

**Data Collection Survey on Traffic  
for International Port and International Corridor  
in Western Africa**

**Final Report  
(Summary)**

Decembre 2012

**Japan International Cooperation Agency (JICA)**

**Yachiyo Engineering Co., Ltd.  
INGÉROSEC Corporation**

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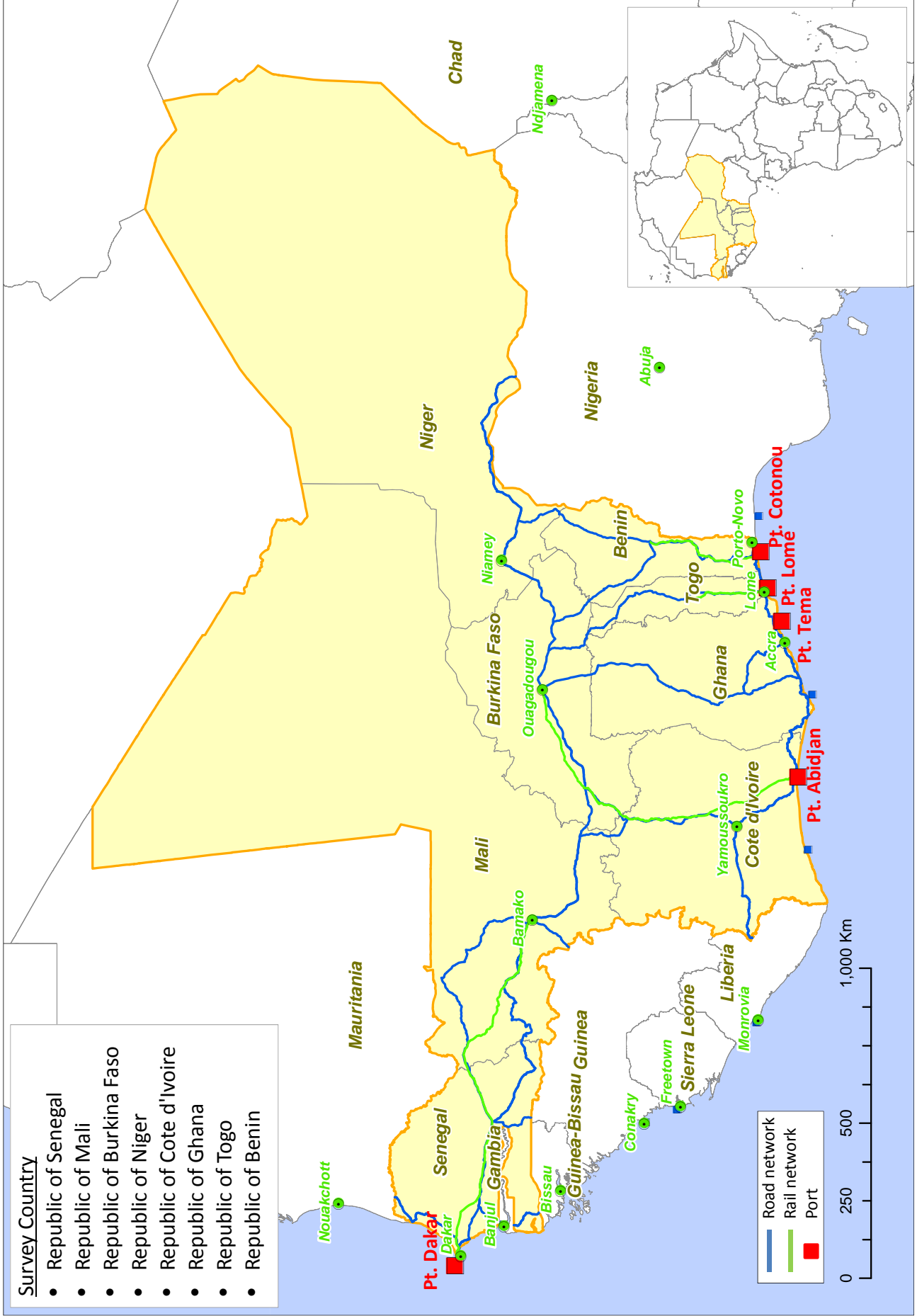
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Survey Country



Road with pothole  
Bamfora-Niangoloko, Cote d'Ivoire



Road with pavement deterioration  
National Route 1 near the Sahel terminal, Togo



Unpaved section  
Cinkansé-Dapaong, Togo



Section under rehabilitation  
Bella-Gaya, Niger



Unpaved section in Coastal Road  
Near the Togo borde, Ghana



Paved section in Coastal Road  
Benin

### Road Situation of the Study Area



Passing of freight train  
Cotonou, Benin



Road-railway combined bridge  
Cotonou, Benin



Departure of customs escort  
Ougarinter, Burkina Faso



Dry port  
Bobo Dioulasso, Burkina Faso



Waiting trucks to pass customs  
Gaya custom office, Niger



Waiting trucks to pass the checkpoint  
Tambacounda, Senegal

### Land Transport Situation of the Study Area

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## Abbreviation

AFD	French Development Agency
AfDB	African Development Bank
AICD	Africa Infrastructure Country Diagnostic
ASYCUDA	Automated SYstem for CUstoms DAta
ECOWAS	Economic Community of West African States
EPZ	Export processing zones
EU	European Union
F/S	Feasibility study
GDP	Gross Domestic Product
JICA	Japan International Cooperation Agency
NEPAD	New Partnership for Africa's Development
OD	Origin Destination
OSBP	One Stop Border Post
PACITR	UEMOA Road Transport Infrastructure Community Action Programme
PPP	Public–private partnership
RECs	Regional Economic Communities
SEZ	Special economic zones
UEMOA	West African Economic and Monetary Union
USAID	United States Agency for International Development
WADB	West African Development Bank
WB	World Bank

## Chapter 1 OVERVIEW OF SURVEY

### 1.1 Objective of Survey

The aim of the Survey is to carry out a current traffic survey on automobile-based cross-border traffic in the West African region centered on the (WAEMU, hereinafter referred to UEMOA; L'Union économique et monétaire ouest-africaine) zone in combination with an interview survey involving relevant organizations, in order to identify problems in the transport infrastructure of the region. In addition, traffic data acquired through the current traffic surveys will be published as basic data to be used for promoting the development of transport infrastructure in the future. It is expected that the data will be widely utilized by UEMOA, local governments and international aid organizations.

### 1.2 Survey Area

The Survey is conducted in a total of eight countries, i.e., the members of UEMOA (Republic of Senegal, Republic of Mali, Republic of Burkina Faso, Republic of Niger, , Republic of Cote d'Ivoire, Republic of Togo and Republic of Benin) and Republic of Ghana.

### 1.3 Survey Description

In this Survey, the main task is to implement current traffic surveys and the following items will be subject to the surveys. These surveys are composed of spot traffic volume surveys, roadside OD surveys and OD surveys made at logistic nodes.

The field surveys were implemented from March to July 2012. In September 2012, a seminar to report the survey results was held in Ouagadougou city of Burkina Faso, to which other donors and local government officials participated.

Table 1-1 Survey description and Schedule

No	Survey item	Duration
1	Preparation	March 2012
2	Collection and analysis of basic data	March-July 2012
3	Implementation of current traffic and logistics facility survey	
4	Current traffic flow analysis	July-September 2012
5	Future traffic demand forecast	September-October 2012
6	Holding of seminar	24 September 2012
7	Final report (English and French version)	October-November 2012

Source: JICA Study team

Table 1-2 Survey Country profile

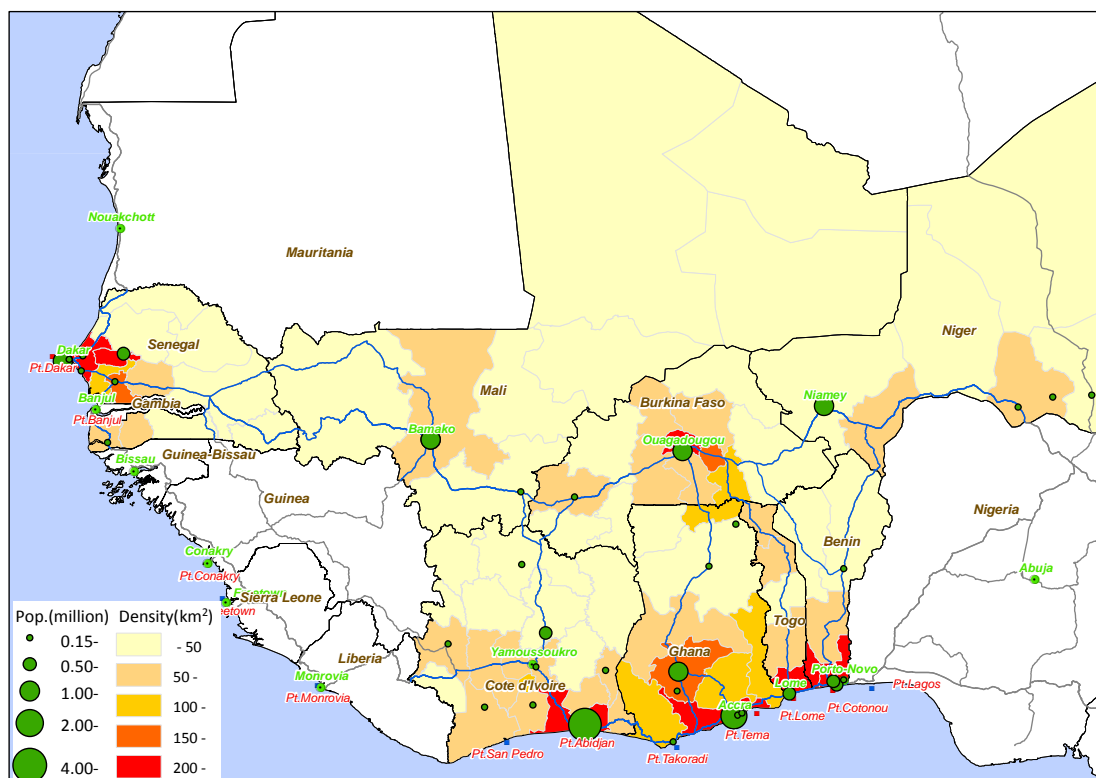
	Unit	Benin	Burkina Faso	Cote d'Ivoire	Ghana	Mali	Niger	Senegal	Togo
Area	km <sup>2</sup>	112,620	274,000	322,460	238,540	1,240,190	1,267,000	196,720	56,790
Population	million hab	8.8	16.5	19.7	24.4	15.4	15.5	12.4	6
Population growth	%	2.8	3	2	2.4	3.1	3.5	2.7	2.1
Population density	hab./km <sup>2</sup>	80	59	67	103	11	13	6	11
Urban population	%	42.5	26.5	51.3	52.2	36.6	17.2	42.7	44.1
Life expectancy	years	61	55.4	55.4	64.2	51.4	54.7	59.3	57.1
Literacy	%	41.7	28.7	55.3	66.6	26.2	28.7	49.7	56.9
Human Development Index	HDI	0.427	0.331	0.4	0.541	0.359	0.295	0.459	0.435
rank		167 / 187	181 / 187	170 / 187	175 / 187	186 / 187	155 / 187	162 / 187	
Languages		French(official), Fon, Goun, Mina, Yoruba, Dendi, Bariba...	French(official), Moore, Dioula, Fulani, Tamacheq...	French(official), Dioula, Baoule, Bete, Senoufo...	English(official), Gha, Twi, Ewe, Fante...	Bambara, Senoufo, Fulani, Soninke, Tamacheq, Songhai, Dogon...	French(official), Haoussa, Djerna, Fulani, Tamacheq, Kanouri...	French, Wolof, Peul-toucouler, Serere, Diola...	French(official), Ewe, Kabie...
Settlement		Fons, Adjas, Peuls, Yorubas, Sombas...	Mossis, Mandes, Peuls, Bobos...	Senoufos, Dans, Agris, Beetes, Baoules, Dioules, Malinkes...	Akans, Dagombas, Gourmantches, Ashantis, Akwapims, Krobos...	Bambaras, Peuls, Dogons, Bobos, Touaregs, Songhais...	Haoussas, Djermas, Foulas, Touaregs, Kanouris...	Wolofs, Toucouleurs, Peuls, Sereres, Diolas, Mandingues...	Ewes, Kabies, Minas...
Religions		Animism, Christianity, Islam	Animism, Christianity, Islam	Christianity, Islam	Islam, Animism, Christianity	Islam	Islam, Animism	Islam, Christianity, Animism	Animism, Christianity, Islam
Currency		Franc CFA	Franc CFA	Franc CFA	Cedi	Franc CFA	Franc CFA	Franc CFA	Franc CFA
Parity in the first janv. 2012	1€(CFA)	655.96	655.96	655.96	2.10(cedi)	655.96	655.96	655.96	655.96
Parity in the first janv. 2012	1\$(F CFA)	496.63	496.63	496.63	1.62(cedi)	496.63	496.63	496.63	496.63
GDP per capita	\$	756	670	1049	1588	796	438	1096	496.63
Distribution of GDP (primary)	%	35.9	35.2	25	32	39	44	17	47.5
Distribution of GDP (secondary)	%	14.5	23.8	25	19	21	16.1	22	17.8
Distribution of GDP (tertiary)	%	49.6	41	50	49	40	39.9	61	34.7
GDP 2011	in billions of dollars, current prices	7.5	10.1	23.8	38.6	11	6.5	14.7	3.6
Rate of growth 2011	in % constant prices	3.8	4.9	-5.8	13.5	5.3	5.5	4	3.8
Inflation	%	2.1	0.9	2.7	8	1.4	3.4	1.2	5.3
Foreign direct investment	million \$	111	37	418	2.5(billion \$)	148	947	237	41
Exports	billion \$	1.2	1.3	10.3	7.9	2.4	930(millions / \$)	2.2	800(millions / \$)
Imports	billion \$	2.2	2	7.8	10.7	2.9	2.2	4.8	1.6
Key Resources		cotton(80% of export earnings), fish	cacao, cotton, coffee, sugarcane	cacao, cotton, coffee	gold, diamond, cacao, tourism	gold, cotton	uranium, carbon, gold, livestock, agriculture(cereals)	phosphates, peanuts, cotton, coffee, cacao	phosphates, cotton, coffee, cacao

Source: JICA Study team

## Chapter 2 SOCIOECONOMIC SITUATION

### 2.1 Population

The total population of each country increased uniformly. The total population of the survey countries area reached about 120 million in 2011. The total population has increased 2.7 % on average per annum in recent 5 years. When we look at the population distribution, the population accumulation is high on the coast, mainly in port areas. In each country, the population accumulation is remarkable in the capital cities and port cities as centers of economy.



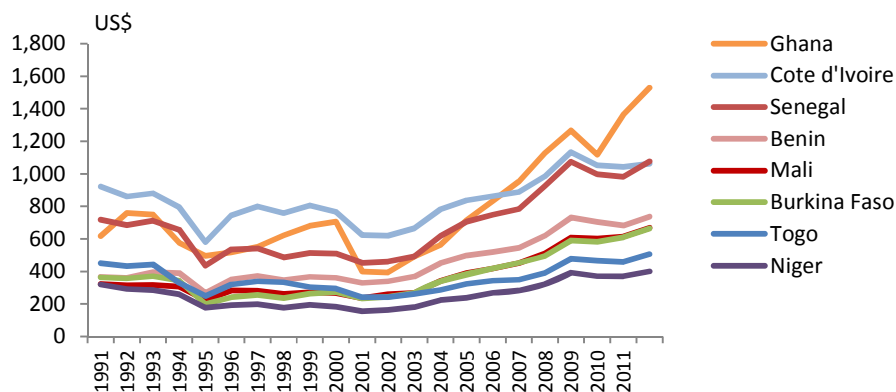
Source: JICA Study team based on Statistical data of each country

**Figure 2-1 Population Density by Region and Population Distribution in Major Cities**

### 2.2 Economy

The US dollar based nominal GDP (Gross domestic product, current prices) hovered at a level of 40 billion dollars between 1990 and 2002, but it jumped to an economic scale of about 2.9 times between 2002 and 2011. By share of each country in 2011, Ghana had the greatest scale of 33 %, followed by Cote d'Ivoire (21 %) and Senegal (13 %). When looking at the real economic growth for the last 5 years, it is found that these countries have been growing at an average rate of around 4 %.

The GDP per capita continued to grow in the 21st century. It grew more than 3 times between 2000 and 2011. There is, however, a gap in the growth rate between the top 3 growing countries of Ghana, Cote d'Ivoire and Senegal and other countries.

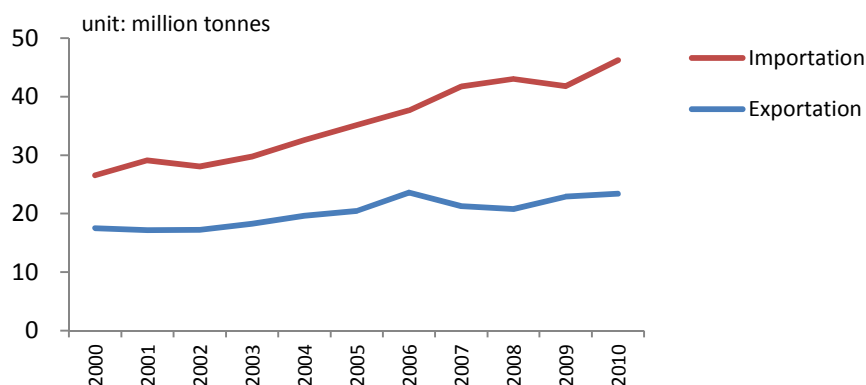


Source: JICA Study Team based on statistical data of each country

Figure 2-2 GDP per Capita (1991-2011)

### 2.3 Situation of Exports and Imports

The imports and exports in the area remained sluggish temporarily due to the civil war in Cote d'Ivoire in 2002 but are increasing thereafter. Between 2000 and 2010, the export grew 1.3 times and the import grew 1.7 times.

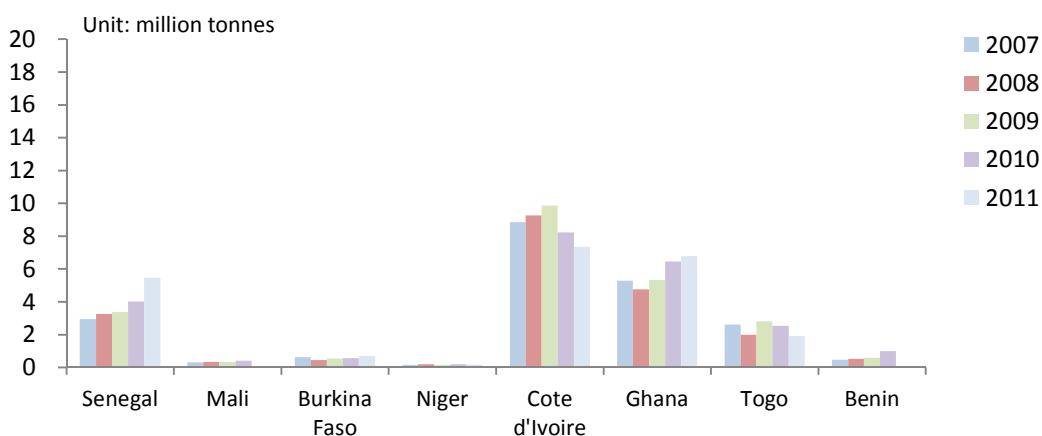


Source: JICA Study Team based on statistical data of each country

Figure 2-3 Changes in the Total Trade Volume in the Area (2000-2010)

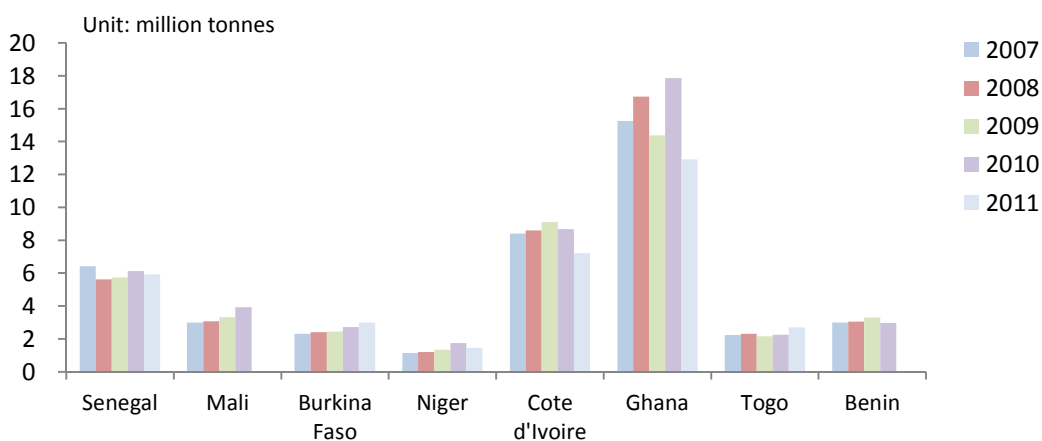
By country, Cote d'Ivoire had the largest amount of export but it is decreasing in recent years due to political instability. This is followed by Ghana and Senegal, which had large amount of exports and experienced increase. The amounts of export from the 3 landlocked countries are relatively small but increasing. In imports, the amount is the largest in Ghana, or 39 % of the total, followed by the Republic of Cote d'Ivoire (19 %) and Senegal (13 %).

When we compare the total import and export, the import stood at 66 % and the export stood at 34 %, indicating that the import is twice as much as the export. By country, the 3 landlocked countries had the remarkable trade deficit. The rate of import was 91 % in Mali, 83 % in Burkina Faso, and 90 % in Niger.



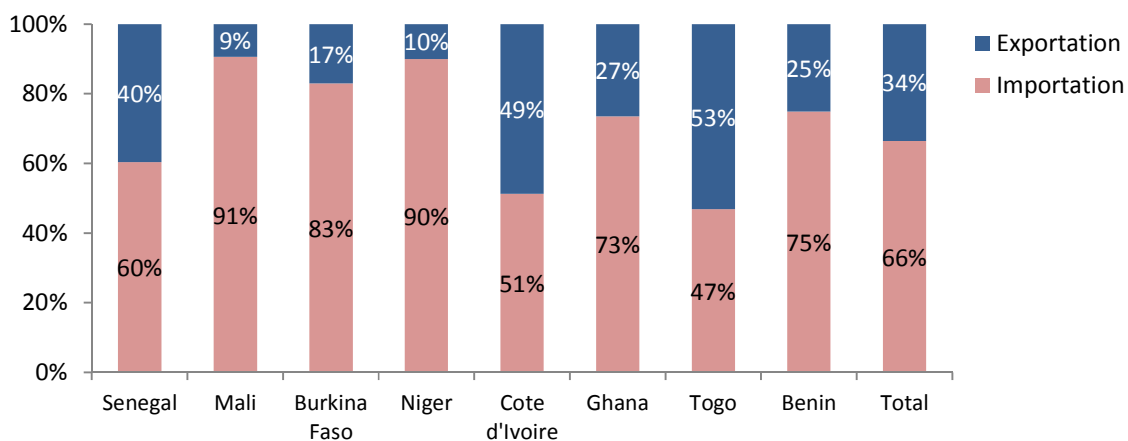
Source: JICA Study Team based on statistical data of each country

Figure 2-4 Export Volume by Country (2007-2011)



Source: JICA Study Team based on statistical data of each country

Figure 2-5 Import Volume by Country (2007-2011)



Source: JICA Study Team based on statistical data of each country

Figure 2-6 Import-Export Volume Ratio by Country (2010)

Figure 2-7 shows the transport mode by import-export. When looking at the transport means, country-by-country, truck transportation is the means used most in landlocked countries because of their geographical conditions. On the other hand, maritime transport is the most used transport means in coastal countries.

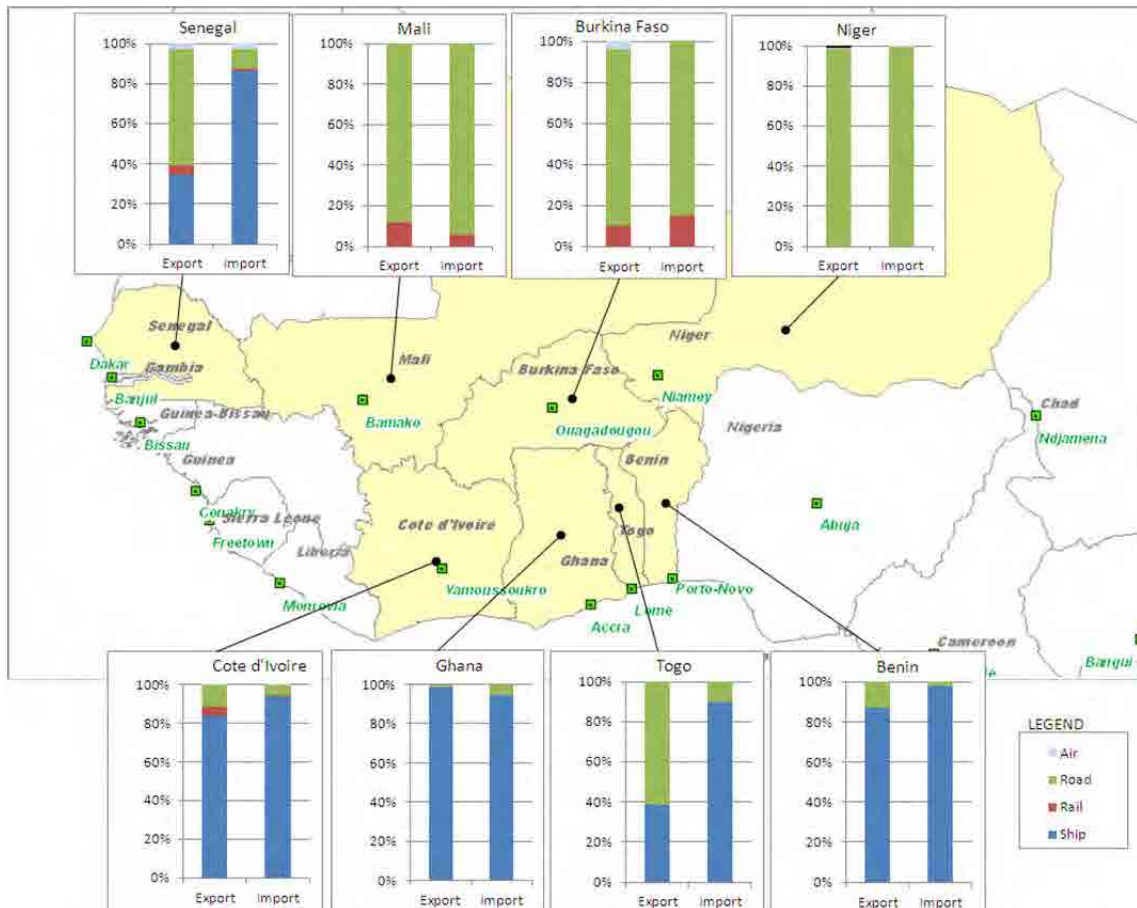
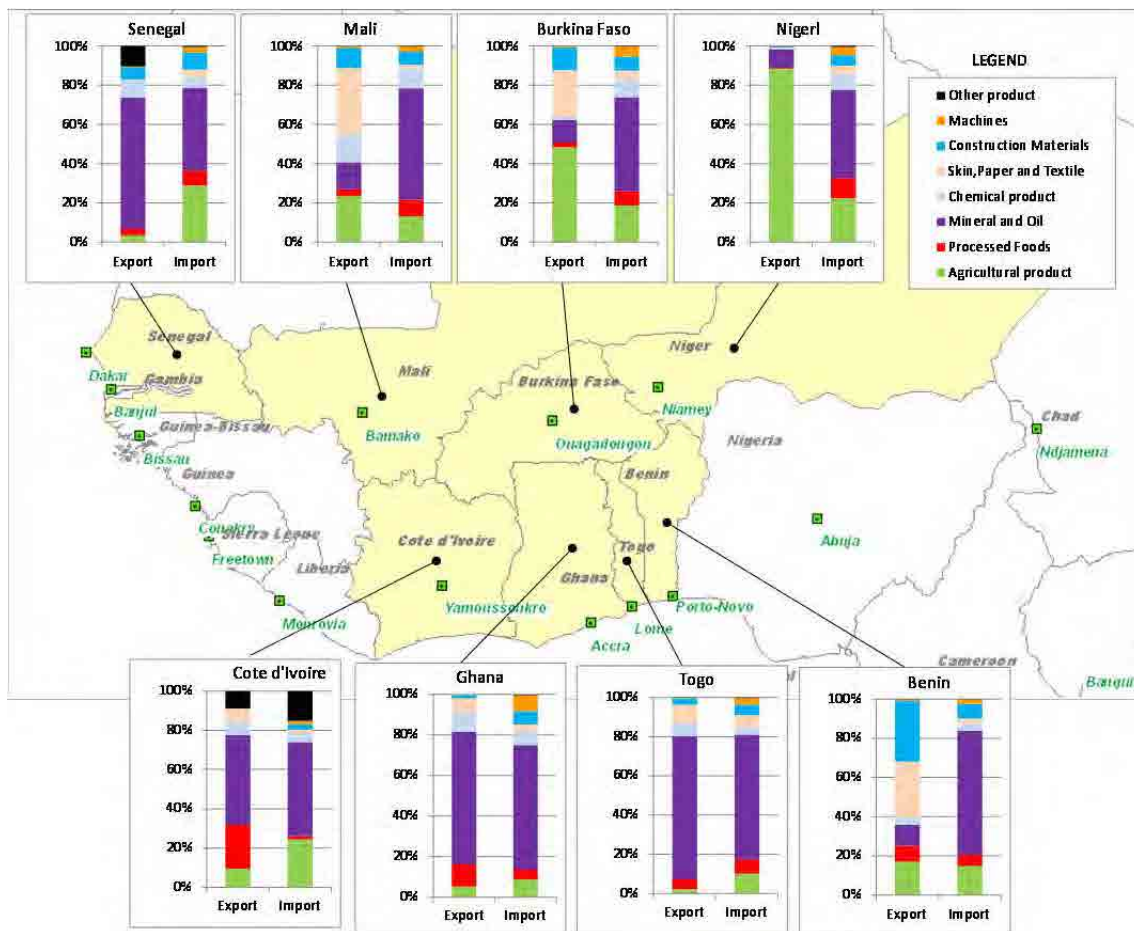


Figure 2-8 shows imports and exports by weight for each item of goods. In imports, mineral substances and oils including gasoline account for 40-60 % of the total. Following this are agricultural products and processed food. These 3 items of goods account for about 80 % of the total, which can be said characteristic of the survey area.

Meanwhile, in exports, we cannot find any characteristic trait in the survey area. In coastal countries, mineral substances and oils are exported in a large volume, while in 3 landlocked countries, agricultural products are mainly exported. In particular, it is characteristic that cotton is a main export product in Burkina Faso, Mali and Benin. In Niger, agricultural products account for 90 % of its exports.





Source: JICA Study Team based on customs data

**Figure 2-8 Weight Share of Goods by Import-Export**

- Each country has both the population and economic scale growing. In particular, the past decade showed the upward trend for the economic growth.
- As populations grow, movement of people and goods between cities and rural areas in each country will also increase as well as cross-border traffic.
- Policies for economic development of each country have shifted from poverty reduction to economic acceleration. The industrial development has been positioned as a top priority in each country. The governments believe that the development of infrastructure is necessary for carrying out development of the industry. In particular, the development of major roads is very important elements to advance the plan.
- Though economic disparity is observed between coastal and landlocked countries, the issue to overcome here is whether the port cities having the large economic scale can lead the regional economy and bring the propagation effects to the inland area.

## Chapter 3 CURRENT STATUS OF INTERNATIONAL CORRIDORS

### 3.1 Current Status of Road

#### 3.1.1 The UEMOA Road Development Plan (PACITR)

In 2001, UEMOA adopted an action plan, the Community Roads of UEMOA Infrastructure and Transport Action programme (PACITR), for infrastructure and road transportation for “harmonization of strategies related to transportation in each country and infrastructure development through an integrated program in the community.” Major roads in the UEMOA Zone are developed according to this action plan.

In the plan, roads with a total length of about 12,800km will be constructed and they will be composed of international corridors and domestic arterial roads. The networks and the route list of these roads are shown below.



Source: UEMOA

Figure 3-1 UEMOA Community Road Network

UEMOA selected 11 routes as UEMOA Corridors at the UEMOA Summit Meeting in 2009 (Decision N°39/2009/CM/UEMOA). Thereafter Corridor 7 was divided into two routes. Another corridor was subsequently added to connect Tema Port to the landlocked countries. UEMOA Corridors, which are international corridors, have been assigned the highest priority in the UEMOA road plans under PACITR.



Source: UEMOA

Figure 3-2 Network of UEMOA Corridors

Table 3-1 List of UEMOA Corridors

Corridor 1	Abidjan - Yamoussoukro - Ferkessedougou - La Léraba - Ouagadougou - Kantchari - Makalondi - Niamey
Corridor 2	Abidjan - Yamoussoukuro - Ferkessedougou - Zegoua - Sikasso - Bougouni - Bamako
Corridor 3	Cotonou - Malanville - Niamey - Gao
Corridor 4	Cotonou - Tindangou - Ouagadougou - Hérémandkono - Bamako
Corridor 5	Lomé - Cinkansé - Koupéla - Kantchari - Makalondi - Niamey - Gao
Corridor 6	Lomé - Cinkansé - Ouagadougou - Hérémandkono - Bamako
Corridor 7-1	Dakar - Kaolack - Tambacounda - Dibouli - Kayes - Bamako - Hérémandkono - Ouagadougou - Katchari - Makalondji - Niamey
Corridor 7-2	Dakar - Kaolack - Tambacounda - Kédougou - Kita - Kati - Bamako - Hérémandkono - Ouagadougou - Katchari - Makalondji - Niamey
Corridor 8	Dakar - M'Pack - Bissau
Corridor 9	Bissau - Pirada - Tambacounda - Kédougou - Kita - Bamako
Corridor 10	San Pedro - Odienné - Bougouni - Bamako
Corridor 11	Abidjan - Bouna - Gaoua - Pa - Ouagadougou - Niamey
Corridor 12	Téma - Kumasi - Tamale - Navrongo - Pô - Ouagadougou - Bobo Dioulasso - Sikasso - Bopugouni - Bamako

Source: JICA Study team

Under PACITR, fundamental policies for arterial road management/maintenance and for improvement of transport efficiency are presented in addition to a basic policy for the development of arterial roads, which is the most important policy in the program.

**Table 3-2 Road Development Plans**

	Basic plan	Targets	Contents
1	Development of international road infrastructure	<ul style="list-style-type: none"> <li>Standardization of periodic maintenance program for inter-member road network</li> <li>Standardization of paved road levels</li> <li>Development of missing links in the member states.</li> </ul>	<ul style="list-style-type: none"> <li><u>Priority 1</u> : Paving of the roads connecting the capitals of the member states, development of missing links, improvement of road service</li> <li><u>Priority 2</u> : Periodic maintenance, and improvement of roads connecting intra-community cities, including the alternative road connecting the capitals.</li> <li><u>Priority 3</u> : Interconnecting roads in the ECOWAS countries and extension of road networks in the member states.</li> </ul>
2	Improvement of secondary roads near borders and branches	Road development to contribute to poverty reduction in local villages	<ul style="list-style-type: none"> <li>Perform pilot projects in five border areas subject to finance by the Fonds d'aide à l'intégration régionale (FAIR 1). The project selection criteria are based on (1) socioeconomic factors, (2) residents' participation, (3) environmental protection, and (4) regional integration.</li> </ul>
3	Develop an information system for roads, transportation and traffic safety, and performance indicators.	<ul style="list-style-type: none"> <li>Development of information systems in each country to meet the demand.</li> <li>Information transmission to be performed by the UEMOA Secretariat and each country.</li> </ul>	<ul style="list-style-type: none"> <li>Building systems for collecting, processing and managing information on road networks in each country.</li> <li>Building technical and monetary systems for monitoring and evaluation of maintenance works.</li> <li>Updating legal systems pertaining to road transportation and infrastructure.</li> <li>System management shall be performed by the secretariat of UEMOA; links inserted in the home page of UEMOA. Information covered by 3 road infrastructure items, road transportation conditions and traffic safety on the UEMOA home page</li> </ul>
4	International road transportation and transit facilitation	<ul style="list-style-type: none"> <li>Enhancement of competitiveness in the economy in UEMOA zone by smooth trading and removal of non-tariff barriers.</li> <li>Reduction of transportation costs.</li> </ul>	<ul style="list-style-type: none"> <li>Removal of special permissions and checkpoints (refrain from setting 2 or more checkpoints in each corridor in the future).</li> <li>Each country to implement policing vehicles in order to use standard vehicles in international transportation.</li> <li>Obligate vehicles used to ship products to carry customs seal.</li> <li>Promote freedom of international transportation and transit in each country.</li> <li>Develop provisions for smooth transportation and smooth inspection escorting to the borders. The escort shall be removed in the future.</li> </ul>
5	Traffic safety	<ul style="list-style-type: none"> <li>Standardization of transportation/traffic systems.</li> <li>Promote traffic safety measures in member countries.</li> </ul>	<ul style="list-style-type: none"> <li>Prepare common road maps and promote traffic safety policies in each country.</li> <li>Based on the response of each country, provide an UEMOA action plan. Collect traffic accident statistics, implement traffic safety training programs, etc.</li> </ul>

Source: JICA Study team



### 3.1.2 Progress of Development

In 2010, evaluation of PACITR implementation was completed. As of 2001, it was planned to improve a total road length of 12,817km. As of 2010, only 52 % of this target, or a total road length of 6,721km had been improved.

**Table 3-3 Progress of road development under PACITR (as of 2010)**

	Plan (km)	Done (km)	Progress	Implementation by other projects	Total (Km)
Maintenance of paved roads	2,640	952	36 %	409	1,361
Road rehabilitation	4,843	2,743	57 %	652	3,395
Paving	4,811	3,026	63 %	708	3,734
Special program for Guinea-Bissau	523	0	0	0	0
<b>Total</b>	<b>12,817</b>	<b>6,721</b>	<b>52 %</b>	<b>1,769</b>	<b>8,490</b>

Source: UEMOA

The UEMOA corridors have been already developed excluding corridors between Bamako and San Pedro (UC10) and between Abidjan and Ouagadougou (UC11). Along existing corridors, however, there still remain some sections in a significantly poor road condition. For example, some have not been asphalt-paved and others have potholes. In particular, roadways tend to be in a poor condition in areas far away from major cities, such as inland areas and areas near borders.



Source: JICA Study team based on the hearing survey in each country

**Figure 3-3 Road Conditions of UEMOA Corridors (2011)**

### 3.1.3 Summary of Current Status of Road

#### (1) Road network

The routes other than the Bamako-San Pedro Corridor and Ouaga-Abidjan (Ouest) Corridor are asphalt-paved road networks, serving as international corridors. Despite of the road construction has already been finished, the Dakar-Bamako (South) Corridor is currently not functioning as an international corridor because a customs clearance service has not been established. Also, there are multiple routes providing access from the landlocked countries to ports.

#### (2) Road condition

Although corridors currently in operation have already been improved through asphalt paving, we also find that many road sections are deteriorating greatly. Also, some road sections are found to require large-scale rehabilitation. Specifically, there is a concern about road sections that are badly maintained in inland areas or areas close to the border far from the capital.

When such large-scale rehabilitation works are required in such places as the border section between Niamey and Benin, the work period hinders the traffic there to make traveling along the road inefficient and unsafe.

Only international corridors currently in operation can connect countries and it is highly important to keep them as permanent logistic routes through appropriate management and maintenance.

In addition, except for roadways around the capital's suburban areas, the UEMOA road maintenance standards (Caractéristique de construction et d'aménagement des routes communautaires) requiring roads to have at least a 7.00 m traffic lane width and a 1.50 m shoulder width are not fully met.

## 3.2 Current Status of Railroads

In the UEMOA region, railroads with a total length of over 3,000km have been developed. Since these railroad facilities are in a very poor condition due to deterioration, they are not unable to fully function. The following is the current status and major issues of their transport capacity, which was found through interview surveys with local governments and Railroad companies.

### 3.2.1 Current Status of Development

#### Only bilateral networks can be found

Currently, Railroads that function as international corridors include the Dakar-Bamako railroad (TRANSRAIL) and the Abidjan-Ouagadougou railroad (SITARAIL). Although railroads are in place in each of Togo, Benin and Ghana, they are used for domestic transport needs and do not function as an international logistic mode.

### **Deteriorated rail tracks and systems**

Rail tracks are vulnerable and at the same time wide in variety. The tracks were laid down as early as the 1920s to the 1970s and about 50 to 90 years have already passed. Railroad structures have aged significantly and are not in a condition to meet transport needs fully.

Their transport capacity is vulnerable because of deteriorated train cars and the poor capacity of freight cars. In addition, it is difficult to procure spare parts when any malfunction occurs, which results in a deteriorated capacity in operating rate. Inefficiency is also caused by the fact it is difficult to standardize locomotive engines and freight cars that are wide in variety. Transport needs are not met because freights are kept waiting at the ports of Dakar or Abidjan where freight cars are scarce.

### **Low-speed traveling and frequent derailment**

Because of deteriorated rail tracks, enough traveling speed is not gathered and derailment occurs frequently, which means only a very low level of service is offered.

In the section between Dakar and Bamako, an average traveling speed of less than 20-km/h can only be gained. In some sections, where there is a deteriorated bridge for example, the speed limit is established at 10km/h. The average traveling speed along the Abidjan-Ouagadougou section is over 30km/h, which is a better than that of the Dakar-Bamako section. The former, however, operates using a single track, which causes a concern because freights are kept waiting for their turn to be transported. There are also safety issues, for example, more than 100 derailment accidents occur annually (along the Dakar-Bamako section).

**Table 3-4 List of Major Railroads in Operation**

Section	Total length	Operator	Operational status
Dakar - Bamako (Senegal-Mali)	1286 km(Total) -644 km(SG) -642 km(ML)	TRANSRAIL	(Freight) 1 train/day *Target: 2 trains/day (Passenger) 3 trains/week
Abidjan-Ouagadougou-Kaya (Cote d'Ivoire-BurkinaFaso)	1260 km(Total) -638 km(CI) -622 km(BF)	SITARAIL	(Freight) 1 train/day *Target: 4 trains/day (Passenger) 3 trains/week *No operation between Ouagadougou and Kaya
Takoradi-Awaso(Ghana)	237km	GRC (Ghana Railway company)	(Freight) 3-4trains/week
Accra-Nsawam/ Accra-Tema (Ghana)	59km		(Passenger)3-4trains/day (no service on sunday)
Lomé-Blitta (Togo)	276km (Only domestically in Togo)	Togo Rail (Only for freight)	(Freight)Railroad exclusive for phosphate rock transport
Cotonou-Parakou (Benin)	438km (Only domestically in Benin)	OCBN (Only for freight)	(Freight)3 trains/week
Total	3260 km		

Source: Based on the railroad strategy of UEMOA and the result of an interview survey.

### 3.2.2 Vision for Development

Under UEMOA, the railroad development strategy (Etude pour l'élaboration d'une stratégie de développement du transport ferroviaire dans l'espace UEMOA in French) has been in place so that rail-road development can be enhanced. In the strategy, the need for new rail tracks is indicated as shown in the following table. Future plans call for a network connecting the capitals of each country. Development utilizing private funds is sought, but achieving this in a short period is considered difficult because of lack of profitability.

**Table 3-5 Development Plan of Railroad**

	Country	Route	length
1	Mali-Cote d'Ivoire	Bamako-Sikasso-Ouangolo	599km
2	Burkina Faso-Niger	Kaya-Dori-Niamey	551km
3	Togo -Burkina Faso	Blitta — Fada Ngourina-Ougadougou	783km
4	Niger-Benin	Niamey –Dosso-Parakou	625km
5	Mali- Burkina Faso	Sikasso-Orodara-Bobo Dioulasso	164km
6	Cote d'Ivoire-Mali	San Pedro-Man-Odiénné-Bamako	900km
Total			3,622km

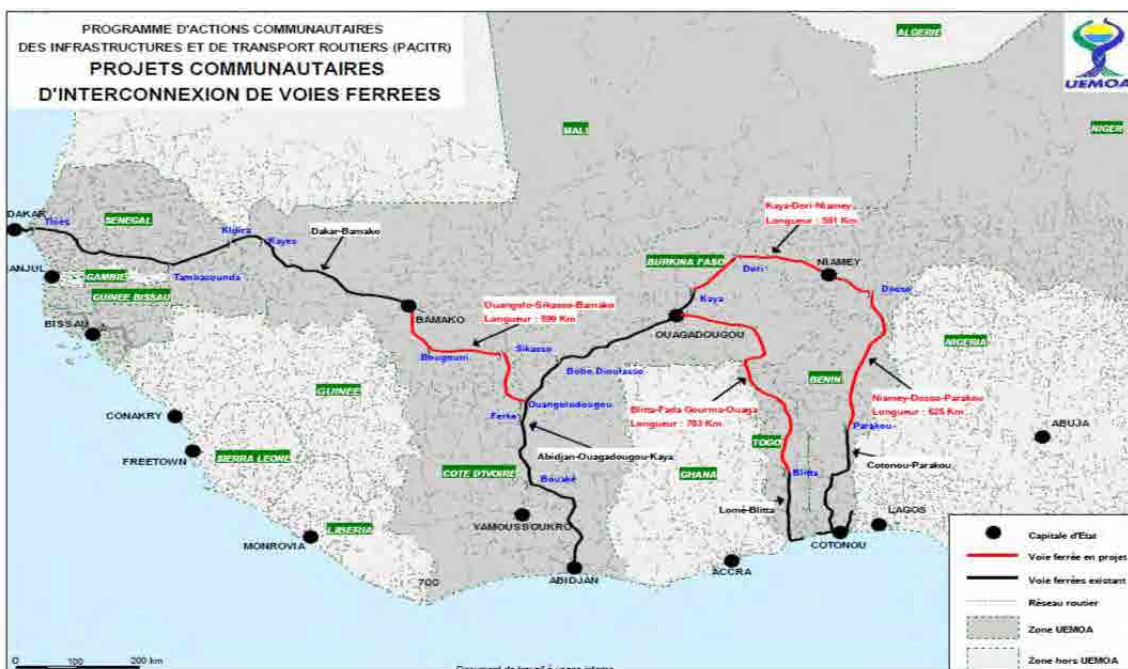
Source: Based on the railroad strategy of UEMOA

In the strategy, it is indicated that a total of 2,500-kilometer of new tracks be developed as a priority as shown in 1 to 4 in Table 3-5. The project size is expected to be 2,370 billion CFA (approximately 380 billion yen) including systems. Meanwhile, prior to the development of new tracks, it is necessary to rehabilitate existing tracks (3,300km) and the project scale is expected to be 1,080 billion CFA (approximately 170 billion yen).

It is targeted that the development of tracks will be promoted by utilizing private companies in a PPP-based approach like SITARAIL. By considering the transport needs and investment actually made in rehabilitation projects so far, significant efforts will be required to realize the planned new track development.

Major donors involved in the development of corridors are UEMOA, AfDB and WADB. F/Ss currently under consideration at the UEMOA headquarters will target the following 3 routes.





Source: Based on the railroad strategy of UEMOA

Figure 3-4 Railroad network project

Table 3-6 F/S for Railroad Development by UEMOA

Route	Contents
Dakar-Bamako-Ouagadougou	Investigation is underway. Dakar-Burkina Faso Border: US Trade & Development Agency Burkina Faso Border-Ouagadougou: UEMOA Headquarters
Parakou – Niamey	Parakou-Dosso: Niger-Benin are conducting survey. Dosso–Niamey: UEMOA Headquarters is waiting for execution of a contract.
Abidjan -Niamey	EU signed an implementation contract, but the study was temporarily halted due to security problems in Cote d’Ivoire.

Source : JICA Study team based on information from UEMOA

## Chapter 4 CURRENT STATUS OF DISTRIBUTION NODES

### 4.1 Current Status of Port

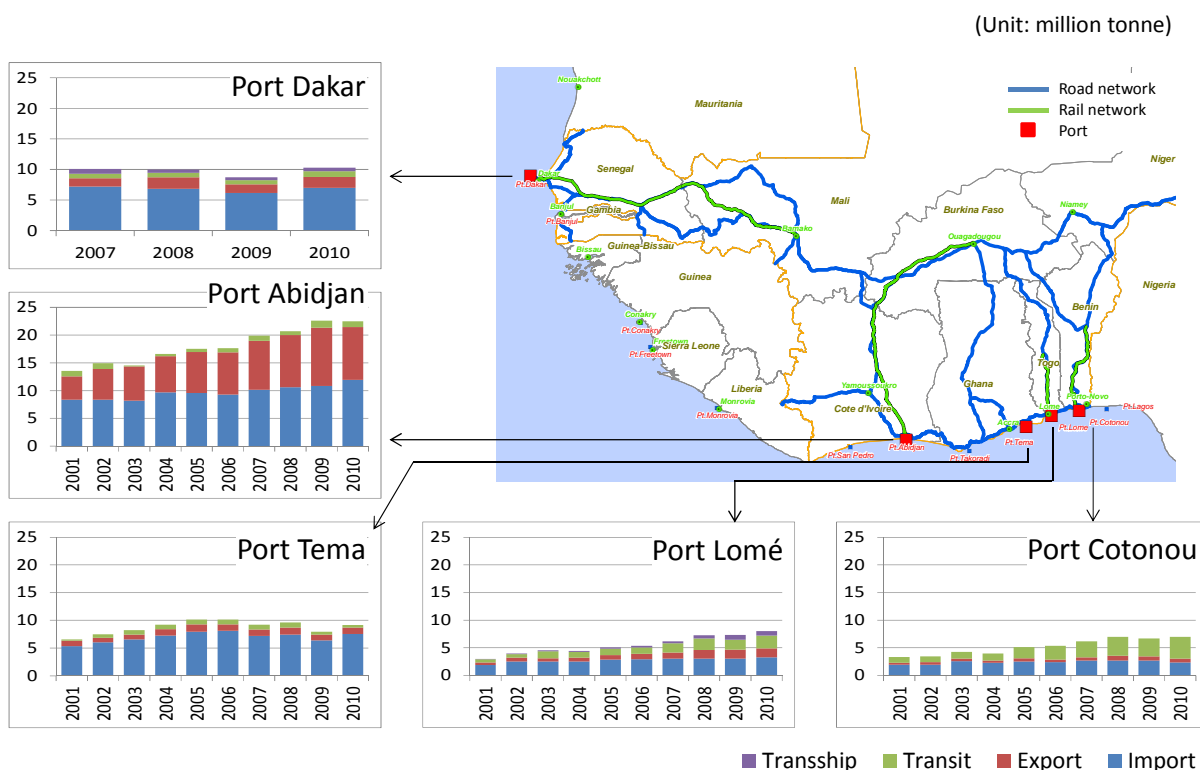
#### 4.1.1 Port Facility and Transaction Volumes

Coastal countries covered by this survey, such as Benin, Togo, Ghana, Cote d'Ivoire, and Senegal have their own international ports. Each port is connected to a UEMOA corridor or a railroad so that it can function as a gateway of the country or landlocked countries.

Data on transaction volume in 2010 indicates that the volume handled at Abidjan Port (Cote d'Ivoire) was the largest at about 22 million tons. This port functions as a central port for the region.

The transaction volumes at the ports of Dakar and Tema have not substantially changed since the beginning of 2000, which indicates that they are approaching their capacity limits.

The ports of Abidjan, Dakar, and Tema mainly handle freightes for their domestic markets. Data on the ports of Lomé and Cotonou show transit freightes accounted for relatively high shares of volume. More than half of the transaction volume at Cotonou Port is for transit. Since the crisis in Cote d'Ivoire in 2002, the port of Lomé has been in charge of transit freight of Burkina Faso and has steadily increased the volume of transit freight it handles. The port of Cotonou has been in charge of transit freight which moves past Niger to the northern part of Nigeria, and has steadily increased the volume of transit freight it handles.



Source : JICA Study team based on information from port authorities

Figure 4-1 Volume of port traffic

**Table 4-1 Current status of port facilities**

Port	Water depth of entrance channel(m)	Water depth of Container berths (m)	Berths	Container gantry cranes	Mobile harbor cranes
Pt.Dakar	15.0	10.0	38(3)	-	3
Pt.Abidjan	10.4	12.5	44(5)	4	2
Pt.Tokoradi	11.5	-	13	-	-
Pt.Tema	12.5	11.5	14(2)	3	30
Pt.Lomé	16.0	11.5	8(2)	-	6
Pt.Cotonou	12.0	10-11	11(1)	-	1

\*Inside ( ) is number of container berth

Source : JICA Study team based on information from port authorities

#### 4.1.2 Level of Service at Port

According to an interview survey conducted with shipping/storage businesses, the level of service provided in terms of waiting time is not good at the port of Dakar, the port of Tema and the port of Cotonou, as the times to wait are longer there. In relative terms, the service level, however, is higher at the port of Abidjan and port of Lomé.

The port charge<sup>1</sup> is relatively higher at the port of Abidjan than other ports, while it is lower than others at the port of Cotonou and the port of Lomé. It is partly why the higher volume of transit freight of landlocked countries is handled at these 2 ports.

**Table 4-2 Quality of Service at Port**

	Container dwell time(day)	Container vessel stay (hours)	Container vessel pre-berth waiting time(day)	General freight vessel stay (hours)	General freight vessel pre-berth waiting time (day)	Truck processing time for receipt and delivery of freight(hours)
Pt.Dakar	7	24	18	60	24	5.0
Pt.Abidjan	12	1	1	2.2	2.9	2.5
Pt.Tokorad	25	32	12.4	48	9.6	8.0
Pt.Tema	13	1	1	N/A	N/A	4.0
Pt.Lomé	12	36	24	48	48	6.0

Source: JICA Study team based on AICD database

<sup>1</sup> The port charge includes a total of payments to be made to public port corporations such as port use fees and freight weighing fees as well as to be made to crane operators for freight handling.

**Table 4-3 Charge of port (20ft Container)**

Unit: CFA

Port	Terminal Charge	Freight handling charge	Total
Pt.Abidjan	21,200	186,000	207,200
Pt.Tema	9,400	76,500	85,900
Pt.Lomé	23,900	74,800	98,700
Pt.Cotonou	3,500	84,000	87,500

Source : JICA Study team based on information from port authorities

**Table 4-4 Charge of port (Bulk: rice sac)**

Unit: CFA

Port	Terminal Charge	Freight handling charge	Total
Pt.Abidjan	300	5,500	5,800
Pt.Tema	450	N/A	N/A
Pt.Lomé	3,000	1,400	4,400
Pt.Cotonou	2,100	1,500	3,600

Source : JICA Study team based on information from port authorities

### 4.1.3 Potential of Port Development

The port of Abidjan, where modernization has been going on, has a strong competitive advantage as it has already large-sized port facilities as well as an industrial zone within the port area. The port, therefore, is expected to continue to act as a hub port in the surrounding area in the future, too. Among other ports, the port of Lomé has a large potential of development as it has naturally good conditions such as a water depth as deep as 16 meters. At the port, currently, the third container berth is under construction and it is apparently planning to establish itself as a hub port for transit freight. In addition, 5 more berths to be used exclusively for containers are currently planned in order to increase the volume of transshipment freight it handles. On the other hand, in Benin where the port of Cotonou is located, there is a plan to accelerate the development of the port of Sémé-Podji. It will be a port having 2 berths exclusive for containers and it is expected to function to complement the port of Logos in the neighboring Nigeria where transshipment freight and the economy are expected to grow significantly.

## 4.2 Dry Port / Inland Depots

In transit transport connecting the inland and ports, dry ports located inland, border customs houses, and bonded warehouses function as principal distribution terminals.

A dry port can function to facilitate customs clearance and bonded storage for transit freight as well as it can act as a transit for freight shipped to any third country. They also contribute to alleviating traffic congestion in urban areas and smooth transport of transit freight.

Due to a recent increase in the distribution flow, facilities are becoming cramped, and expan-

sion is being planned. Landlocked countries are planning new development of dry ports. At present, the marine container utilization rate in transit transport is less than 20 %. In view of the expected growth in demand, the necessity of container depots will increase.

At the terminal in Burkina Faso, the customs clearance process is completed within 1 or 2 days. Trucks have to wait in a queue for customs clearance, because issues on the user side such as deficient documentation, and delay of customs by consignor cause increases in delays.

### 4.3 Border Customs

At the border customs clearance, it is expected that time required to clear customs will be decreased and trucks' freedom of travel will be increased, through the development of OSBPs, a more efficient customs clearance process and decreased need for a customs clearance service (the shift to an alternative such as a tracking system). Time to clear customs required at the border between Burkina Faso and Niger and coastal countries is usually from half a day to one day. Some customs clearance offices do not operate on Saturdays, Sundays and holidays. Fresh goods, however, are cleared preferentially as they are handled as specialty goods.

**Table 4-5 List of Dry Port / Inland Depots**

Country	Facilities	Present status
Senegal	Dakar Port Logistic Platform	In operation
BURKINA FASO	Ougarinter (French name : La Gare routiere international de Ougadougou)	Planned to be expanded and moved
	Dry port Bobo Dioulasso (French name : La Gare routiere international de Bobo-Dioulasso)	Opened in 2011 with a side-track in place
NIGER	Dosso Dry port	In the planning process
	Niger River Right Bank Dry port in Niamey	In the planning process
GHANA	Boankra Dry Port	In the planning process
TOGO	Sahel Terminal	Planned to be expanded
BENIN	Zongo Dry Port	In operation
	Allada Dry Port	In operation
	Parakou Dry Port	In the planning process

\*no information about Cote d'ivoir and Mali

Source : JICA Study team based on interview to Ministry of transport of each country

## Chapter 5 ANALYSIS OF CURRENT TRAFFIC

### 5.1 Description of Survey

#### 5.1.1 Objective of Survey

The survey was consisted of the components shown in table 6-1, mainly there are traffic count survey and Origin-Destination Survey (OD survey) on the on cross-border. The period of survey was from mid April to mid June.

Table 5-1 List of Survey Items

Classification	Name	Number of Days	Time	Locations	Target	Method	Items
Survey No.1	Traffic count survey	3 weekdays 1 holiday	24-hour survey	Border Point:15points Internal Point:6 points Total: 21 locations	Spot traffic volume (All vehicle types)	Counting (Complete survey)	<ul style="list-style-type: none"> <li>Traffic volume on inbound and outbound lanes</li> <li>Survey of vehicle types (passenger cars, buses, small and large freight vehicles and container vehicles)</li> <li>Survey unit: Aggregated every hour</li> </ul>
Survey No.2	Roadside OD survey	As above	16-hour survey (6:00 to 22:00)	As above	Car drivers (passenger cars and freight vehicles)	Interview drivers on inbound and outbound lanes and fill out survey sheets. (20% of samples)	<ul style="list-style-type: none"> <li>Origin/ Destination</li> <li>For passenger cars: Purpose of trip, number of passengers</li> <li>For freight vehicles: Items carried, load weight, maximum allowed load.</li> </ul>
Survey No.3	Survey at port gate (OD survey)	3 weekdays 1 holiday	16-hour survey (6:00 to 22:00)	Senegal: Dakar Port Cote D'Ivoire: Abaidjan Port Ghana: Tema Port Togo: Lome Port Benin: Cotonou Port Total: 5 ports	Freight vehicle drivers	As above	As above
Survey No.4	Dry Port Inland depot survey (OD survey)	1 weekday	As above	Entrances to terminals Total: 5 locations	As above	As above	As above
Survey No.5	EPZ/SEZ survey (OD survey)	1 weekday	As above	Entrances to major EPZs/SEZs Total: 5 locations	As above	As above	As above



Source: JICA Study team

Figure 5-1 Survey point for Traffic Count /Roadside OD survey

## 5.2 Result of Traffic Surveys

### 5.2.1 Result of Traffic Count Survey

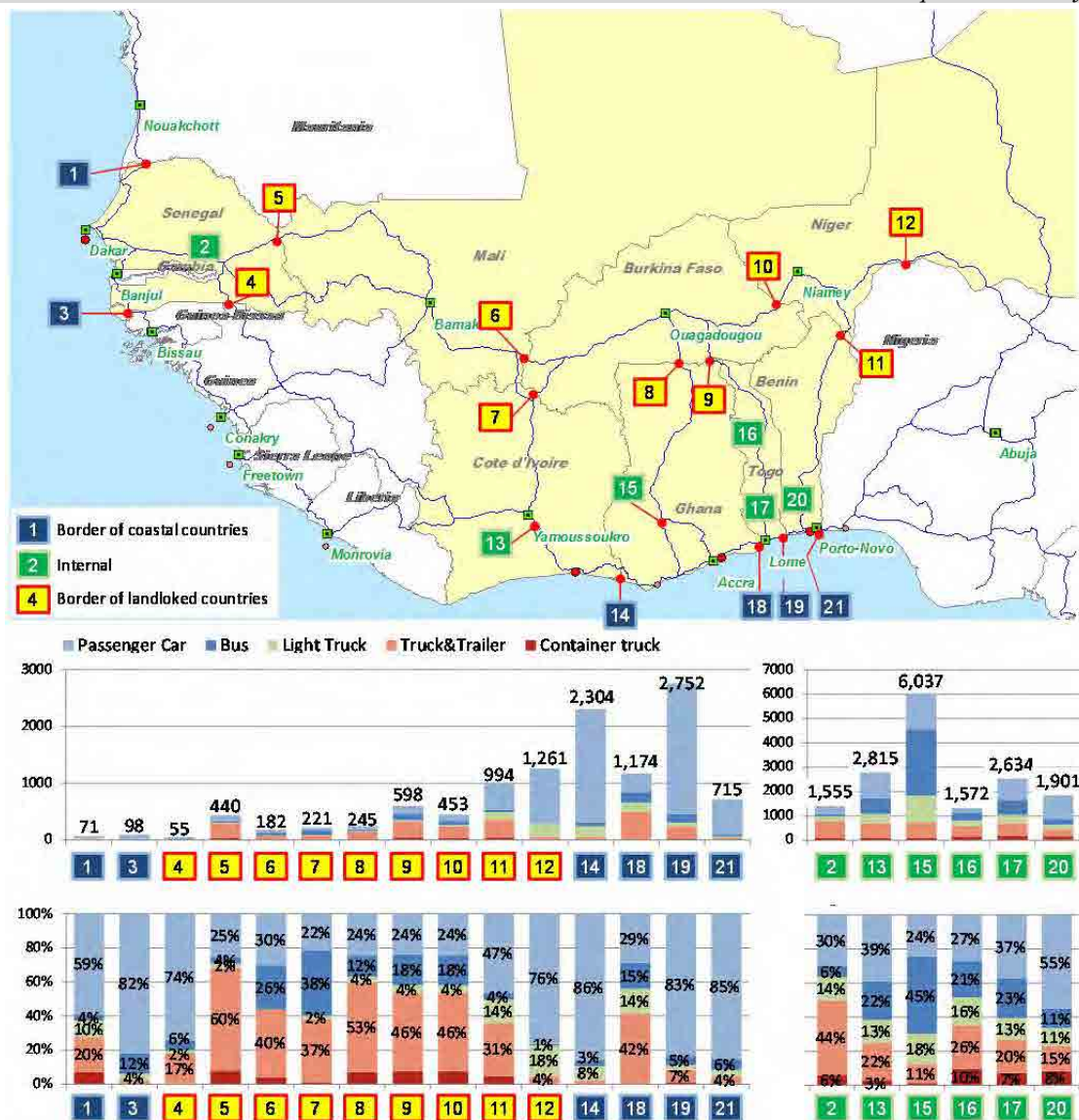
#### (1) Daily Traffic Volume

- The cross-border maximum traffic between landlocked countries and coastal countries is roughly 994 (Point 11) vehicles per day. Senegal-Mali and Burkina Faso-coastal countries had cross-border traffic of 200-600 vehicles per day.  
\*Point 12 (Niger-Nigeria border) has more traffic than other points. It is thought that there are daily exchanges such as purchasing at markets on Sundays.
- In the cross-border traffic departing from and arriving in Burkina Faso, the traffic at the border with Togo (Point 9) leading to the Port of Lomé is more than twice as much as the traffic at the borders with other countries.
- In the cross-border traffic departing from and arriving in Niger (excluding Point 12 where regional traffic is great), the traffic at the border with Benin (Point 11) leading to the Port of Cotonou is more than twice as much as that at the border with Burkina Faso (Point 10).
- The cross-border traffic (Points 6 and 10) between landlocked countries is roughly 500 vehicles per day.
- In the cross-border traffic between coastal countries, Benin-Togo border (Point 19) was the greatest at 2,752 vehicles per day. Next, the Cote-d'Ivoire-Ghana border (Point 14) had 2,304 vehicles per day; the Togo-Ghana border (Point 18) had 1,174 vehicles per day; and the Benin-Nigeria border (Point 21) had 715 vehicles per day.
- The traffic departing from and arriving in Senegal was low as compared to other points, as the traffic other than the Mali border (Point 5) was less than 100 vehicles per day.

#### (2) Share of Types of Vehicles

- Large freight commercial vehicles accounted for 36 %-70 % of the cross-border traffic of landlocked countries.
- The figure for large freight commercial vehicles was 68 % at the Mali-Senegal border, 59 % at the Burkina Faso-Ghana border; 54 % at the Burkina Faso-Togo border, and 54 % at the Burkina Faso-Niger border.
- In the cross-border traffic between coastal countries, the large freight commercial vehicles ratio was high at 42 % at Ghana-Togo border, but 6 % at other points.
- Marine container vehicles accounted for 10 % or less on the whole.





Source : JICA Study team

Figure 5-2 Result of traffic count survey

### 5.3 Analysis of Present Traffic Flow

#### 5.3.1 Preparation of Present OD Tables

In analyzing traffic flows, data obtained from OD surveys were analyzed to prepare OD tables to indicate the present situation (2011). These OD tables were created by separately preparing those for passengers and passenger vehicles and others for freight and freight vehicles.

##### (1) Zoning

These target eight countries are each divided into 2 zones (only Senegal is not divided and has 1 zone). In addition, each of major ports was counted as one zone. Neighboring countries were incorporated as appropriate. As the result, the survey area was divided into 27 zones in total.

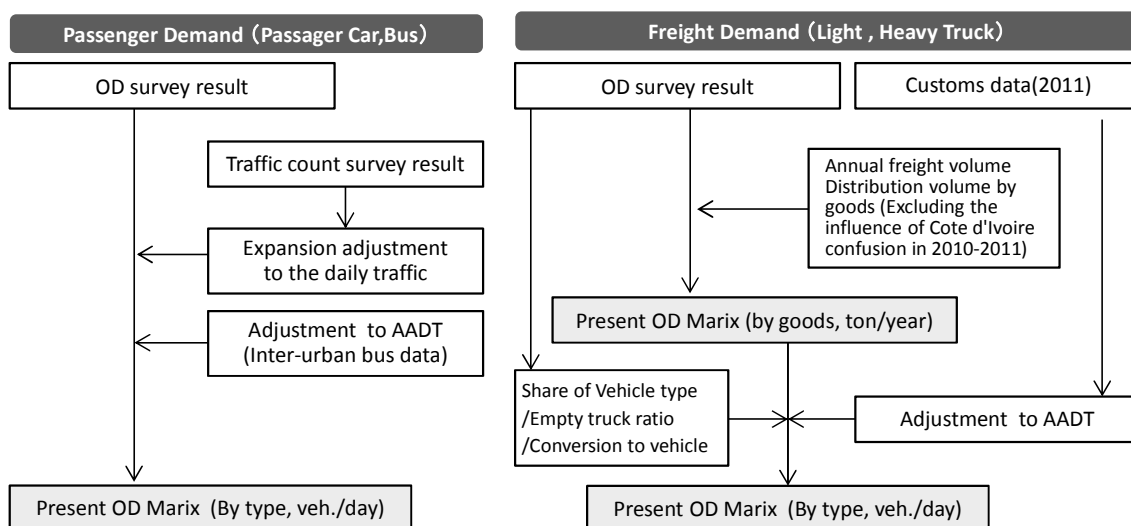


**(2) Preparation of OD Tables for Passengers and Passenger Vehicles**

OD tables for passengers and passenger vehicles were prepared by expanding data obtained from OD surveys and transforming them to data that can be obtained from spot traffic volume surveys. In addition, annual average daily traffic (AADT) was established using data of actual cross-border traffic via intercity bus operation.

**(3) Preparation of OD Tables for Freight and Freight Vehicles**

OD tables for freight and freight vehicles were prepared based on data obtained from OD surveys and each country’s customs clearance data. Customs clearance data can indicate details of how and how much freight flows throughout the year. By using the customs clearance data, several adjustments were made on annual average daily traffic (AADT) and freight volume data by item of goods as well as impact of the Cote d’Ivoire crisis (2010-2011) was eliminated. In addition, empty vehicle rate of freight vehicles was obtained using results of roadside OD surveys to incorporate the rate in OD tables for freight vehicles.



Source: JICA Study team

**Figure 5-3 Flow to Prepare OD Tables**

**(4) OD Tables Prepared**

OD tables prepared are listed below.

**Table 5-2 List of OD Tables to Indicate Present Situation**

year	type	unit	contents
2011	Passengers OD	people(trip)/year	-
	Freight OD	ton/ year	Main 10 goods, others
	Vehicle OD	veh./day	Vehicle type(Passengers Car, Bus, Light truck, Hevy truck, Container truck)

Source: JICA Study team

### 5.3.2 Present Traffic Flow

Based on OD tables to indicate present situation, present situation of traffic flow can be analyzed. OD distribution chart shown here indicates cross-border road traffic and traffic between domestic zones (ex. traffic between 2 zones in Ghana) is not indicated. In the OD tables, however, domestic traffic volume between zones of a country is indicated.

#### (1) Result of Analysis

##### Flow of passengers

Flow of passengers is more prominent between coastal areas, particularly it is found that a large number of passengers flow between southern Cote d'Ivoire where Abidjan is and southern Ghana as well as southern Benin and southern Togo. Flow of passengers is relatively large between the southern zone of Cote d'Ivoire and landlocked countries.

By looking at flow between landlocked countries and coastal countries, it is clear that linkage between neighboring zones across a border tends to be strong.

##### Flow of freight

Flow of freight is characteristic in that it is prominent between landlocked countries and ports and between landlocked countries and coastal countries. Mali is strongly linked with Senegal and Cote d'Ivoire. While, Burkina Faso has a particular strong linkage between Togo. Also it can be seen that Niger is relatively strongly linked with Benin and Nigeria. On the other hand, flow between landlocked countries is not large in volume.

Note) According to interviews conducted at the Niger Shippers Council and border customs, approximately half (48%) of the freight that crosses the Niger-Benin border is transit freight from the Port of Cotonou bound for northern Nigeria. However, this fact could not be corroborated from the current traffic surveys conducted in this study and the customs data obtained. Therefore, all the freight that crosses the border concerned is treated as bound for Niger.

##### Flow of vehicle

Passenger cars' flow in a large volume between coastal zones, particularly between southern Cote d'Ivoire and southern Ghana and between southern Togo and southern Benin. In addition, passenger cars' flow is strong in landlocked countries, between neighboring inland areas across a border. Flow of freight vehicles is large in volume between landlocked countries and ports or areas where a port is located, due to a large volume of transit traffic. When comparing the average trip length, it is 512km for passenger vehicles and 940km for large-sized freight vehicles, which indicates that the latter is about twice of the former.

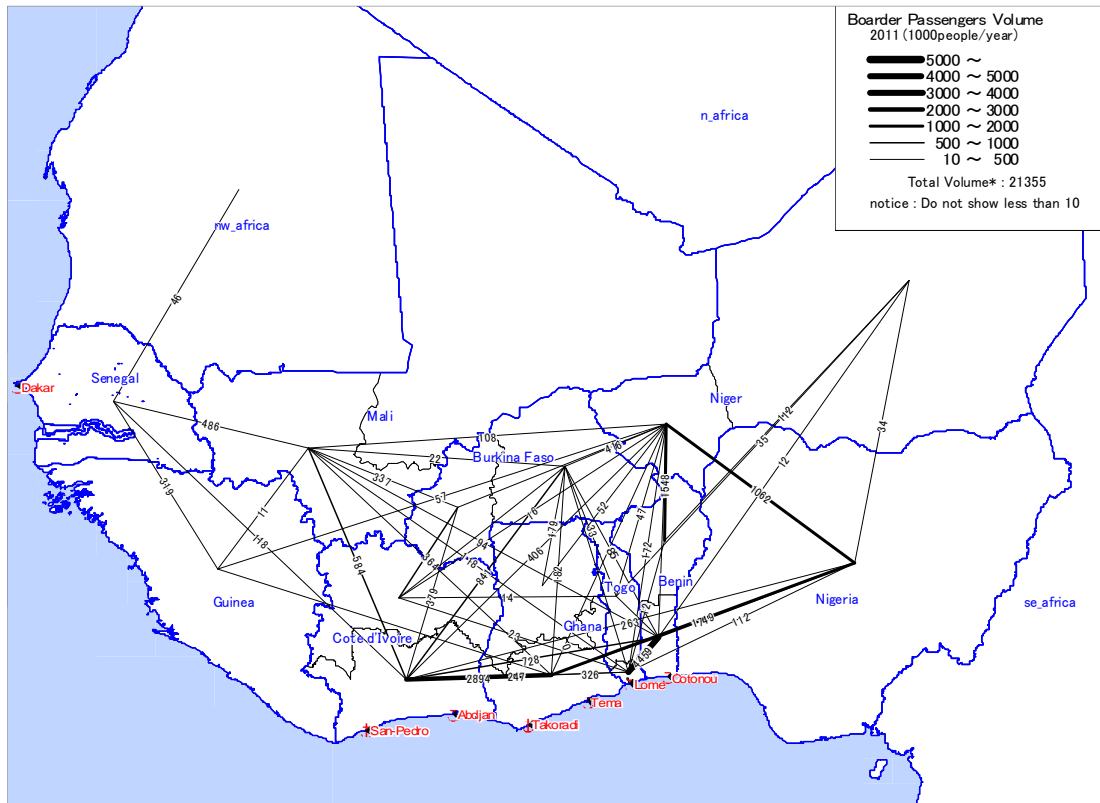
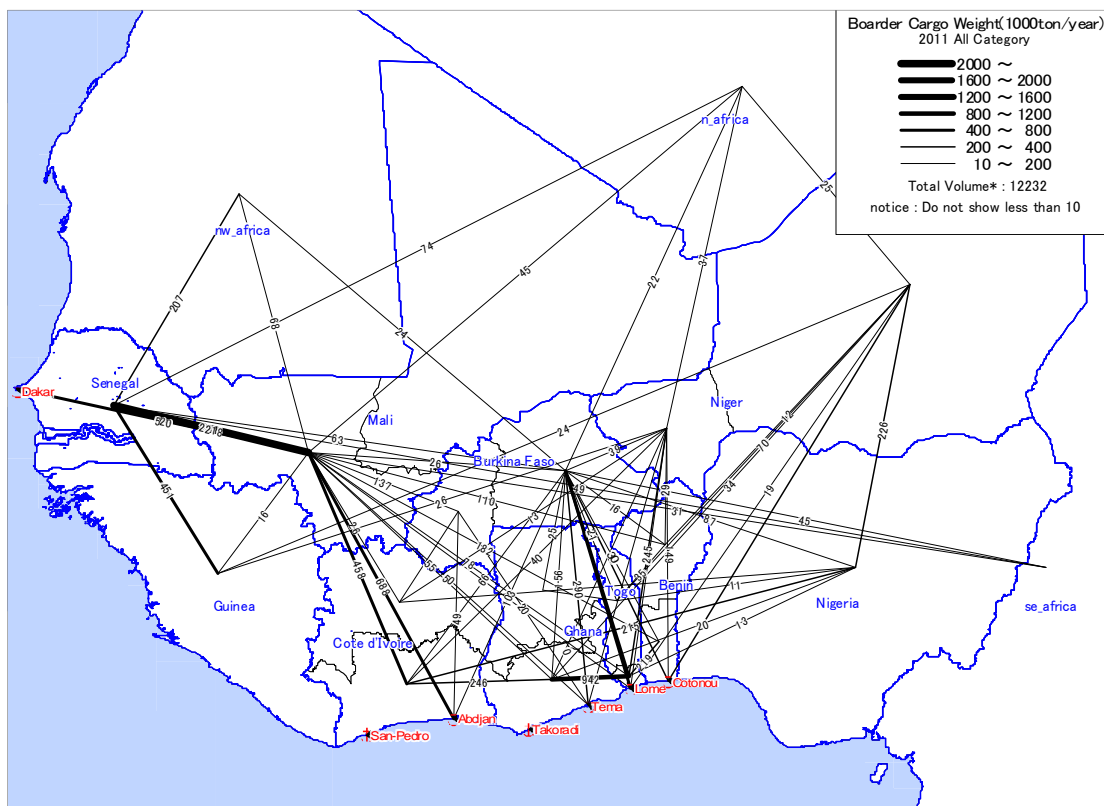
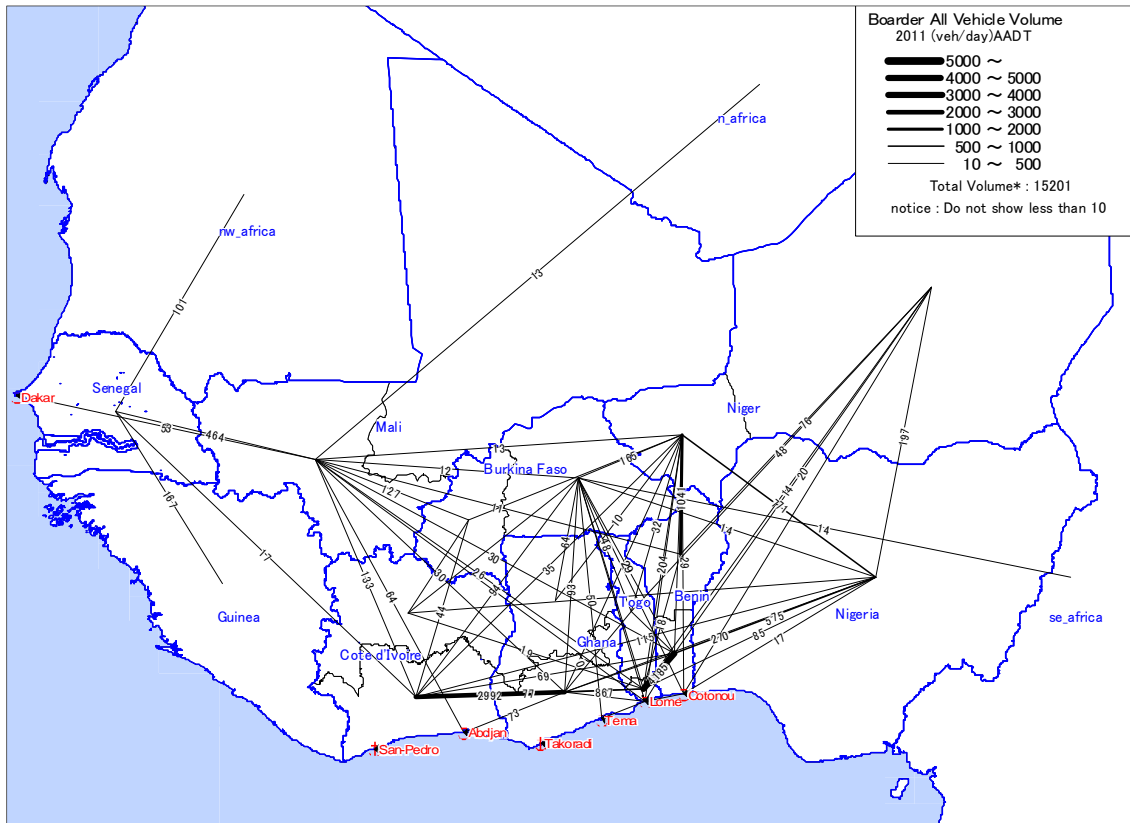


Figure 5-4 Present passengers flow ('000 peoples/year)



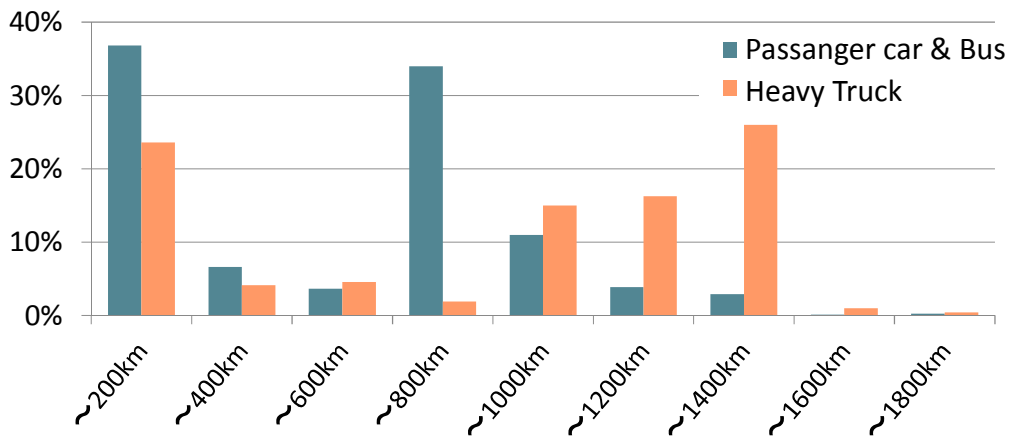
Source: JICA Study team

Figure 5-5 Present freight flow ('000ton/year)



Source: JICA Study team

Figure 5-6 Present Vehicle flow (Total of all type: veh./day)



Average Trip Length

- Passanger car & Bus : 512km
- Heavy Truck : 940km

Source: JICA Study team

Figure 5-7 Average Trip Length

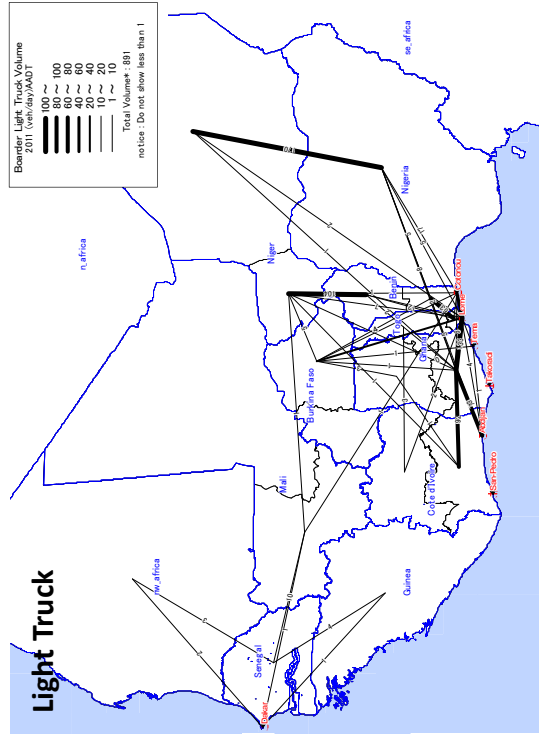
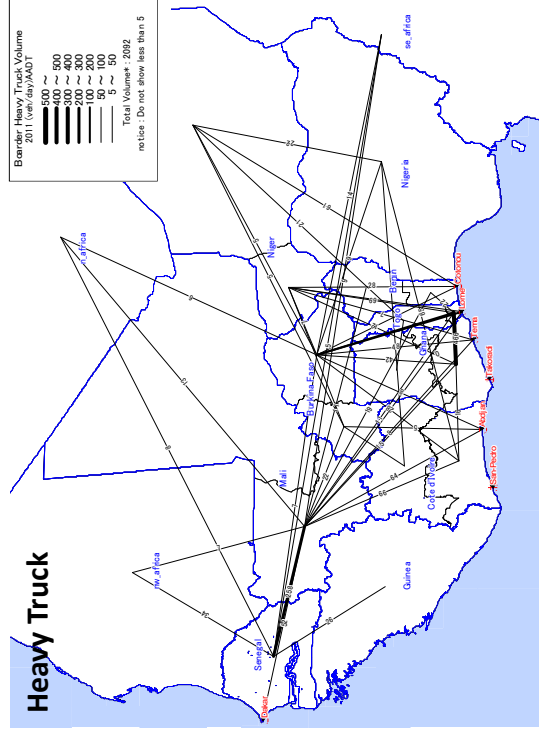
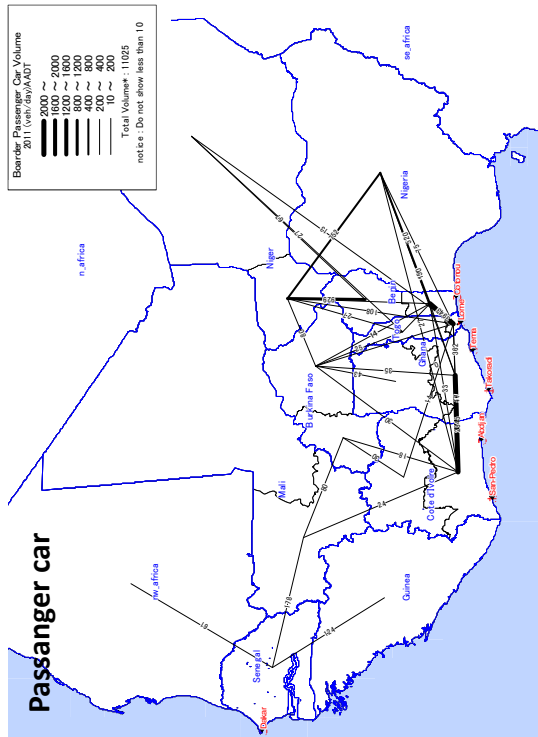
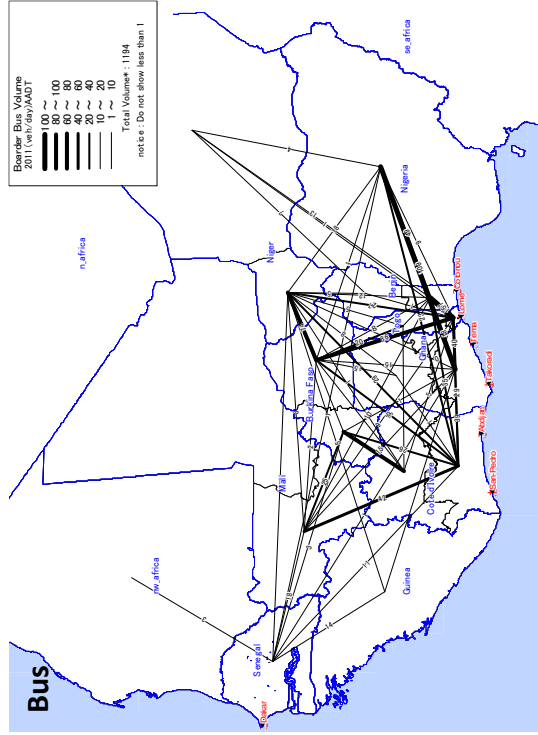


Figure 5-8 Present vehicle flow by vehicle type (veh./day)

Source : JICA Study team

### 5.3.3 Present Traffic Assignment

Based on OD tables for vehicles already created, traffic volume was allocated along the present international corridors to calculate present cross-border traffic volume. Traffic volume shown here is cross-border traffic volume and presented in the form of annual average daily traffic (AADT).

#### (1) Present Traffic Volume (All Zones)

##### 1) Cross-Border Traffic Volume

When looking at the entire target area, traffic volume along roads running from east to west in coastal areas is as large as from 1,700 veh./day to 5,000 veh./day, which indicates traffic is busy between coastal countries. Meanwhile, of corridors connecting landlocked countries and coastal countries, traffic is the largest along the Ouagadougou-Lomé corridor (608 veh./day), followed by the Dakar-Bamako corridor (568 veh./day).

##### 2) Share of Goods Type

By the share of goods weight, the largest goods on the Ouagadougou-Lomé corridor is cements as a construction material. On the other hand, the Ouagadougou-Cotonou corridor is used mainly to transport fuels like gasoline. Apart from these corridors, the corridors of Tema and Abidjan are used to transport a wide range of good.

##### 3) Share of Transit Freight

The Dakar-Bamako corridor is used mainly as important route for trade between Senegal and Mali. On the other hand, the transit traffic and country-to-country traffic are almost equal on the Ouagadougou-Lomé and the Ouagadougou-Tema corridors. Based on this, it is considered that UEMOA corridors are important not only for trade overseas such as Europe or Asian countries but also for the transport country to country in UEMOA zone and Ghana.

#### (2) Heavy Truck Traffic Origin/Destination from 3 Landlocked Countries

The Dakar-Bamako corridor is found to have the largest freight truck traffic volume, followed by the Ouagadougou-Lomé corridor and the Niamey-Cotonou corridor. Each of these corridors functions as a main logistics route for Mali, Burkina Faso and Niger, respectively.

Traffic of freight trucks leaving and arriving at Burkina Faso is dispersed along a number of corridors such as the Abidjan route, Tema route, Lomé route and Cotonou route. Among these, the Ouagadougou-Lomé corridor has the largest share in freight truck traffic. It can be said that serving here as background is the fact that the Ouagadougou-Lomé corridor is competitive in terms of transport costs and time distance. In addition, it is partly because freight trains have a larger share in freight traffic to the port of Abidjan than freight vehicle traffic along roadways. It is also partly because at the port of Tema, transit freight has a limited share as the port handles a larger volume of domestic freight.

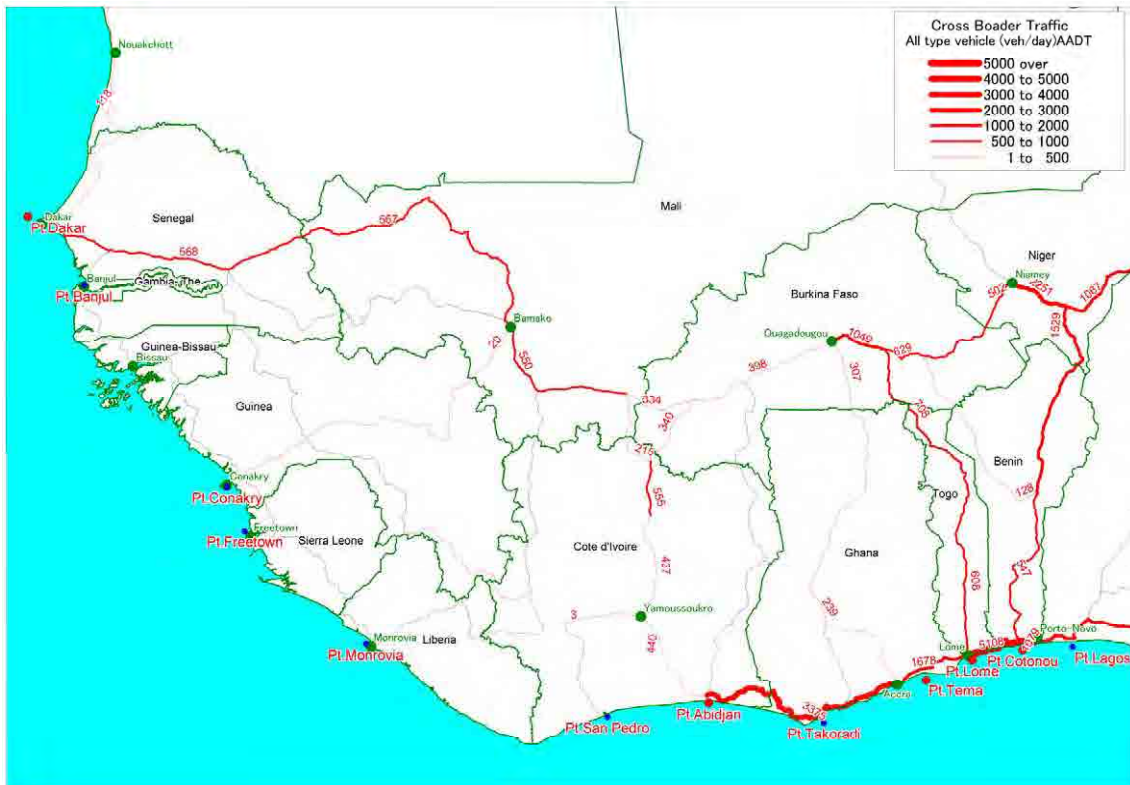


Figure 5-9 Result of the present road traffic volume (All vehicles)



Source : JICA Study team

Figure 5-10 Heavy truck traffic volume origin/destination from 3 landlocked countries



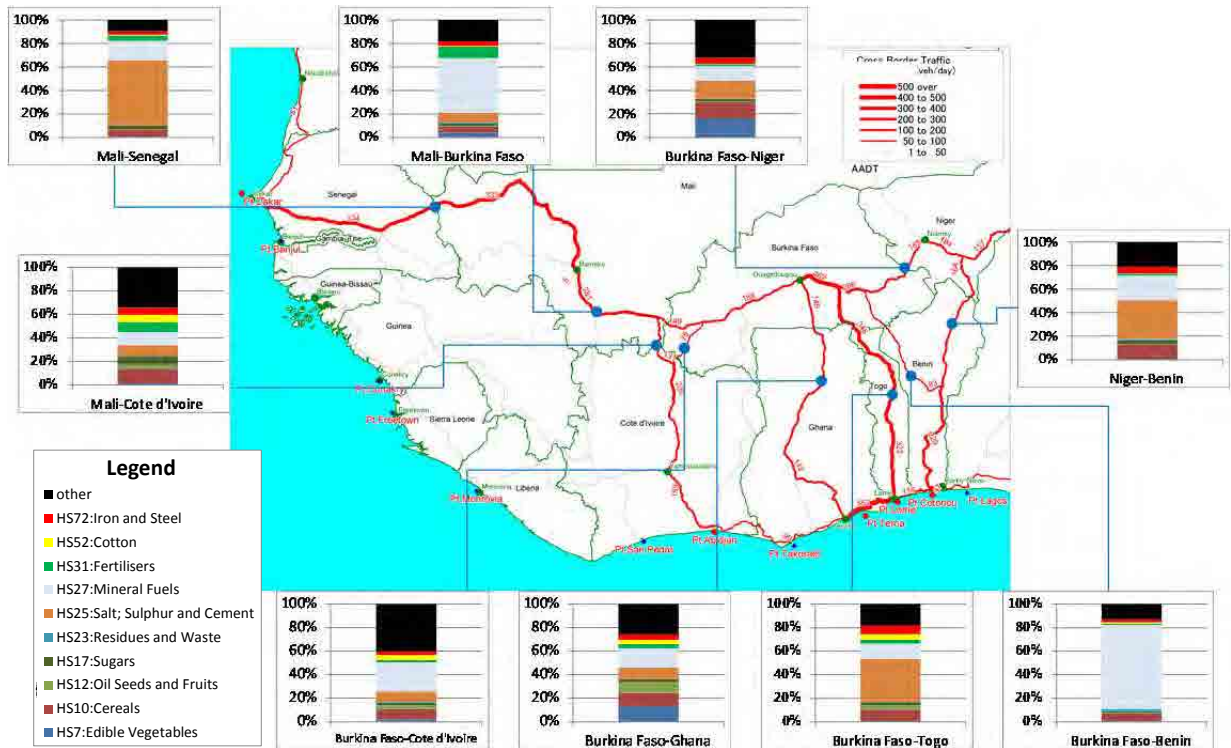
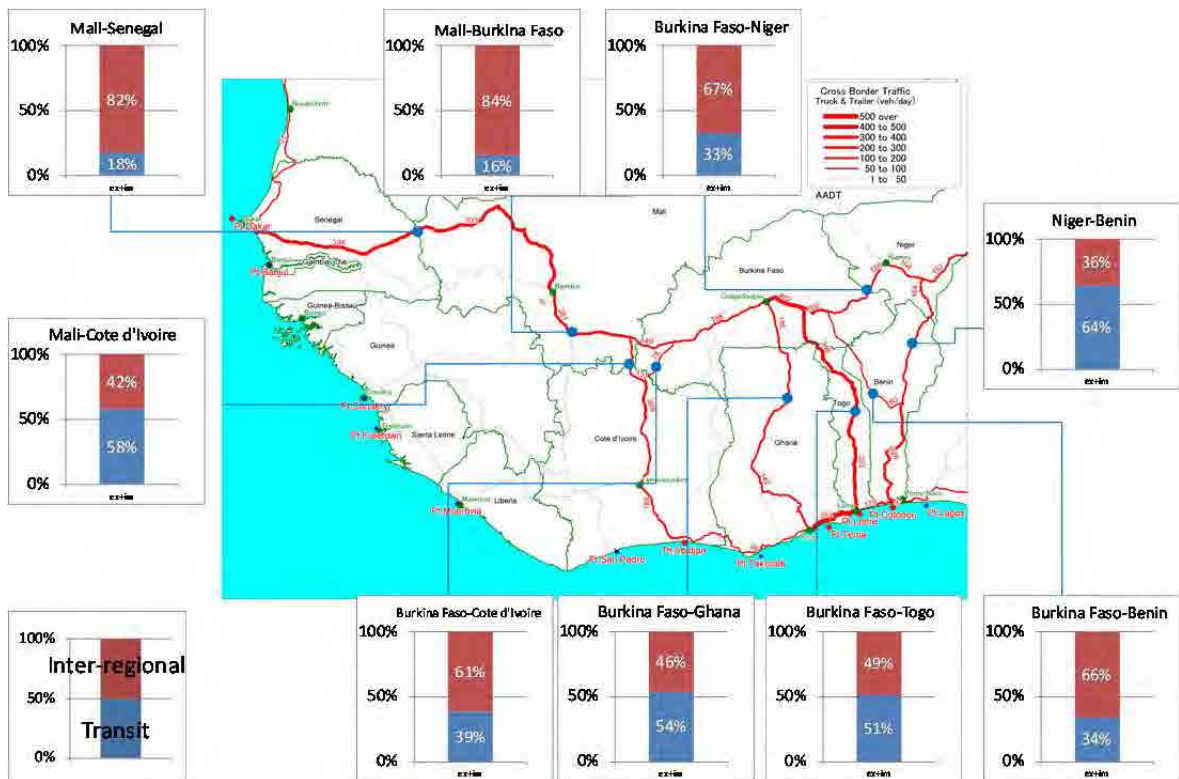


Figure 5-11 Share of goods type



\*Inter-regional: Traffic country to country in this area, Transit: Traffic between landlocked country-Coastal country  
Source : JICA Study team

Figure 5-12 Share of transit freight



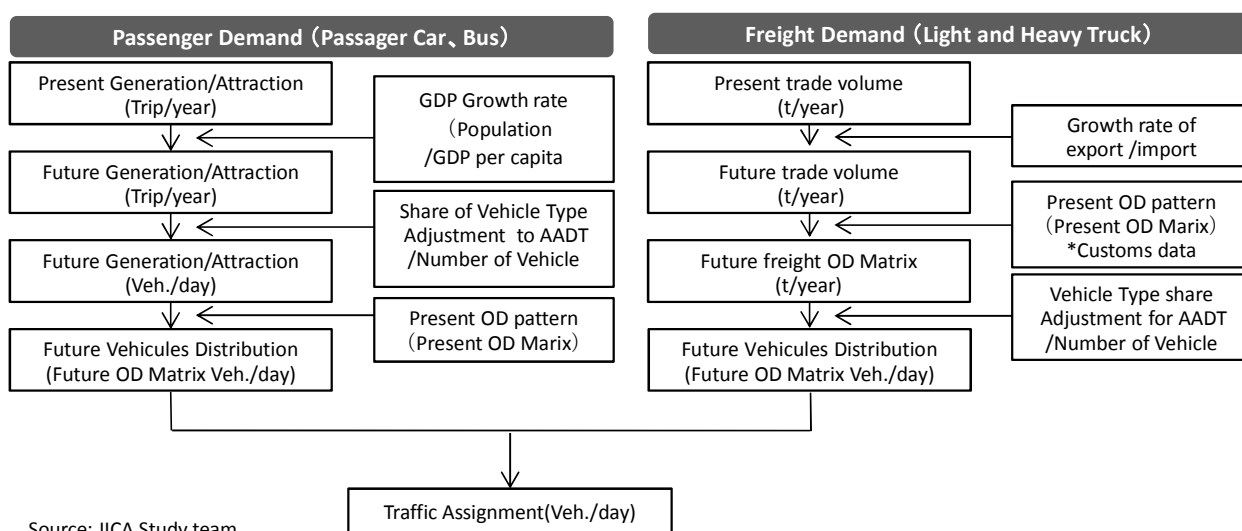
## Chapter 6 FUTURE TRAFFIC DEMAND FORECAST

### 6.1 Basic Idea for Future Traffic Demand Forecast

In this Survey, future OD tables are forecasted based on the OD tables to indicate present situation created through field traffic surveys, while an overview of future traffic demand for each corridor is calculated. Basic preconditions are shown in Table 6-1 below. Forecast of future traffic demand was obtained based on these preconditions and using flows of passengers and freight shown in Figure 6-1.

**Table 6-1 Preconditions of Future Traffic Demand Forecast**

Items	Preconditions
Target year	Future OD table (2022)
Zoning	27 zones
Future road network	The target road network is UEMOA corridors. It is presumed that current underdeveloped routes will be difficult to be in service by the year for forecast. Therefore, the current UEMOA corridors are used in the forecast.
Generation/Attraction model	The growth rate methodology is applied here. Since the traffic subject to the survey has the nature of cross-border traffic, the regression model usually used for urban traffic surveys cannot offer a fully satisfactory explanation. And, the number of samples is limited.
Distribution model	The present pattern methodology is applied here. It is presumed that there is no major variables in road performance and duration needed to travel between zones and linkage of zones will not change (Business As Usual: BAU).
Assignment model	Route assignment. Routes connecting zones are limited and inter-zone traffic is uniquely allocated to inter-zone roads. In accordance with bilateral agreements, traffic bound to landlocked countries cannot cross over other coastal countries.
Share of vehicles	In the year for forecast, share of vehicles and Railroads in traffic volume does not change. For share among vehicle types, the current share is applied.
Transport efficiency	Conversion factor to vehicles is obtained based on the number of passengers and freight volume transported in a vehicle obtained from surveys.



Source: JICA Study team

**Figure 6-1 Basic Idea for Future Traffic Demand Forecast**

## 6.2 Socio-Economic Frame Work

In forecasting future traffic demand for passengers and freight, a socio-economic frame was set up. Population, GDP and import/export volumes that are generally used in forecasting future traffic demand are set up for the frame.

### (1) Population

For the population frame, a frame established in each country was applied. For countries where the population frame up until 2022 is not known, forecast was made by applying a logistic curve created with actual data for 1990 and later. The population frame established is 160 million for 2022 (120 million for 2011).

**Table 6-2 Population Frame**

	Senegal	Mali	Burkina Faso	Niger	Cote d'Ivoire	Ghana	Togo	Benin	Total
2011	12.9	15.8	16.2	15.7	20.1	25.0	6.4	9.1	121.2
2022	17.3	21.8	22.8	22.9	24.2	31.8	8.7	12.2	161.7

Source: Estimation by JICA Study team

### (2) GDP

GDP here is based on the median estimates published in REP2 (Deuxieme phase du Programme economique regional de l'UEMOA). For 2017 to 2022, the value of 2016 is applied. Meanwhile, for GDP frame by country, linear regression analysis was made based on actual per capita GDP up until 2011 to obtain future values up until 2022. By multiplying the values by already obtained future population, GDP for each country was obtained. Furthermore, using GDP for the entire UEMOA area as a control total, each country's GDP was adjusted to obtain GDP for each zone subject to forecast.

**Table 6-3 GDP Frame (Growth rate)**

	Senegal	Mali	Burkina Faso	Niger	Cote d'Ivoire	Ghana	Togo	Benin
2012-2017	6.6 %	7.0 %	7.8 %	7.3 %	4.3 %	4.3 %	6.1 %	6.4 %
2017-2022	6.8 %	7.1 %	7.7 %	7.5 %	4.3 %	4.0 %	6.3 %	6.5 %

Source: Estimation by JICA Study team

### (3) Import/Export Volumes (Weight Basis)

For import/export volumes, a future frame was obtained through linear regression analysis in which country-by-country import/export volumes (weight basis) for the past five years were used. Major items of goods used here are key 10 items selected when conducting analysis of present traffic flow. In the volume totaling those of all items, exports are forecasted to grow by 1.63 times and imports by 1.56 times.

## 6.3 Future Traffic Demand Forecast

### 6.3.1 Future Passenger Demand

According to the forecast, future cross-border passenger traffic demand (generated demand) will be 40 million peoples/year, which is about 1.9 times the current figure. Examining concentrated occurrence by country, Benin (16 millions peoples/year) and Cote d'Ivoire (13 millions peoples/year) are the largest, followed by Togo (11 millions peoples/year).

### 6.3.2 Future Freight Demand

Future cross-border freight traffic demand (generated demand) will be 20 millions tons/year, which is about 1.6 times the current figure. Looking at concentrated occurrence by country, Mali (8.6 millions tons/year) is the largest, followed by Senegal (6.2 millions tons/year) and Burkina Faso (5.0 millions tons/year).

### 6.3.3 Future Traffic Demand

Future cross-border traffic demand for all vehicles (2022) obtained based on demands for passengers and freight will be 27,330 veh./day, which represents about 1.8 times the current figure. In the subject area, an increase in traffic volume is expected mainly in traffic between coastal countries. On the other hand, double the current growth rate is expected between inland countries and coastal countries.

**Table 6-4 Future road traffic demand**

	From landlocked countries to coastal countries	Between landlocked countries	Between coastal countries	Others	Total
Present	4,720	341	9,980	177	15,218
Future (2022)	9,217	802	17,009	302	27,330
Increased volume	4,497	461	7,028	125	12,112
Rate of increase	2.0	2.4	1.7	1.7	1.8

1) There are 3 landlocked countries. They are Mali, Burkina Faso and Niger (OD zone: 2-7).

2) The coastal countries include the Gulf of Guinea countries, which are Senegal, Nigeria and other countries in between (OD zone: 1, 8-17 and 21-27).

Source: JICA survey team

### 6.3.4 Road Traffic Assignment

From the results of a process of traffic assignment among the UEMOA corridors, it is found that, of corridors connecting landlocked countries and areas where a port is located, the Ouagadougou-Lomé corridor will be the largest traffic volume, with 1,109 veh./day. It represents about 1.8 times of the present figure. Following this is the Niamey-Cotonou corridor, where the traffic will be 1,075 veh./day. In future, road traffic volume will vary depending on the transport conditions of ports and corridors.

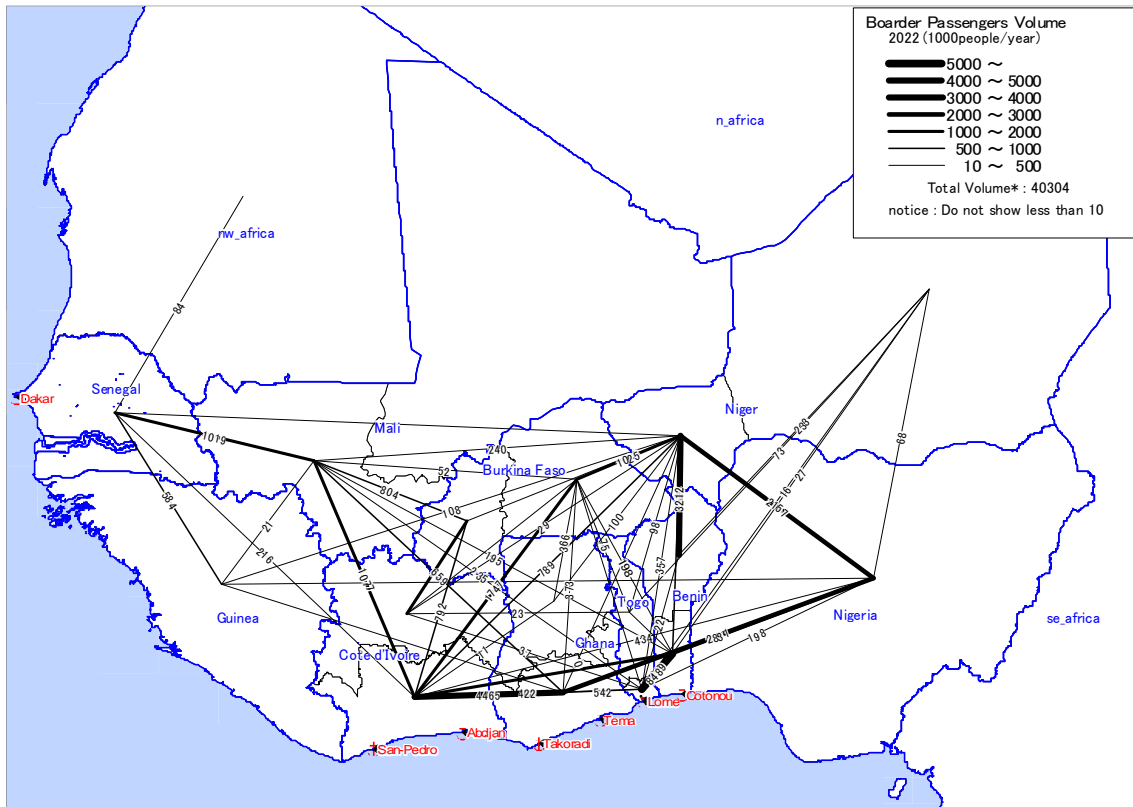
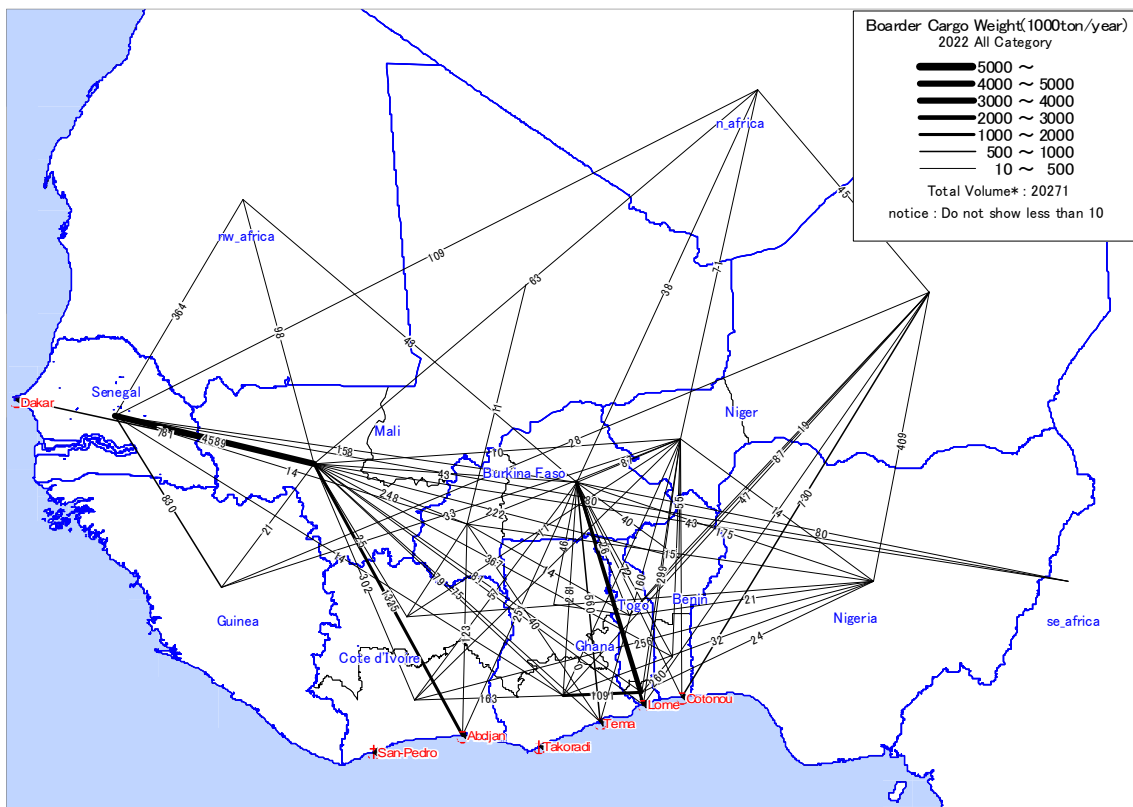


Figure 6-2 Flow of future passengers demand ('000 peoples/year)



Source: JICA survey team

Figure 6-3 Flow of future freight demand ('000ton/year)

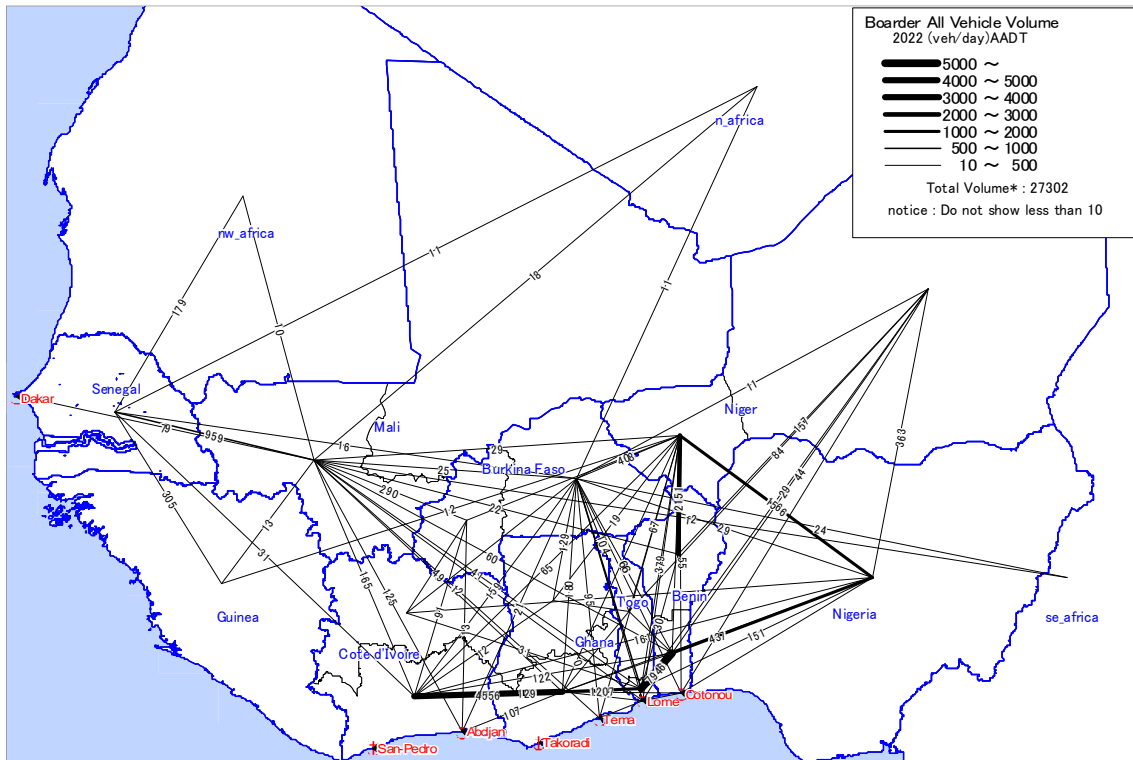


Figure 6-4 Future traffic demand (All vehicles: veh. /day)



Source: JICA survey team

Figure 6-5 Result of the future road traffic volume (All vehicles: veh. /day)

## **Chapter 7 ISSUES AND DIRECTION FOR PROMOTION OF IMPROVEMENT OF INTERNATIONAL CORRIDOR**

This study has revealed the current state of the cross-border traffic in the study area. The analysis of the findings of the study has confirmed a large movement of people and goods between the densely populated coastal countries where geographic distances between major cities are small.

Meanwhile, the Study Team has been able to confirm that most of the transport to and from the three landlocked countries is with the countries with trading ports. The study has found a characteristic that Lomé port Cotonou port which have limited volume of import and export freight transport to and from them, in particular, handle a large portion of transit freight to and from the landlocked countries. The study has also found that ca. half of the traffic volume on the international corridors is that of large trucks and that the volumes of the transit freight and the freight traded within the study area on the corridors are approximately the same.

The above-mentioned study results have proven the indispensability of the road infrastructure which forms the international corridors as basic infrastructure which supports movement within the area and composes part of the framework of the area. The landlocked countries which have to import the majority of everyday goods can emphasize the importance of the international corridors as major transport infrastructure, because they are the trading routes to the trading ports and gateways to foreign countries, on which economic activities and development in the countries depend. If the political and economic stability of the countries in the area is maintained in future, the volume of traffic between the landlocked and coastal countries is expected to double in the next ten years. As a consequence, the importance of the road infrastructure is expected to increase further. The following summarizes the tasks for the development of the study area and the improvement of the transport infrastructure.

### **7.1 Importance of the International Corridors in the Social Development**

#### **(1) Promotion of the Integrated Improvement in the West Africa**

The study results have revealed that the international corridors support transport of people and goods not only within countries in which a corridor exists but also over a wider area. Therefore, an integrated approach to their improvement and maintenance will have to be taken by all the countries in the area. The practical issue of the highest priority is finding a guaranteed source of funding, which requires reform of the existing UEMOA Fund for appropriate sharing of financing among the member countries and the increase in the amount of the fund.

#### **(2) Increasing the Impact of the Synergy between the Landlocked and Coastal Countries**

Integrated development of this area requires the viewpoint that the three economically advanced countries (Côte d'Ivoire, Ghana and Senegal) with strong economies help the other countries in the

area, including the three landlocked countries, in their economic development. Therefore, there is a need for the implementation of economic and industrial policies and regional development projects that strengthen mutually complementary relationships between the landlocked and coastal countries, in addition to the improvement of the international corridors.

## **7.2 Issues for Transport Infrastructure and Direction for Future Improvement**

### **(1) Road Network**

The UEMOA corridors are positioned as a critical infrastructure to support not only transit transport in landlocked countries but also exchanges and trades between landlocked countries and coastal countries. At present, the UEMOA Corridors which connect the landlocked countries and the coastal countries are the only major highways connecting the countries in the area.

There are a number of poorly maintained sections along the corridors in landlocked areas of coastal countries as well as cross-border areas, which is a bottleneck for logistics. Meanwhile, the projection of the traffic demand suggests that two-lane roads will meet the demand for the next ten years with the exception of urban areas.

Therefore, the cross section of the UEMOA standard two-lane road shall be used as the basic road cross section in the future road construction and the pavement and bridges shall have to have sufficient durability to withstand the expected increase in the traffic of heavy trucks. It is extremely important to continue appropriate maintenance of the roads to ensure that they serve the function of permanent physical distribution routes.

Measures to increase traffic capacity of certain sections of roads, such as construction of by-passes, passing lanes and climbing lanes, shall be taken where such measures are required. Sufficient right of way shall be reserved beside the roads so that appropriate measures can be taken when the traffic demand has increased.

If the criterion that the importance of a corridor correlates with the volume of transit freight transport on it is used, the priorities of the followings are high: Ouagadougou - Lomé and Niamey - Cotonou Corridors with the long stretches of unpaved sections and serious degradation of the pavement.

### **(2) Railroad Network**

Although some of railroads have been in operation, there are issues such as degraded infrastructure and poor transport capacity. When compared with road transport, railroad transport has advantages including lower costs and higher safety. Since it is expected, however, reasonable costs will be necessary to develop new and rehabilitate old railroad facilities, it is needed to work on railroad development from the mid to long perspective, while promoting demands for freight transport.

**(3) Ports**

Ports play a role of core economic activities in landlocked countries as an import/export gateway to those countries. As it is expected that demands will increase in the future, each port is promoting its modernization efforts and expansion programs.

In transit freight transport to and from landlocked countries, considerations to realize smooth access from ports to international corridors are required when developing infrastructure. In relation to this, reviews should be made to install dry ports for more efficient customs clearance processes.

**(4) Soft Infrastructure**

Transport is unable to be efficient, since there are hindrances such as troublesome procedures at the port or border, the issue of customs clearance escort and a number of checkpoints along the corridors. It is significant to create an environment that can meet needs of road users who want lower transport costs and shorter travel time.

**(5) Promotion of the Creation of the Basic Data of Infrastructure**

Measures are required for elucidating the current conditions in the area accurately and identifying problems and tasks to be tackled. Such measures include regular implementation of both inventory surveys of transport infrastructure and traffic flow surveys, whose results are to be used for the formulation of effective programs and the maintenance of the infrastructure. The Study Team is convinced that the results of this study will help implement these measures.