, and harmonize national rail policies. It formed Corridor Management Groups (CMGs) in 1998, in charge of coordinating and implementing agreed interventions and procedures in selected corridors. Under SARA leadership, joint inspections at border posts have been instituted. Since 2001, it has developed an integrated marketing policy for all railways in the region.

The West Africa Road Safety Organization (WARSO) was launched in 2008 in an attempt to improve safety and security along the roads. Thirteen Member States of ECOWAS are already members.

The Federation of East and Southern African Road Transport Associations (FESARTA) is active in developing an efficient road industry in that part of Africa. Its objectives are to achieve wide recognition of the value of the road transport industry to the Eastern and Southern Africa region, and to enhance its efficiency and competitiveness through the National Road Transport Associations.

Transport corridor organizations

Transport corridor organizations in Africa have taken different forms, with the common objective of monitoring and improving performance of corridors. In Southern Africa, the SADC Transport Protocol prescribes how to improve corridor operations. In Namibia, the Walvis Bay Corridor Group (WBCG), formed as a national PPP in 1990, has been investing in the port of Walvis Bay and, for over a decade, in building highways to neighbouring parts of SADC. The WBCG championed the formation of the Trans Kalahari Corridor Management Committee (TKCMC) and was very successful in addressing problems on this new three-country route. It is now a separate entity with its own secretariat and functions, funded by the three governments and moving toward a user fee system

The Maputo Development Corridor is a leading example of a corridor development organization. It was created by the Governments of South Africa and Mozambique to encourage industry development in light of the construction of a major toll road (BOT) from Pretoria to Maputo and having concession of the port. A new institution, the Maputo Corridor Logistics Initiative (MCLI), was created by the private sector in 2004 to motivate logistics improvements for shippers and industries. The Maputo corridor has been a key factor for the development of industries along the corridor.

In view of this successful experience, the Development Corridor concept has been tried on a number of other corridors– Beira, Mtwara and Central. Other corridor organizations are adding a development unit to transport management groups, such as the Northern Corridor.

In East Africa, the corridor institutions emerged in response to landlocked countries and the region's need for port access. The Northern Corridor Transit Transport Coordinating Authority (NCTTCA) substituted a multilateral agreement for bilateral agreements to insure right of access to the port of Mombasa. Its legal basis is an agreement signed in 1985 and ratified in 1986 by Kenya, Uganda, Rwanda and Burundi and joined by the Democratic Republic of Congo in 1987. It committed the participating Governments to guarantee a right of access to the port and freedom and facilitation of transit. NCTTCA has evolved to become a body also promoting infrastructure improvements and use of the corridor.

The West African approach is more regional. The institutional model consists of a Regional Facilitation Committee (ECOWAS) and Joint Technical Committee (WAEMU/UEMOA), with a national facilitation committee in each of the member countries. In this way, regional transit initiatives are conveyed to the national level for implementation and problems perceived at the national level are conveyed to the regional level for resolution.

4.1.3 National Level Institutions

National Trade and Transport Facilitation Committees (NTTFCs) have been established in many African States. Their role is to facilitate international trade.

The large majority of African States have established road funds to finance the maintenance of their road networks. Fees on petroleum products constitute the largest source of revenue of these road funds.

4.2 Proposed Implementation Strategy

These continental, regional and national institutions are to intervene at different levels in the cycle of the PAP activities and projects depending of the

mode of transport and of the proposed strategies.

This implementation proposal is made by type of projects, namely the main modes of transports.

4.2.1 Implementation of the Road Sector Activities

This Study has identified a number of regional roads that have been organized along the corridors to form part of the African Regional Transport Infrastructure (ARTIN). Many of these corridors are operated by Corridor Authorities with various administrative set up, some others are, as yet, not managed by authorities The final objectives of PIDA is to have an harmonized, efficient and well managed African regional road network extending over more than 100 000 km (selected corridors plus the Trans African Highways).

The PAP focuses on the road corridors that have been ranked as proprietary. It is expected that the other corridors will be dealt with through following PAP that should be established after a roll over process along the PIDA period.

Improving connectivity

In order to improve connectivity, the PAP recommends implementing a first phase of a program aiming at completing all the missing links of the TAHs before the end of the PIDA period. As mentioned above, about 12 000 km of missing links should be built to complete these TAHs, about 3 500 km should be completed under the PAP.

Finalization of the TAHs

The finalization of the TAHs is not always justified by economic consideration but should be achieved for social and political reasons as well. This Study proposes a special implementation program to complete these missing links.

1. NPCA should finalize the list of the missing links and for each of them prepare a pre-feasibility analysis in order to identify potential traffic and construction costs. It should be noted that part of the work is on-going at the AUC. NPCA would have to complete these studies by focusing on the sections of the TAHs not yet studied.
2. NPCA should rank these various projects, by using the selection criteria proposed by the Study.
3. These ranking should be presented to the RECs for possible amendment and to be finalized
4. NPCA and AUC should then start the process of searching for financing by presenting the program to the relevant stakeholders.

a. Each interested State should indicate their willingness to financially contribute to the program and the amounts they are planning to allocate to it

b. The program should also be presented to the various IFIs as well as to the G8 and G20 to get their financial contribution. This process will be facilitated by the previous classification and prioritization work.

5. Once the amounts for a first tranche are agreed, NPCA should identify the missing links to be completed in priority based on their ranking and the proposed contribution of the relevant States.
6. The final studies of these missing links (detailed engineering) should be conducted by the relevant States that should also be responsible for the relevant civil works.
7. NPCA should monitor the progress achieved to regularly inform the Heads of State and the key financiers and to assist the Member States that will face difficulties in the implementation of their specific projects.

BOX: Connectivity Programs in Central Africa

The connectivity of capital and large cities is particularly accurate in the central region where PIDA recommends building a minimum of 1 900 km of connecting road of which 1260 should be achieved within the PAP.

The Consultant has included in the PAP a special program to complete at least 1 260 km of roads in that region. This program which is estimated to cost about 600 million USD is part of the "Plan Prioritaire" prepared by ECCAS.

a. The implementation of this program should be conducted by ECCAS with the support of the relevant Member States. ECCAS should finalize the list of missing links to be included in the PAP and get the approval of the relevant Member States.

b. The final design engineering studies should be conducted by the Member States, under the guidance and technical assistance of ECCAS.

c. Once approved and finalized, the program should be presented by ECCAS with the support of the Member States and the NPCA to the potential financiers.

d. The civil works should be conducted by the relevant States, and

e. ECCAS should inform regularly the NPCA of the level of implementation of the program.

Modernization of the regional road network

The implementation of a modern and efficient regional road network is absolutely necessary in Africa. This modernization should deal not only with the improvement and modernization of the road infrastructure along ARTIN with harmonized characteristics, norms and standards but also with the modernization of transport services by introducing smart corridors and generalizing one stop border posts (OSBP). All the roads along the ARTIN should be modernized during the PIDA period. A first set of roads which are located along the priority corridors should be modernized during the PAP.

a. The characteristics, norms and standards for the regional ARTIN road should first be defined by the NPCA and AUC. Proposals should be made and discussed with the RECs before their finalization and approval.

b. The NPCA should also review the various smart corridor systems in operation in the world and select the most compatible systems with the African conditions. The NPCA could test two or more systems by using some of the priority corridors as pilot. This should be done in perfect coordination with the Corridor Authorities and the RECs concerned.

c. Once one (or more) smart corridor system has been chosen, NPCA should inform all the selected corridors of the PAP and assist with the implementation of the system on their given corridor.

d. The RECs and the relevant Corridor Authorities should also design programs to develop OSBP along their corridors.

e. Finally the RECs should identify all the legal and regulatory measures to be taken by the Member States to facilitate the regional transport services along these corridors.

f. In cases like the Douala-Bangui-Ndjamena corridor where, there is no Corridor Authority, the relevant RECs, with the Member States, should rapidly set up such Corridor Authorities.

g. Once the characteristics of the road are defined and the best smart corridor systems approved, each Corridor Authority should review the conditions of their infrastructure and prepare with the relevant States and REC the projects to up-grade their road, including the review of the road layout, the set up of a smart corridor and the opening of OSBP.

h. These road corridor modernization projects should then be reviewed and approved by the Member States of the REC and these relevant projects should be included in the REC priority programs.

i. Each Corridor Authority, with the assistance of the Member States, the relevant REC and NPCA should then start the search for financing including efforts to attract the private sector which should be requested, when feasible, to finance part of these projects with the possibility to establish tolls along these corridors.

j. Once the program is finalized, the civil works should be undertaken by the institutions of the relevant States, the Corridor Authorities, being responsible for the implementation of smart corridor systems and the REC being responsible for the creation of OSBP, and

k. The RECs should monitor the progress in the implementation of the programs and regularly inform NPCA.

Increasing road capacity to fill the gaps (Road upgrading)

Some of the priority corridors selected for the PAP will face shortage of capacity and will need to be extended by adding extra lanes in heavy traffic sections.

This will happen on corridors such as: Abidjan-Lagos; Douala-Bangui-N'djamena; Northern Corridor; Central Corridor, Maputo corridor, etc. The Authorities of the corridors and their Member States should make sure that these extra road capacities are available on time to satisfy the transport demand:

a. The concerned corridors should first confirm, on the basis of the traffic forecasts prepared by the Consultant, which section of the corridors will be saturated and when potential traffic bottlenecks could happen;

b. When the road sections to be upgraded are confirmed, each Member State, with the assistance of the Corridor Authorities and the REC should identify which sections could be developed through PPP with the possible implementation of tolls;

c. For the section to be built under PPP, the Corridor Authorities and the REC should assist the Member States:

i. in establishing an enabling environment to attract private operators,

ii. in preparing the necessary bidding documents, and

iii. in conducting the bidding and implementation process;

d. For the other sections not suited for PPP, the Corridor Authorities should then assist the relevant Member States with the preparation of the necessary studies (feasibility and detailed engineering studies) of the sections to be upgraded.

e. To ensure harmonization of the future roads, the Corridor Authorities should either be in charge of these studies (after the signing of a MoU between the authorities and the Member States) or monitor closely these studies.

f. The projects resulting from these studies should then be included in the REC program after approval by all the Member States.

g. NPCA and the RECs should lead the resource mobilization process as well as the other PAP activities.

h. The civil works should be conducted by the relevant national institution, and

i. The RECs should closely monitor the implementation progress of these projects and regularly report to NPCA.

4.2.2 Implementation of the Railway Sector Activities

The PIDA Study has shown that the railway sector which has been neglected during the past ten years should play a much larger role in the future and the share of transport by rails along the ARTIN corridor should substantially increase. This could be achieved through the modernization of existing railways and the construction of new railway lines. As noted above, the rail projects included in the PAP are located on the priority corridors and should contribute to satisfy the transport demand along them, more particularly to and from the landlocked countries.

Modernization of existing railways

The PAP recommends the modernization of various railways in order to divert traffic from the road to the rail which is less costly, more secure and more environmentally friendly. The modernization of a railway covers the rehabilitation of the tracks, the modernization of the rolling stocks, the setup of smart corridor systems, the implementation of modern management systems (with the possibility of signing concession agreements) etc. Experience around the world shows that successful modernization projects have been conducted under PPP with the relevant States financing the track rehabilitation and the private sector financing the rolling stocks and modern telecommunication equipment. Successful modernization projects have also taken place where the relevant States have established an enabling environment for the smooth development of the transport by rail.

The majority of the rail modernization projects recommended by the Study relates to railways companies already operated under concession agreement. The exception is the rail transport along the North South Corridor where different concessionaires (one by a State) manage the railway.

a. The NPCA with the assistance of the UAR should agree, with the concerned RECs and the railway concessionaires, on the best way to finance the modernization of a railway, in particular the part of the program to be financed by the concessionaire and the part to be financed by other sources.

b. Once an agreement is reached on the financing mechanisms, the relevant concessionaires should prepare, with the assistance of the REC, modernization programs (a good example is the modernization projects prepared by the Rift Valley Railway). In the case of the North-South corridor, the program should be prepared in close coordination with the North-South corridor Authority to secure harmonization along the line.

c. The programs should also highlight the necessary reforms to be carried out in each State to establish the best enabling environment for the development of the rail transport.

d. The modernization programs are then presented to the Member States under the guidance of the REC for approval (the investment programs and the rules and regulation changes required). Once approved, these programs should become part of the priority investment programs of the REC.

e. The Member States involved in the railway line should organize round-tables, under the guidance of the REC to discuss the programs and resource mobilization.

f. At the same time, the States involved should put in place the required rules and regulations.

g. When financing mechanisms are agreed upon, and the enabling environment established, the implementation of the projects would best be undertaken by the concessionaire under a MoU agreement with the national institutions for that part of the investment programs not financed by the concessionaire.

h. The REC should closely monitor the implementation of the rail modernization program and report regularly to NPCA.

Construction of new railway lines

The PIDA Study has identified some corridors where it would be necessary to increase the capacity of the railway by building new, modern rail lines. The majority of these new lines should be identified in close coordination with the port development programs. It is estimated that about 12 000 km of new rail lines should be built during the PIDA period and some new lines would

be required under the PAP. The RECs involved should first prepare port and railway master plans to identify the best ways to increase regional port capacities and the most economical ways, including new rail lines, to link these additional port capacities to the landlocked countries.

a. Each African region (except North Africa) should rapidly conduct studies to establish port and railway master plans. To ensure harmonization of these studies, the Terms of Reference should be proposed by NPCA that should work in close coordination with the UAR and the Port Associations. The financing should be coming from a project preparation facility funds under the management of NPCA.

b. Each REC should be responsible for conducting the studies and for elaborating ports and railway master plans.

c. The result of these studies should then be presented to the Member States for approval and the relevant projects included in the RECs Priority Action Plans.

d. Regarding the rail modernization programs, the construction of these new rail lines should be done through the railway company that will manage the railway. If no company exists, the REC should encourage the States involved to establish such a company.

e. The elaboration of a railway project is time consuming. Although only a limited number of projects will be implemented under the PAP, many other projects are registered with PIDA; the preparation of these projects should start soon after the completion of the port and rail master plans.

f. The Member States involved in the railway line should organize round-tables, under the guidance of the REC to discuss the programs and resource mobilization.

g. At the same time, the States involved should put in place the required rules and regulations.

h. When financing mechanisms are agreed, and the enabling environment established, the implementation of the projects would best be done by the concessionaire under a MoU agreement with the national institutions for that part of the investment programs not financed by the concessionaire, and

i. The REC should closely monitor the implementation of the rail modernization program and report regularly to NPCA.

4.2.3 Implementation of the Port Sector Activities

The lack of port capacities will rapidly become (before 2020) a major transport issue everywhere in Africa and should be addressed by all the stakeholders as soon as possible. The problem will be particularly accurate for the transport of containers to and from the landlocked countries. The planning of port extensions at country level, as it is done today, will probably not result in the implementation of the appropriate additional port capacities required by the region, specially the landlocked countries. As mentioned above, port and railway master plans should be conducted by each REC under the guidance of NPCA and the port Associations.

a. NPCA, in close coordination with the Port Associations, should prepare the ToRs for the preparation of these master plans.

b. Based on these ToRs, each relevant REC should prepare these master plans in close coordination with the States involved.

c. The result of these master plans should be discussed by each REC with their Member States. During the discussions, detailed information should be given on potential compensation mechanisms to ensure that all the members could benefit either directly or indirectly from the proposed additional port capacities.

d. Once the master plans are approved the relevant Member States should be responsible for conducting the required studies to construct these new capacities. Some of these projects will be built under PPP. In these cases, the REC together with the Port Associations should help the Member States conduct the process to attract the private sector interest.

e. In the meantime, the RECs with the assistance of NPCA and the Port Associations, should define the various compensation mechanisms that should be put in place to ensure that the States that will not be directly benefitting from the ports investments, will be compensated for their possible economic losses.

f. The resource mobilization process should be conducted by the RECs with the assistance of NPCA.

g. The States where these additional port capacities will be established should then finalize any agreement with private operators and implement the projects, and

h. The RECs should monitor the implementation of the port projects and regularly inform NPCA.

4.2.4 Implementation of Air Transport Activities

Air transport infrastructures and services need to be modernized to increase their competitiveness and some airports need to be extended in order to satisfy air transport demand

Modernization of air transport services

The efficiency of air transport needs to be strengthened by, on the one hand, rapidly implementing the Yamoussoukro Decision to increase competition, and on the other, by restructuring the air transport services in Western and Central Africa. This could be achieved by setting up one or two hub airports in these regions.

a. NPCA, in close coordination with AFCAC, should launch a series of activities to convince the African countries which have not yet ratified the Yamoussoukro decision to do so rapidly.

b. ECCAS and ECOWAS should conduct studies to analyze the pros and cons of establishing one or two hub airports in their regions. These studies should be done with all the Member States, the regional airlines and possibly the inter-continental airlines serving the regions.

c. The results of these studies should be presented by the RECs to all the stakeholders for discussion and approval.

d. If agreements are reached to establish such hub airports, the RECs involved should be responsible for conducting detailed studies on the best ways to implement such new air transport systems.

e. The RECs should conduct the dialogue with the regional airlines on how best to organize a new service.

f. Each State which is selected to host a hub should then be responsible for building the required airport investment, which should be implemented through PPP.

g. As regards the ports, the implementation of hubs might require to put in place compensation mechanisms. These mechanisms should be defined by NPCA and then put in place by the RECs, and

h. Africa needs to put a new air navigation system in place. This should be done by NPCA in close coordination with AFCAC.

Upgrade of airports to fill the gaps

The PIDA Study shows that all the regional airports would need to be extended before 2040. The Study already indicates that sixteen airports would need to be extended before 2020.

a. Each REC in close coordination with the Member States should review the air traffic demand and confirm that the airport would reach capacity before 2020.

b. Once the list of airports to be extended is finalized, each countries involved should carry out the necessary studies (feasibility and detailed engineering studies) to prepare the projects.

c. The private sector can and should be associated with the extension of these airports. The best ways to work with private operators could vary from one region to another. NPCA should assist each region in working with the private sector (the private sector can be part of the feasibility and detailed engineering studies if the bidding process take place early.

d. The RECs involved, with the assistance of NPCA, should then assist the countries with the resource mobilization process.

e. The selected countries should then be responsible for implementing the projects with or without private sector participation, and

f. The RECs should closely monitor the implementation of these projects and regularly report to NPCA.

Advanced air navigation system

There is a need for a high-level, satellite-based air navigation system for the African continent. There are similar systems operating in Europe and other regions of the world using different technologies and communications systems.[6] The benefits of this project would be a full coverage of the continent for air navigation (which will fill gaps in the existing air navigation system), shorter air routes and improved safety for air services. Airlines will also have cost savings due to efficiencies achieved.

The first phase of this project includes: (a) the design of an advanced air navigation system, b) development of an implementation and financing plan for the system and c) the initial implementation of the system in selected locations.

The Civil Aviation Authorities of the African States, being regulatory bodies with vested power to regulate the provision of air navigation services of the States, have embarked on the streamlining and harmonization of air navigation regulations with adjacent States. The proposed programme would build on this cooperation to support the implementation of an advanced air navigation system. This requires the harmonization of air navigation, flight safety and economic regulations and the development of a funding mechanism, different from the current system that is based on regional air traffic control and fees to regional air traffic control agencies. A technical committee

[6] Some of these systems have coverage of the African continent, but are not extended to African use.

should be formed at the continental level to: (i) recommend appropriate technical and financial solutions to this problem reflecting best practices, and (ii) develop a financing plan for the different activities.

The exercise of harmonizing air navigation, flight safety and economic regulations and of adopting and implementing rules with legislative power is currently being carried out throughout Africa within blocs such as SADC, EAC and ASECNA, etc. The strategy is to harmonize bloc by bloc and eventually to achieve the vision of having regulations that apply to the whole of Africa. This exercise is on-going and significant achievements have been realized within these blocs. MoUs between States have been signed regarding regulations in the AFI Region.

The most challenging of these issues is the harmonization of economic regulations and developing a funding mechanism for the project. This depends on the political climate prevailing within the States. The key obstacle to implementing a new system is that this requires a tariff to be charged and the collection and allocation of the accruing funds. Although the stakeholders would be willing to pay for its implementation, African States have different views on the air navigation charges. The challenge, however, is in identifying and defining the best practices that will ensure sustainability of the provision of adequate air navigation services regardless of the differences in the air traffic mix, regarding aircraft weight in charging formula.

4.3 Factors Influencing Transport Sector Financing

There are several major factors that will influence the financing of the transport sector:

- PIDA recommendations and vision for the transport sector include more reliance on efficient railways, which will increase rail financing needs, but will also reduce part of the need for funding future road expansion projects
- A major increase is seen in the role of the private sector in the financial sphere as well as in sector management and operations, but this role needs to be carefully supervised and managed, and supported by key policies that provide an enabling environment
- A major increase in the use of domestic funding sources is foreseen, especially in the area of development bonds. This has special implications for project design from a financial perspective
- Incentives are needed to encourage both public and private investment in ARTIN
- Cohesion and structural funds established by the AUC can be used to leverage more budget allocation from governments who are under-investing in transport infrastructure, and
- A variety of PPPs can be mobilized to improve the management and increase the share of private funding, namely:
  - Loan guarantees (full or limited) for large projects (such as for the Trans-European Transport Network Projects or for ASEAN transnational infrastructure funding)
  - Toll roads for improvements and maintenance funding, and
  - Performance-based maintenance for roads to get more cost-effective maintenance practices (which also reduce the need for road rehabilitation and reconstruction).

Different options will need to be applied in different circumstances and for different parts of the ARTIN as described below.

4.4 Sector-Specific Mobilisation of Financing

There is a significant diversity in the structure of PAP projects in the transport sector, some of which are likely to be in the public sector, others being suitable for PPP under various arrangements. Similar types of projects in the PAP will be conducted by each REC taking into account the financing needs of each project and the circumstances of each region. The inclusion of programmes in the PAP comprised of various projects, and those not considered previously as single programmes by the RECs will create a need to carefully plan financing and actions for each programme to be put in place. The preparation of these programmes should also aim at reaching a consensus from all the stakeholders on the action plans and at searching for financing in a coordinated manner.

The rapid availability of funds for the financing of the preparation of these programmes is essential for the success of the PAP. These funds should be provided by donors interested in the development of Africa through project/programme preparation facilities.

In order to examine their suitability for private sector financing, the recommended projects for the PAP can be grouped in 6 categories:

- Expansion of port capacity
- Improvement of air services and expansion of airport capacity
- Construction of modern railway lines and creation of modernized rail services
- Construction of OSBPs
- Upgrading and modernization of the roads along ARTIN corridors, and
- Construction of the missing links along the TAHs and between capital cities.

4.4.1 The Financing of Port Capacity Expansion Projects

Studies are required to identify the best ways to expand port capacities to meet future needs (through existing port expansion or through new ports). These studies should be conducted under the leadership of the relevant RECs with the participation of relevant private and public sector stakeholders.

African port traffic amounted to about 310 million tons in 2009 and will jump to 750 million tons by 2020 according to the PIDA Study forecasts. Considering that most African ports are operating close to capacity and that a much larger share of traffic will be handled through containers (see Chapter 1), port capacity must be increased by between 350 and 400 million tons before 2020 at a total cost of approximately US$ 4 billion.

Port capacity extension could potentially be financed through PPP. However the review of recent port projects shows that it is important for the customers of a port not to have a port operator linked too closely to one specific shipping line as this could create a monopoly or at least an oligopoly situation.

It is therefore recommended that part of the port expansion projects, where there is a potential 'anti-trust' problem, be financed with local resources through the use of local bonds and other domestic resource instruments.

Some short-term port projects such as dry ports and lake or river ports may be unlikely to attract private investors and the financing of these projects should be done by each state involved, with national or donor financing.

The expansion of port capacity is justified by the forecast national traffic but also by traffic to and from landlocked countries. It is recommended that private (or public) interests from these landlocked countries also contribute to the financing of these projects in order to be able to contribute to the final choices and the final design and make sure that their regional interest is taken into consideration.

The short-term projects selected for ECOWAS, EAC and SADC should be implemented rapidly, as part of the financing is already available. However, the potential financing shortage should be assessed rapidly by the relevant RECs that should immediately begin to search for the way to fill any financing gaps.

4.4.2 The Financing of Air Service Improvement and Expansion of Airport Capacity

As mentioned earlier, the analysis of the potential for improvement of air services through the implementation of hub airports is particularly important in Western and Central Africa. As recommended above, these analyses will require the establishment of working groups in each region under the leadership of the relevant REC with the participation of the Member States, the air transport users, the existing national and regional airlines and the international airlines serving these regions.

The cost of a new airport can vary substantially depending on the technical characteristics and the quality of services to be provided. A minimum estimate could be US$ 25 million per million additional passengers. It is forecast that total air traffic, which was about 90 million passengers in 2009 will reach about 160 million passengers in 2020 and 390 million passengers by 2040.

Considering that the majority of the African airports are close to their capacity and that 17 would need to be upgraded by 2020, it is estimated that the total cost for these expansion projects will be around US$ 1.5 billion by 2020.

The financing of airport expansions could be done by the private sector through PPP and, in these cases, the relevant Member States should ensure that they provide the necessary enabling environment for PPPs in their respective countries.

4.4.3 Financing of New Railway Lines

Considering the forecast future volume of rail transport from the landlocked countries to the sea, the construction of new modern railways will become economically and financially feasible where the extensions of port capacities are concentrated in a few hub ports.

As mentioned in the Africa Transport Outlook 2040, the development of these new rail services should largely be carried out by the private sector through concessions. Experience in other parts of the World, in particular in Latin America, shows that the private sector alone will not take the risks associated with the construction of a new rail lines but would stand ready to invest in rolling stock and telecommunication equipment and take responsibility for railway management. Experience also shows that better results are achieved when financing from the private operators can be found locally; this would require the mobilization of national financing through local commercial banks, pension funds etc.

Assuming that two new lines could be built during the PAP, for a total of 2,000 km, the total financing requirement for the rail infrastructure would be around US$ 4 billion. The financing of the infrastructure for these new rail lines should be the responsibility of the Member States, with the assistance of financial institutions and bilateral agencies but also from their own investment budgets.

The PAP proposes also, in a few cases (such as the Northern Corridor and Dar es Salam Corridor), the upgrading of the existing railway lines and operations located along the corridor. Private operators presently operate these railways under concession agreements. Experience in other parts of the world, clearly shows that any substantial improvement of the infrastructure cannot be done by private operators and any upgrading should be financed by the relevant Member States.

4.4.4 Financing of One Stop Border Posts

So far, all the OSBPs at present in operation in Africa have been financed by the bilateral agencies (such as JICA) and by IFIs (EU, World Bank and AfDB). One (Heremankano) is proposed for PPP.

Once a OSBP is completed, its management can be handled by private operators under concession agreements and it may be possible to ask the private operators to finance the required infrastructure. However, taking into account that two countries are involved in each OSBP project, it is likely that the proposed OSBP projects of the PAP continue to be financed from the same sources as recent OSBP projects.

4.4.5 Financing the Pilot Programme for the Use of Private Operator for the Upgrading and Maintenance of ARTIN Roads through PPP

The PAP pilot PPP projects are based on the following hypotheses:

- The REC or the Corridor Authority together with the Member States have reviewed the design of the road sections along the corridor, with corridor road designs applying the agreed norms, standards and characteristics for the ARTIN road network; and
- The Member States have agreed to place tolls on the selected sections of ARTIN road corridors,

Once these conditions are fulfilled, it would be the responsibility of each Member State to call for bids to select private operators and sign concession agreements. The REC and the Corridor Authority should monitor these bids and encourage a corridor approach.

4.4.6 Financing of the Construction of Missing Links along TAHs

As mentioned above, a special programme is proposed for completing the construction of the 9 TAHs before the end of the PIDA period. The missing links account for about 12,000 km and their completion will cost about US$ 7.5 billion. According to the proposed methodology; the completion of these TAHs for the portions not part of the ARTIN corridors should be planned at continental level and then executed at national level. The identification of all the missing links, the evaluation of the costs to complete each of them and their ranking should be done at continental level.

The proposal is to implement these projects in tranches of 3 or 5 years. It is expected that the first tranche could reach US$ 1.5 million and result in the construction or rehabilitation of about 3,000 km of missing links.

The search for financing of the first tranche should also be done at continental level. The AUC/NPCA should approach each Member State, the IFIs, the bilateral financing organizations, etc. with financing proposals. They should also introduce the TAHs programmes to the donors in order to assess the amount of funds that could be made available for the completion of the missing links. Once the volume of civil works is defined, the next step will be for the continental institutions to assess the missing links based on their priorities, for execution during each tranche period.

The implementation of the civil works should be delegated to the Member States under the monitoring of the RECs