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Study on the Development of Transport infrastructure in Congo

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(Massounda Bantsimba Reine Dahlia, 2024)

Abstract
The historical background, present situation, difficulties, and potential future of the transportation infrastructure in the Democratic Republic of the Congo and the Republic of Congo are the main topics of this study. Economic development and social integration depend heavily on transportation infrastructure, yet both countries confront major obstacles because of colonial legacies, unstable political environments, and a lack of investment. Although the Republic of Congo has made significant progress in developing its rail and road systems, only over 10% of its roads are paved, and maintenance is still a major problem. The Democratic Republic of the Congo, on the other hand, has an even more disjointed transportation system, with only 2,250 km of paved highways serving a sizable population.

This study uses empirical analysis and the GIS model to demonstrate a causal relationship between transportation infrastructure and economic growth in these nations. The findings show that investments in roads and railroads increase productivity and contribute to long-term economic growth. Recommendations include prioritizing rural infrastructure investments, including sustainable practices into construction projects, and enhancing governance to prevent corruption and inefficiency.
Finally, this study aims to provide useful insights for policymakers and stakeholders involved in infrastructure development in the Republic of Congo and the Democratic Republic of the Congo, emphasizing the importance of strategic investments that can promote long-term economic growth and improve connectivity between these countries.

Keywords
Roads, railroads, Republic of Congo, Democratic Republic of Congo, economic growth, and transportation infrastructure

CHAPTER I

INTRODUCTION

Background of study

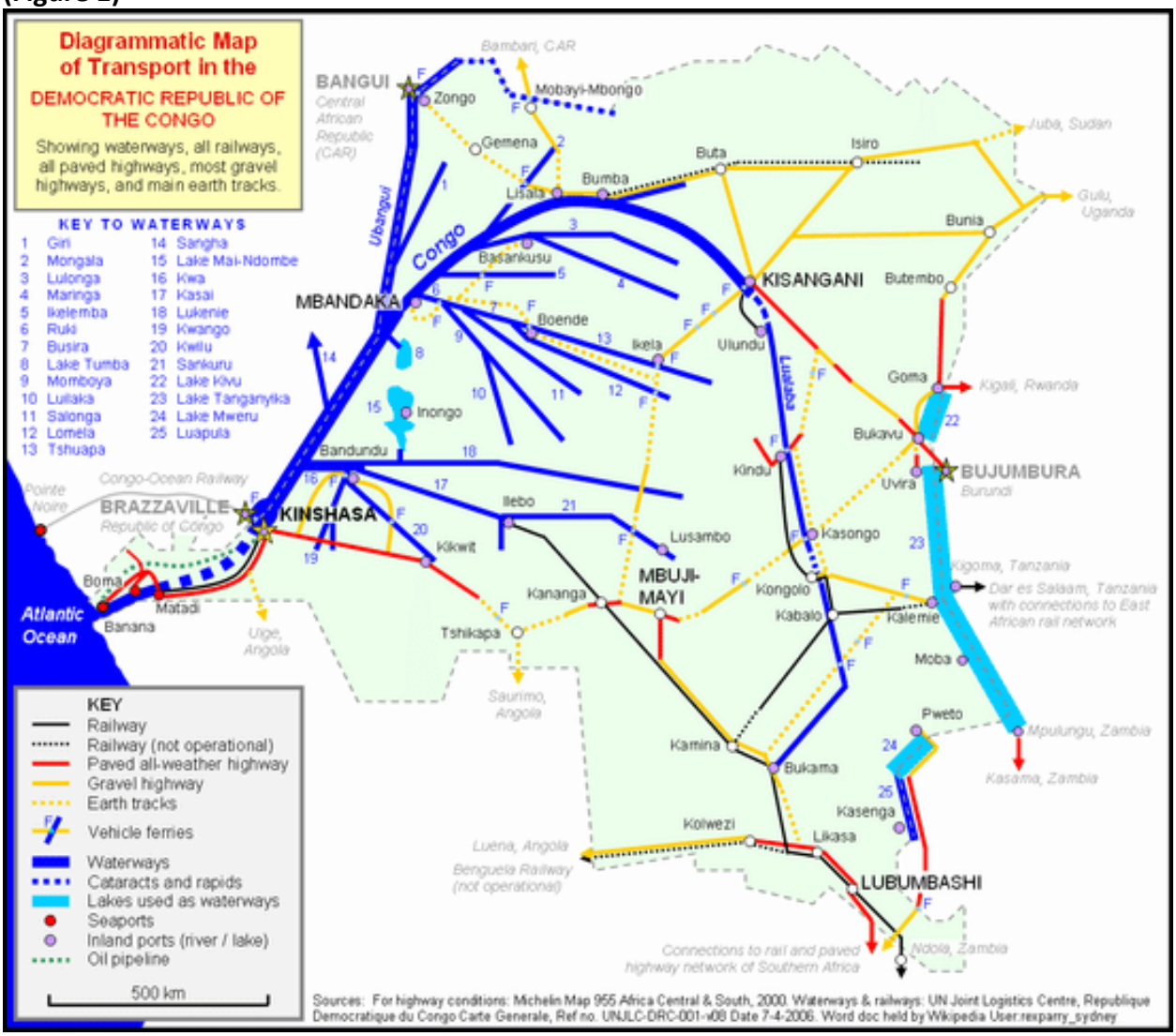
Transport networks are essential for improving connectivity both within and across areas in the Democratic Republic of the Congo (DRC) and the Republic of Congo (Congo-Brazzaville). The huge nation of Congo is home to abundant natural riches, breathtaking scenery, and dynamic cultures. On the other hand, moving from one location to another might resemble negotiating a maze. Its ports, railroads, and highways all require significant renovation. Why is this important, then? Improved transportation makes it simpler to get to work, education, and medical treatment. It has the secret to releasing the full potential of the nation.

The transportation infrastructure in both Congos was greatly influenced by the colonial era. Resource exploitation, not local economic growth, was the main emphasis of infrastructure development. Current infrastructure conditions are nevertheless impacted by the legacy of neglect and underinvestment left by this historical environment. Both nations experienced political unrest after gaining independence in the 1960s, which impeded the construction of infrastructure. Decades of violence have disproportionately hurt the DRC, resulting in a serious lack of investment in transportation infrastructure. The research of Bonin (2024) examined the function of transportation infrastructure. According to the author, transportation infrastructure—including roads, highways, railroads, and energy infrastructure—was essential to progress on a political, economic, and technological level. In fact, these primary lines enable the creation of landscapes, the division or joining of surroundings, and the creation of new relationships with areas. They have the power to alter our way of life, foster cooperation among interested parties, and improve the coexistence of living things and man-made objects. The development of infrastructure is essential to economic growth and productivity, claim Abdelkader et al. (2019).

It is widely known that the DRC's infrastructure deficit is a major growth limitation, even while it is understood that increasing infrastructure is by no means a cure-all. However, given the DRC's geography and socioeconomic makeup, figuring out the best place to invest in infrastructure becomes difficult. First, in order to foster trade and economic cohesion, it is imperative to improve both intra- and interprovincial connection given the enormous distances and stark differences in the geographical distribution of GDP (Figure 1). Linking thriving and (relatively) underdeveloped areas might significantly accelerate economic progress. Second, the DRC's extensive river network significantly aids with the connection difficulty.

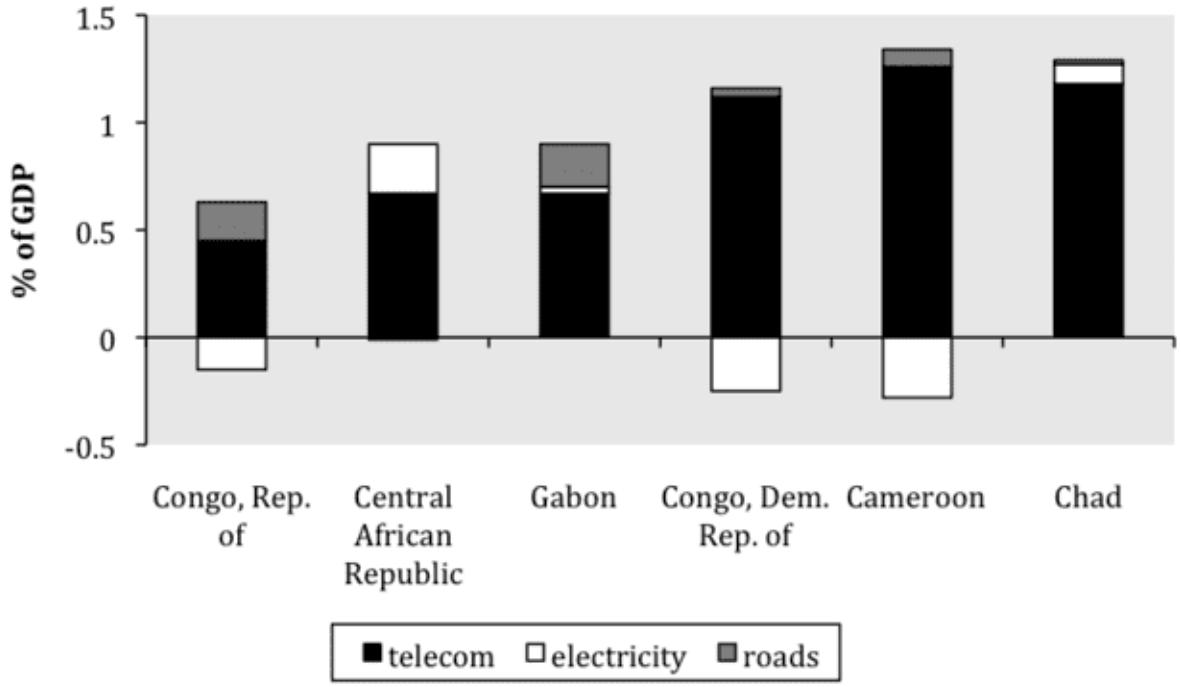
It connects places that are normally disconnected by roads and is widely utilized as a mode of transportation. However, the cost of this potentially helpful kind of transportation is still higher than it ought to be (World Bank 2014). Third, the growth and enhancement of infrastructure may jeopardize the DRC's remarkable forest wealth. Given the woods' extremely high local and worldwide significance, reducing the likelihood of their loss must be a primary goal. Last but not least, any infrastructure improvements undertaken in the eastern part of the nation may be limited or completely negated by the ongoing violence that exists there, which needs to be taken into consideration.

(Figure 1)

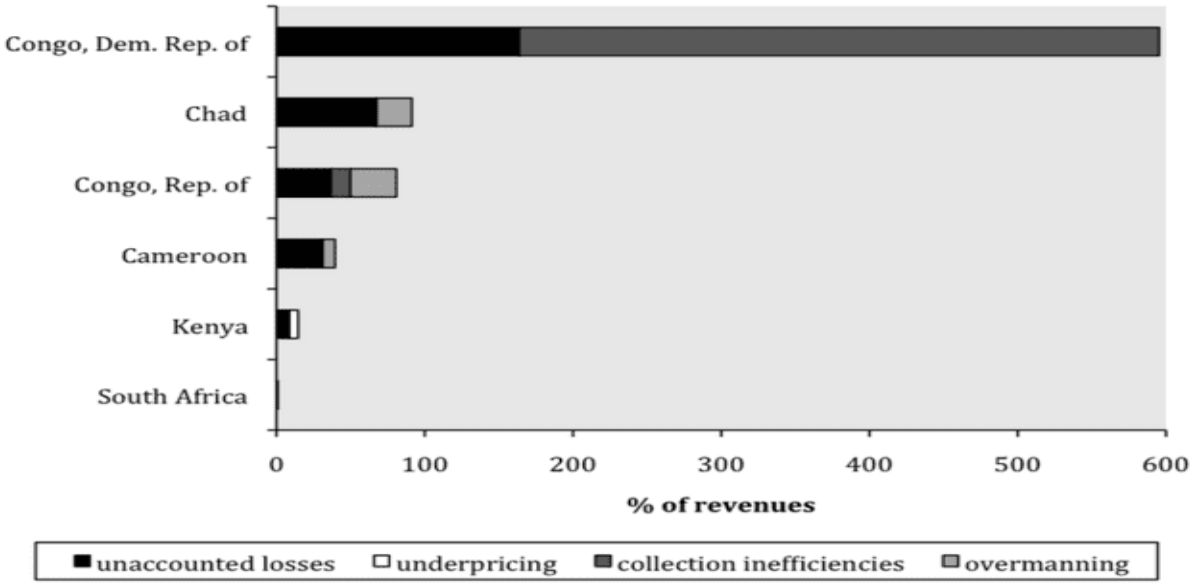


Why Infrastructure matters?

During the period from 2001 to 2005, per capita economic growth in DRC was on average 2.1 percent higher than during the period from 1991 to 1995. Despite this improvement, growth levels, which oscillated between 4 and 8 percent in the early 2000s, still fell short of the sustained 7 percent per year needed to meet the Millennium Development Goals (MDGs). Improved telecommunications
infrastructure has been the main driver of this change, contributing 1.1 percentage points to the country's per capita growth rate. Deficiencies in power infrastructure, on the other hand, held back per capita
growth by 0.25 percentage point over this period. Simulations suggest that if Central Africa's infrastructure platform could be improved to the level of the African leader, Mauritius, per capita growth rates could increase by as much as 5 percent per year. Almost half of this impact would come from
improvements in the power sector alone **(figures 2 and 3).**



Enterprise surveys in the Democratic Republic of the Congo (DRC) show that the lack of affordable power is the most significant infrastructure constraint that firms face, accounting for roughly 40% of the productivity disadvantage faced by Sub-Saharan firms. Poor governance, bureaucratic red tape, and financing constraints account for the rest.



The state of DRC Infrastructure

In the Democratic Republic of the Congo (DRC), the population and economic activity are concentrated in three distinct centers that form a triangle: Kinshasa in the southwest, Lubumbashi in the southeast, and Kisangani in the northeast **(figure 3**). The maps clearly show that there is a marked absence of well-developed infrastructure linking these three cities, particularly in terms of road and rail. Power and ICT infrastructure is somewhat developed along the Kinshasa Lumbubashi axis, although GSM coverage has lately increased in the east. In terms of transportation infrastructure, several DRC areas (particularly the southeast and northeast) are better connected to infrastructure corridors in bordering countries than to those in their own country.

A Snapshot of DRC Transportation System

A number of railway lines connect Kinshasa with Kasai and Katanga provinces, but their service is frequently erratic and slow, making the shipment of perishable goods along them a questionable and uncertain endeavor. The Congolese transport system is a multi-modal system with the Congo River as its spine. Much of the DRC depends on a combination of roads and rivers to transport people and goods throughout the country. In some parts of the country, including much of Equator province, roads have deteriorated so much or never existed, making river transport the only option.

In order to expedite the export of raw materials (primarily rubber, ivory, minerals, and timber) from the interior of the DRC, a large portion of the current transportation system was constructed during the colonial era, with little consideration for the socioeconomic integration of the Congolese territory.

The Democratic Republic of the Congo features one of the world's greatest networks of navigable rivers, stretching over 25,000 kilometers. Increasing the use of river and lake transport can lead to economic growth and poverty reduction, as it is cost-effective and supports the country's interior regions with significant agricultural potential. Additionally, it can supplement or perhaps replace road infrastructure in other key Congo regions. Kisangani, the third biggest city, and Mbandaka, the seat of Equateur province, are solely accessible to Kinshasa via river travel.

Until 1971, river and lake transport was monopolized by public firms. However, private operators currently dominate both formally and informally. Kinshasa is the country's main port, handling over 2 million tons of cargo annually. In comparison, one single port transports more than quadruple the amount of the national railway, Société Nationale des Chemins de Fer du Congo (SNCC). River transport is crucial for the growth of agriculture, which is central to the DRC government's economic development policy. It enables the opening up of vast rural regions.

The road network is insufficient for long-distance transportation to the capital, despite its importance for local travel. River systems are critical for long-distance transportation. Despite weak port infrastructure, transportation may nevertheless travel across rivers for most of the year. In many places where the more infrastructure-intensive transportation networks of roads or

railroads have failed or never existed, the river has therefore become a last alternative. Lastly, a method for calculating a portion of the financial gains from building roads is shown.

The Concept of Sustainable Transport Development

Sustainable transport development not only addresses environmental concerns but also focuses on social equity and economic viability. It advocates for a shift from Car-centric urban planning to more sustainable models that prioritize public transit, walking, and cycling. This shift can significantly reduce urban congestion and pollution, improving overall quality of life.
Sustainable transport development integrates environmental, social, and economic dimensions. Banister (2008) argues, "sustainable transport seeks to integrate environmental considerations into transport planning" . This concept is echoed by Newman & Kenworthy (1999), who state, "the future of urban transport lies in sustainable approaches that prioritize public transit and non-motorized options" . In the African context, Mbewe et al. (2015) emphasize that sustainable transport initiatives are crucial for urban mobility and reduced emissions.
Sustainable transport development is essential for balancing mobility needs with environmental stewardship. According to Banister (2008), "sustainable transport seeks to integrate environmental considerations into transport planning" . In the African context, authors like Mbewe et al. (2015) emphasize that sustainable transport is crucial for economic growth while addressing environmental challenges.

The transport network's present state

A geographical model that pinpoints trip expenses and obstacles is created. It mimics the flow of people and exchanged items throughout the DRC. The model uses demographic statistics, land topography, and the network of roads and rivers (including location and quality information) as inputs. Based on these inputs, it makes a number of reasonable assumptions about how local farmers, traders, and other economic actors would travel around the nation. The result is an algorithm that calculates the transportation routes that a cost-minimization strategy would use to deliver goods to and from any place in the Democratic Republic of the Congo. In the end, the evaluation determines which present road network segments are both most important to the network as a whole and most in need of repair.

This study begins by evaluating the important accomplishments and problems in each of the DRC's major infrastructure sectors, with key results presented in table 1. The issue of how to fund the DRC's unmet infrastructure requirements will also be addressed.

Table 1 Transport network's present state, Evaluation of accomplishments and challenges

Achievements		Challenges
AIRPORTS	increased internal connection and refurbishment of aircraft	Strengthen regulations to improve the abysmal air transport safety record.

	fleet.	
ICT	High amount of GSM signal coverage at an affordable price	Increase mobile phone penetration. Create links to underwater cables.
PORTS	Matadi port serves the Kinshasa region.	In the near run, increase service at Matadi Long-term, secure access to deepwater ports
:POWER	Strategic networks are available to facilitate mineral and forestry exports.	Invest extensively on power generation. Improve utility performance.
RAILWAYS	Progress in raising external funding for network reconstruction.	Improve infrastructure and service quality to reclaim market share from road transportation.
ROADS	Rapidly increasing access to unimproved latrines	Provide for road network upkeep. Modernize the regulatory framework for trucks. Give sufficient attention to river navigation.

Source: Authors elaboration based on study's findings

Public Transport Situation in Brazzaville

Many means of transportation, each tailored to the unique needs of the urban population, define Brazzaville's public transportation system. Cabs, buses, and minibuses are the primary modes. There are two types of taxis: "100-100" drivers follow predetermined routes at reasonable rates, and private drivers run on demand. Routes are also served at competitive rates by minibuses, sometimes referred to as "hiace," and buses, also referred to as "coasters." In Brazzaville and Pointe-Noire, where infrastructure is frequently insufficient, these forms of transportation are vital for inhabitants' daily travel.

Public transportation in Brazzaville has a number of difficulties in spite of its diversity. Regular traffic bottlenecks and early vehicle deterioration are caused by inadequate road infrastructure. It takes longer to go there on roads because they are frequently narrow and badly maintained. Furthermore, only a small portion of the fleet of vehicles is really in use due to inadequate management and insufficient numbers. Limited financial resources for transport system growth and upkeep exacerbate these issues. Ineffective management also plays a part.

Table 2 Private-Owned Means of Transport in Brazzaville, from 2007 to 2016

Means of Transport	Taxi	Collective Taxi	Minibus	Bus	Total Tc
2007	2115	65	900	143	3223
2008	3120	75	975	160	4330
2009	4700	108	1215	183	6206
2010	5406	132	1350	196	7084
2011	6104	220	1802	220	8346

2012	8824	389	2509	221	11943
2013	10824	489	3209	228	14750
2014	12000	590	4008	232	16830
2015	12307	678	4207	256	17448
2016	12356	689	4218	269	17532

***Source*: SRTU/Brazzaville**.
Parc automobile data

From 2,115 in 2007 to 12,356 in 2016, there were a lot more taxis. This increase demonstrates the expanding significance of taxi services as a revenue stream for a variety of owners, including business owners and public personnel.Collective taxis also saw significant increase, growing to 689 by 2016, while the number of minibuses reached 4,218. This development indicates a move toward more economical and flexible transportation options for users.
Although the number of buses remains low (269 in 2016), the establishment of the Urban Public Transport Authority (STPU) in 2015, which includes 150 new vehicles, intends to improve the organization and dependability of public transportation services.
The total number of private transportation means (Total Tc) increased from 3,223 in 2007 to 17,532 in 2016, indicating a significant growth in demand for urban transportation amid growing urbanization.
the table depicts a dynamic rise in Brazzaville's private transportation sector, which is driven by economic and social causes. However, the reliance on used automobiles, as well as a lack of severe regulation, raise quality and safety concerns. Initiatives like the STPU are critical to improving the efficiency of public transport systems.

An additional significant obstacle is the fierce rivalry amongst many operators, which results in a lack of coordination and overall inefficiency. Every form of transportation caters to a distinct set of customers; nonetheless, intense competition among them all leads to erratic behavior and inconsistent service standards. The absence of stringent regulations and oversight exacerbates this predicament by permitting operators to alter routes and tariffs at will, which causes confusion and discontent among passengers.

Multiple steps are required to enhance Brazzaville's public transportation system. For traffic to flow more easily and with less congestion, road infrastructure investment is essential. Enhancing the administration and synchronization of transportation services, along with providing sufficient cash to revive the Urban Public Transport Company (STPU), could enhance the system's dependability. To ensure fair rates for all consumers and standardize services, more laws governing transport operators should be implemented.

CHAPTER II
TRANSPORT MODELS AND NETWORKS

Geospatial Model

This study's analysis is predicated on the results of a geospatial model that was created to replicate the movement of people and goods throughout the DRC. Because it enables analysis across all regions of the nation, not simply the areas where the respondents are situated, a geospatial model was selected above other analytic techniques like household surveys. Considering that there is a dearth of household survey data for the DRC, it also enables a more thorough examination.
There are two processes involved in building this model. Initially, a transportation network dataset is assembled. This required gathering information on the network of roads and rivers, as well as the locations of ports. Subsequently, assumptions are established regarding the flow of people and goods inside this network.
Following a discussion of these two processes, a section outlining the risks associated with applying this methodology follows.

Transportation Network

The ability to calculate the cost of transportation between any two locations inside the DRC is the basis of the geospatial model. Under the presumption that agents would reduce transportation costs, transportation routes may be readily estimated once that is established. Considering the kind of transportation infrastructure that is in place as well as its state and quality is the first step in achieving this.
Data for this study were collected from a variety of sources. Delorme, a GPS mapping software business with extensive road networks in the Democratic Republic of the Congo, provided the road position data. The African Infrastructure Country Diagnostic (AICD) provides information on road quality, including width, pavement type, and condition. The FAO and DRC's Ministère des Infrastructures, Travaux publics et Reconstruction (MITPR) provided data on navigable rivers, while the UN's Joint Logistic Center provided information on port locations. After constructing the transportation network, accurate estimates are established on the cost of moving around it. The cost estimate for the road network was based on the Highway Development and Management Model (HDM-4). Engineers commonly use a model that considers terrain, road quality, and country-level factors (e.g., fuel price, fleet quality, used truck price, and wages) to calculate the unit cost of traveling across a road network (Ali et al., forthcoming). Information on the cost of traveling along the river and the cost of loading products onto boats was obtained from World Bank (2014). Now that the costs of moving people and things in DRC are understood, the Congolese's transport routes may be replicated. To conduct the research, DRC's area was divided into over 27,000 cells (about 10 by 10 kilometers) with origin points at each centroid. To estimate transport costs to the local market, all feasible routes from each cell centroid are calculated and the most cost-effective route/market combination is chosen as the most likely route/destination. This research defines a market as a city with at least 50,000 people. This criterion was set to encompass both big and minor cities in the Democratic Republic of the Congo and is consistent with African transport literature.

Although this model aims to precisely represent the movement of people and things in DRC, it has several limitations. The approach does not account for the cost of delays at ports, highways, or waterways. Transport in the DRC, particularly along rivers, can take longer than expected due to dilapidated infrastructure, river silting, and human factors like low capacity and skills at shipyards, as well as port operators' lack of information on supply and demand.

Model Caveats

While it is believed that this model simulates how people and products move around DRC as accurately as possible, some shortcomings must be acknowledged. First, the model does not factor in the cost of delays at ports, or along the roads or rivers. Transport in the DRC, especially along the river, can take significantly longer than one might expect because of dilapidated infrastructure (such as roads that are washed away during the rainy season), river silting (which can make segments of some rivers impassable, especially during the dry season), or other human factors (such as low capacity and skills at shipyards, or port operators having little information on supply and demand for transport, and thus not making optimal staffing decisions) (World Bank 2014). The model probably understates the real cost of utilizing the river, which is relatively inexpensive in terms of money but requires a substantial time investment, in the absence of accurate estimates of the opportunity cost of time. However, time delays along the roads are often far less than those caused by utilizing the river, even if cost estimates for using the roads solely account for financial charges.

Lastly, even though the model incorporates the two most popular modes of transportation—roads and rivers—there are other ways to move people and goods around the Democratic Republic of the Congo. The DRC does have a number of train lines. However, these are infamously unreliable and only cover a limited area of the nation, namely in the provinces of Kasai and Katanga. In the DRC, flying is also a very frequent way to move between provinces. However, the majority of Congolese population cannot afford this (World Bank 2013).

Road Networks

After independence, the majority of the road network was made up of dirt roads, the majority of which were seasonal routes that were closed during the rainy season. Communication between the various parts of the area was frequently disrupted by the rains. In 2020, there will be 23,234 km of roads, 1826 km of which will be paved.
There are now 3089 km 250 of paved national roads. It consists of many rural service roads totaling 14,980 km in length, 15 national roads totaling 5604 km, and 33 departmental roads totaling 2650 km.
Given the current state of the Congolese road network, the assessment of road infrastructure construction from 1960 to 2020 is still pessimistic.

The Congolese Ministry of Equipment and Road Maintenance claims that "if its level of service was satisfactory, this network could have been considered relatively dense."
In addition to being extremely unstable, the majority of road infrastructures are also being impacted more and more by geomorphological processes like floods, sedimentation, and water erosion. In fact, this has a detrimental effect on rural areas' socioeconomic growth and affects both the people who are the primary victims and the government. The primary factors contributing to the deterioration of roads and country trails include traffic, the harshness of the rains, the sensitivity of the geological formations, the extremely rough topography of these areas, and human activity.

Railways: The Forgotten Giants

Roads are important, but railroads are also quite important. Although Congo has a number of railway lines, many of them are outdated and in poor condition. Consider these railroads to be the nation's economic lifeblood. To keep everything running properly, they must be in good health. People and products may move more easily when distant locations are connected to cities by a robust railway infrastructure. What if someone's life might be changed by a straightforward train ride? The colonial past of both Congos greatly influenced their railway networks. In the beginning, railways were built more for resource extraction than for regional economic growth. This historical emphasis has led to disjointed networks that frequently lack efficient connections with other modes of transportation.
During the colonial era, the DRC's rail system was developed, but it has since suffered from decades of violence and poor administration. Due to inadequate maintenance and a lack of funding, several lines are presently non-operational or underused.

The Republic of Congo has several projects in the pipeline to improve its railway infrastructure: Road-rail bridge between Brazzaville and Kinshasa:** This project aims to connect the two capitals, with an extension of the railway to Ilebo in the DRC. Currently, the link is made by ferry and barge. The bridge, estimated to cost €2.5 billion, would be built under a 35-year public-private partnership. It would be constructed in Maloukou, 45 km north of Brazzaville, due to the navigability of the river and the proximity of the special economic zone. This project is a priority for NEPAD and the African Union's Agenda 2063. The law authorizing its ratification was adopted by Congo in January 2021.

Rehabilitation and Expansion of the CFCO:** The agreement with a Chinese state-owned company to rehabilitate 510 km and build 1,800 km of new lines, if successfully implemented, would significantly improve the capacity and efficiency of the railway network.

Strengthening the legal and regulatory framework and encouraging private sector involvement in road construction, rehabilitation, and maintenance:** These initiatives are crucial for ensuring the sustainability of the railway infrastructure and attracting investment.

Table 3 Rail Traffic from 2009 to 2018

Category	Units	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Passenger Traffic											
Passenger	10^3 v	592	576	601	523	574	517	405	130	121	39
Passenger-km	10^6 Vk	207	198	265	266	335	322	274	50	19	6
Freight Traffic											
Tonnage	10^6 tonnes	593	770	913	962	982	822	800	586	110	108
Tonnage-km	10^6 Tk	257	331	362	417	432	374	379	280	26	31

Table: Evolution of the volume of the main goods transported by rail from 2009 to 2018

Category	2009	2010	2011	2012	2013	2014	2015	2016	2027	2018
Wood	29527	45581	33520	25270	29746	32 101	28 420	30 987	4 330	4 607
Sugar	35611	36768	13510	9150	5772	23 531	24 132	13 084	1 250	...
Flour	22220	29054	36040	44290	45898	51 597	40 930	23 218	...	...
Vehicles	5179	4996	5950	5200	2163	3 150	4 375	986	111	...
Beverages	9830	13895	14400	11520	9142	3 206	...	...	...	...
Hydrocarbons	94621	120612	137480	142710	161005	164 202	152 777	133 959	92 102	86 963
Butane Gas	5342	7771	6570	8730	7940	5 711	5 648	2 685	...	...
Cement	162882	223894	263930	284220	348815	268 577	276 163	189 954	...	2 806
Basic Necessities	113226	137955	153120	173000	168267	121 184	189 954	104 944	...	631
Miscellaneous Goods	114885	150174	205400	217310	183670	131 838	135 298	85 850	12 224	13 247
Total	593323	770700	869920	921400	962418	805 097	799 872	586 090	110 017	108 254

Table 4: Evolution of the number of wagons suitable for operation at CFCO from 2009 to 2013

Type	2008	2009	2010	2011	2012	2013
K Loué	2	3	3	...	1	...
Service Wagons	103	108	69	57	57	...
Leased Flats	11	11	20	...	16	...
G.V and P.V Vans	25	25	28	26	32	...
21-meter Container Carriers	24	27	44	33	36	...
21-meter Cranes	151	182	243	169	150	...
10 to 14-meter Cranes	79	115	218	151	166	
dump truck	161	242	309	250	288	...

Special	2	10	12	57	6	...
Covered Ordinary	176	177	334	331	336	...
Passenger Equipment	25	28	51	22	64	...
Flat Boards	6	8	27	15	12	...
Wagons + Tankers of Individuals	83	82	151	89	91	...
Covered Bananas and Livestock	2	4	11	9	9	...
Covered with Sliding Walls	...	...	,,,	331	336	...

Table 5-7: Evolution of the number of wagons suitable for operation at CFCO from 2014 to 2018

Category	2014	2015	2016	2017	2018
Total General Passenger Cars	37	41	--	49	36
Old Cars	11	14	--	15	16
"Korean" cars	26	25	--	23	9
South African Cars	--	2	--	11	11
Total Commercial Wagons CFCO	805	774	--	865	660
DP (Ordinary Vans)	21	21	--	16	16
KPC (Covered with sliding walls)	140	140	--	140	60
KK (Ordinaries)	--	--	--	--	1
KA (Covered to livestock)	3	3	--	5	--
KB (Covered to bananas)	--	--	--	--	300
Tippers ex-comical (9 m)	315	315	--	224	300
CFCO dump trucks (14-15 m	25	25	--	50	50
21 m RD welded straight ranchers,	51	51	--	49	49
21 m Sawing	7	7	--	9	6
NGRA (10-14 m removable log trucks)-NGTR+ (10-14 m log trucks with triangular stakes	52	52	--	30	20
NGRA (21m removable logging trucks)-NNGTR (21m logging trucks with triangular stakes)	86	86	--	121	90
NNPC (21m Container Ship)	62	63	--	64	50
LP (Rented flats 15 m)	35	6	--	44	20
NB (Flat edges)	4	1	--	8	5
Specials (Low)	2	2	--	5	3
K rented (transport)	2	2	--	-	-
Total Towed Equipment of Service CFCO	63	64	30	30	24
Service wagons	51	50	2	17	12
Service tank	-	1	--	2	4
Service vehicles	**12**	**13**	**11**	**11**	**8**
Total Wagons of Individuals	127	101	153	153	95
Private wagons	--	--	--	--	-

saris	6	11	8	8	8
GPL SA (Gaz)	7	9	11	11	-
SCLOG	107	74	127	127	80
Minoco	7	7	7	7	7
Source: CFCO Pointe-Noire					

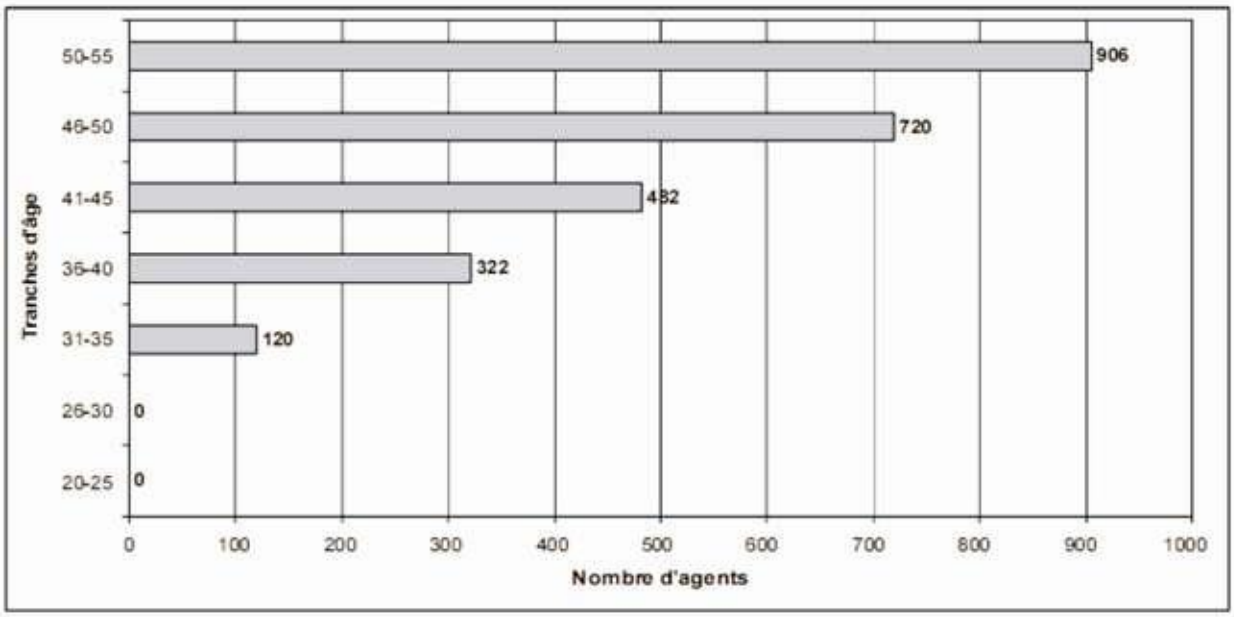
KEY ROUTE INFORMATION

Pointe Noire - Brazzaville	Mont Belo - Mbinda	Bilinga-Dolisie	
Track Gauge	1067 cm	1067 cm	1067 cm
Ruling Gradient			
Total Track Distance	510 km	285 km	91
Type of Rail	N/A	N/A	N/A
Type of Sleeper and Fastenings	310 x (9-14 m x 2.4 m) & 113 (21 m x 2.6 m)	310 x (9-14 m x 2.4 m) & 113 (21 m x 2.6 m)	310 x (9-14 m x 2.4 m) & 113 (21 m x 2.6 m)
Total Track Travel Time			
Maintenance	MARGINAL/BAD	MARGINAL/BAD	MARGINAL/BAD
Companies / Consortiums Operating on Line	CFCO	CFCO	CFCO
Traffic Frequency	WEEKLY	WEEKLY	WEEKLY
Security	BAD	BAD	BAD
Main Stations	MBILINGA	DOLISIE	MBIDA

Travel Time Matrix (DAYS)

City	Pointe Noire	Bilinga	Mont Belo	Mbida	Dolisie	Nkay	Brazzavile
Pointe Noire		1/2	1/2	2	1/2	1/2	2
Bilinga	1/2	...	1/2	1 ½	1	1	1 ½
Mont Belo	1/2	1/2	...	1 ½	1	1 ½	1 ½
Mbida	2	1 ½	1/2	...	1	2 ½	2
Dolisie	1/4	1	1	1	...	1/4	1
Nkay	1 ½	1	1	2 ½	1/4	...	1
Brazzaville	2	1 ½	1 ½	1 ½	1	1	...

https://lca.logcluster.org/24-republic-congo-railway-assessment



The bar chart illustrates the distribution of agents across different age groups. The data indicates a significant concentration of personnel in the older age brackets, particularly in the 50-55 age range, which has the highest number of agents at 906. Following this, the 46-50 age group also shows a substantial presence with 720 agents. The numbers gradually decrease in the younger age brackets, with 482 agents in the 41-45 group, 322 in the 36-40 group, and only 120 agents in the 31-35 range. Notably, there are no agents in the 26-30 and 20-25 age groups.
This distribution suggests an aging workforce, which may have implications for succession planning and the need for recruitment strategies to ensure a balanced age demographic in the future. The data highlights the importance of investing in younger talent to maintain operational effectiveness and continuity.

Current Challenges

- Infrastructure Status: The state of the railway infrastructure presents serious difficulties for both nations. Due to track degradation23, a large portion of the DRC's SNCC network is in poor condition, with speed limitations as low as 10–35 km/h. In a similar vein, track maintenance problems at the COR impact

service dependability.

- Funding Restrictions: One of the most frequent problems is a lack of funds for upkeep and improvements. For rehabilitation projects, both Congos mostly depend on outside funding, sometimes in the form of alliances with international businesses.
- Road Transport Competition: Railway traffic has further decreased as a result of the growth of automobile transportation. Rail freight volumes have decreased since trucking has become a more appealing alternative for many enterprises due to improved road networks.

Future Prospect

The Democratic Republic of the Congo (DRC) is prepared for considerable railway infrastructure expansion, led by a variety of projects aimed at improving connectivity, supporting economic growth, and increasing transport efficiency. The plans and projects listed below detail the future growth of the DRC's rail network.

- Investment Initiatives: Rehabilitating old lines and building new routes are the goals of recent agreements with international investors, especially those from China. For example, initiatives are under progress to strengthen ties between ports and mining areas in both nations.56.
- Public-Private Partnerships (PPPs): Allowing private operators to run railroads might increase productivity and draw in much-needed capital. As part of its modernization initiatives, SNCC is investigating this strategy

Kinshasa Urban Train Project

The Kinshasa Urban Train is a major plan that aims to create a 300-kilometer urban rail network to accommodate Kinshasa's fast population expansion and transportation demands. This project, created by Africa Finance Corporation (AFC) and Trans Connexion Congo, will be implemented in four phases:
Phase 1: A 25-kilometer line from Kinshasa Centrale to N'djili International Airport, which includes total track restoration.
Phase 2: Expansion along Kinshasa's principal arteries, reaching 75 kilometers.
Phase 3 will include a 90-kilometer outer circle around Kinshasa.
Phase 4: Connect N'djili Airport to Maluku for an additional 80 kilometers.
The first phase is predicted to cost at least $500 million, with services slated to debut in Q3 2026.

The Chemin de Fer Congo Ocean (CFCO) is the only structure operating in the field of rail transport in Congo-Brazzaville. It has legal personality and financial and management autonomy. It was built between 1921 and 1934 with the objective and vocation of connecting the maritime coastline on the Atlantic Ocean to the navigable part of the Congo River. The construction was carried out starting from the two ends, namely Pointe-Noire, on the one hand, and Brazzaville, on the other hand. For the Brazzaville side, the materials constituting the railway were transported from Matadi and Kinshasa. The junction point of the two construction operations is located between Dolisie and Mont-Belo. The lack of rail connection to PAPN and the port of Brazzaville is, however, a handicap, because it does not allow direct transshipment between maritime and rail and causes a disruption in loads. CFCO’s lack of willingness to use the port of Brazzaville as a freight train terminus did not allow for a volume effect capable of developing this hub.
An attempt to concession CFCO was launched in the second half of the 1990s, but the process was declared unsuccessful. A few years later, a study was carried out for the rehabilitation of the CFCO track between Pointe-Noire and Brazzaville by the China Railways Construction Corporation (CRCC), but, ultimately, a memorandum of understanding was concluded in 2017 with a another Chinese public company, China civil engineering (CCECC), for the same rehabilitation project, to which was added the construction of nearly 1,800 km of new railway lines to connect Pointe-Noire to Ouesso in the north, in addition of the 510 km to be rehabilitated between Brazzaville and Pointe-Noire. At the same time, the Congolese mining group SAPRO

has been seeking for several years the means to rehabilitate a portion of the railway line, allowing heavy traffic, in order to evacuate its ore from the Mayoko mine, Mbinda (south-west) on the Gabon border. The Chinese company Sangha Mining Development, which in March 2021 obtained three operating permits for the iron mines of Badondo, Avima and Nabemba, in the Sangha in the far north of the country, also announced the construction of a railway line between Sangha and Kouilou for the transport of ore to Pointe-Noire, an ore port at Indian Point (Kouilou), as well as an electric transport line. The CFCO rehabilitation project was once again on the discussion agenda during the Forum on Sino-African Cooperation, held in June 2019 in the Chinese capital. For the moment, the crisis has the better of this project carried out by Chinese companies (Ministry of Transport of the Republic of Congo, 2023).

Société Nationale des Chemins de Fer du Congo (SNCC) Initiatives

The SNCC is continuously attempting to modernize and extend its rail network. Key tactics include:
SNCC is getting into open access agreements with commercial operators to attract investment and increase service efficiency. This move intends to improve freight capacity and connect key cities with critical mining locations.23 .

Infrastructure rehabilitation: The World Bank has allocated $631 million to an eight-year plan aimed at upgrading lines, trains, and boats throughout the SNCC's operational region. This involves considerable modifications to boost competitiveness when exporting commodities and minerals.

CHAPTER III
EMERGING DEVELOPMENTS AND FINDINGS

Regional Connectivity Projects.

The DRC is participating in a number of regional initiatives aimed at improving rail connectivity:
Lobito Corridor: An further 800 kilometers of rail are planned in the DRC as part of a bigger project that involves the renovation of existing Angolan railroads. This corridor will provide access to maritime routes and promote mineral exports.5. Proposed cross-border rail routes between Zambia, Angola, and the DRC aim to increase commerce by connecting mining districts to ports. These initiatives are financed by several international financial organizations and are designed to encourage regional economic growth. (Coface2023)

The port situation: A Double-edged sword

Congo has access to several key rivers and ports. These rivers have the potential to increase trade and tourism. However, they also require updates. Port facilities sometimes lack the infrastructure to accommodate contemporary ships, which may stymie economic progress. Imagine a thriving port that connects Congo to the rest of the world—that's a goal worth pursuing!

Recent changes in Congo's port situation, notably at the Port of Pointe-Noire and the newly established Port of Banana, indicate major expenditures targeted at improving trade capacity and addressing long-standing infrastructure difficulties.

Port of Pointe-Noire Developments:

Congo Terminal has revealed a significant investment of around 400 million euros to build a new container terminal at the Port of Pointe-Noire called Môle Est. By 2027, the project intends to greatly expand the port's capacity from one million to more than 2.3 million TEUs (twenty-foot equivalent units) per year. The port's standing as a major maritime center in Central Africa will be strengthened by the new terminal's 750 meters of quays and capacity for bigger ships1.

Economic Impact: Pointe-Noire will be positioned as a vital transit and transshipment center for international shipping lines thanks to the Môle Est project, which is anticipated to generate over 900 employment and strengthen economic exchanges within the sub-region1.

Port of Banana Initiatives Deepwater Port Project:

Supported by DP World and British International Investment (BII), the Port of Banana is being developed as the first deepwater port in the Democratic Republic of the Congo (DRC). It is projected that this project will greatly improve the DRC's access to international markets, generate around 85,000 employment, and lower trade costs by about 12%34.

Details of the infrastructure: To accommodate big cargo ships, the port will initially have a 600-meter quay with an 18-meter draft. Construction is anticipated to be finished by 202534, with an annual capacity of 450,000 TEUs being the project's goal.

In 2021, about 1 million TEUs were handled. As it is, the Pointe Noire port authority may concurrently accept 15 boats in the public harbor, 3 130-meter vessels at the onshore base, and 3 tankers at the oil sites of Djeno, Nkossa, and Yombo for commercial transactions.

Accessible day and night, around-the-clock, Pointe Noire Port processed over 1 million TEU on December 31, 2021. Its 84-hectare basin exits onto the bay by a 180-meter-wide harbor channel that is pulled at 16 meters by a 1500-meter-long feeding channel. Piloting and towing are required and guaranteed around-the-clock, and night marking is guaranteed. Any vessel with a gross tonnage of 100 tons or more is required to have a pilot. For boats that are 160 meters or over in length, two pilots are required. Additionally, every vessel with a gross tonnage of 2000 MT or more is required to tow. The provisioning of the vessels is guaranteed, and private businesses are given permission to handle, stevedore, consign, and transport.

Table 8: Infrastructure of the Autonomous Port of Pointe-Noire from 2009 to 2013

	Units	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Surface area of water bodies	ha	84	84	84	84	84	84	-	-	-	-
Length of docks	m	2861	2861	2861	3091	3091	3091	-	-	-	-
Area of warehouses, hangars, and storage	m²							-	-	-	-
Zone 1	m²	55754	55774	55764	36649	62434	68245	-	-	-	-

Zone 2	m²	57665	55665	57676	47205	79142	81257	-	-	-	-
Area of open storage	m²	....	....	....	....			-	-	-	-
Zone 1	m²	1010435	1010435	763253	763253	255108	255105	-	-	-	-
Zone 2	ha	85	85	85	85	85	85	-	-	-	-
Zone 3	m²	...	...	...	...			-	-	-	-
Fixed cranes		...	...			1144602	1223595	-	-	-	-
Crane		1	1	-	-	-	-	-	-	-	-
Ship repair workshops	Workshop	1	1	-	-	1	1	-	-	-	-
Remarks	Remark	4	4	4	4	4	4	-	-	-	-

Table 9 General traffic at the Autonomous Port of Pointe-Noire from 2009 to 2018

	Units	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Ships	Ship	3121	3421	3509	3518	4110	4228	...	...	...	...
Ship-days	Day	17417	19306	32214	35393	38446	38446	...	...	...	...
Gross tonnage	1000 Tx	14881	15571	16685	17683	21951	21951	...	...	...	...

Table 10:Evolution of the volume of goods boarding and debarking at the Autonomous Port of Pointe-Noire from 2009 to 2013 by main products.

	2009	2010	2011	2012	2013
TOTAL DOARDING	15552119	16645526	17610188	15090980	13485028
Food products	74423	64178	39990	37759	36061
Fishing products	2168	1271	885	1253	1341
DRINK	627146	678460	550983	486615	426779
Construction materials	5811	5321	5351	6648	1908
siderurgical and metallurgical products	68766	37096	47029	30062	5761
Energetic products	399368	259277	216213	245246	341015
Raw animal and vegetal materials	50259	5671	100	507	2320
Fertilizers and chemicals	18790	3504	3548	5932	996
Materials and machines	34049	39604	22343	18229	28617
Manufacturing and various articles	1669374	1315087	1825980	2079334	2308929
Raw petiole	12446862	14204493	14897766	12179395	10272055
Ghost	155103	31564	...	...	59246
TOTAL DEBARKING	4 205 966	3 334 418	4062466	4577887	3103483
Food products	389 422	408 729	481406	672086	704903
Fishing products	48 334	51 671	58099	60044	66975
DRINK	7 921	9 099	8649	30095	30840
Construction materials	756 919	788 853	889251	1125170	1383463
siderurgical and metallic products	118 776	111 758	79658	116628	239543
Energetic products	157 886	118 997	180851	137767	179176

With steady rise in boarding volumes reaching a peak in 2011, the evolution of freight traffic at the Autonomous Port of pointe-Noire between 2009 and 2012 demonstrates an upward general trend, indicating a dynamic business environment and efficient port operations. However, there was a notable decline in shipments in 2012, raising questions about potential operational or economic difficulties. Simultaneously, the landing quantities were increasing, indicating a persistent need for imports. The present analysis underscores the necessity of making strategic investments in infrastructure and port services to sustain the region's competitiveness and flexibility in the face of market volatility, as well as to solidify its indispensable role in the regional economy.

Figure 4 Traffic of goods at the Autonomous Port of Pointe-Noire from 2010 to 2014

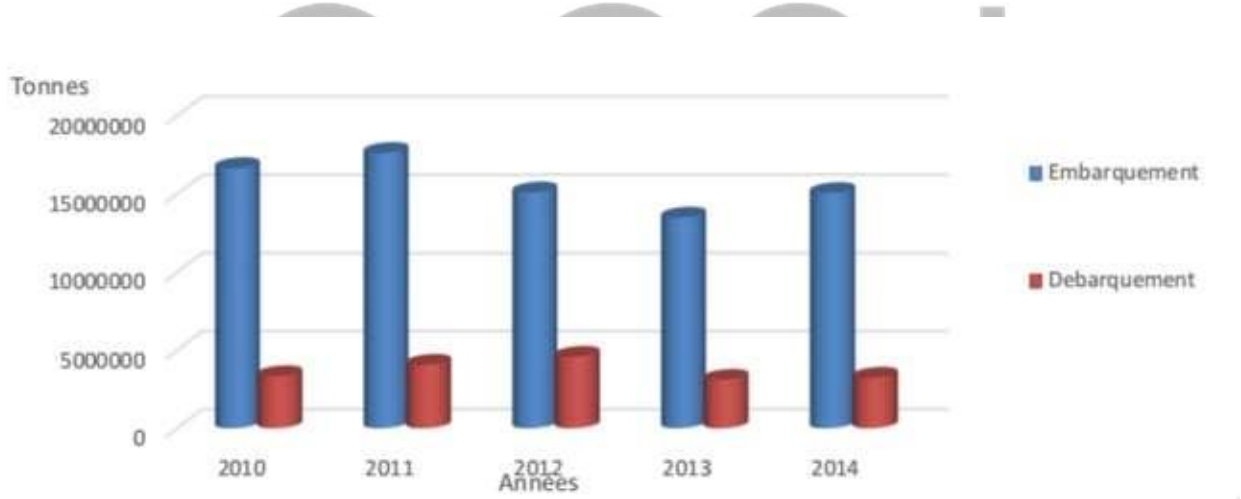


Table 11: Evolution of the volume of on -board goods and landed at the port Autonomous Pointe-Noire 2014 to 2018

	2014	2015	2016	2017	2018
TOTAL DOARDING	14 603 168	11 339 855	12 781 735	14 858 603	21 007 825
Food products	19 148	32 289	206 006	199 292	902 865
Fishing products	2 674	878	13 479	12 424	7 169
DRINK	751 779	424 925	479 293	567 020	614 341
Construction materials	1 395	2 163	23 221	32 391	109 537
Siderurgical products and Metallurgics	5761	7833	25654	41333	181266
Energetic products	341 015	423 164	324 911	405 181	744 176
Raw animal and vegetal materials	22 320	213	11 017	5 793	28 344

Fertilizers and chemicals	875	3 149	39 655	35 629	143 141
Materials and machines	26 825	17 121	55612	48727	162938
Manufacturing and various articles	2 308 063	1 629 703	1 545 426	2 289 116	435 411
Raw petrol	11 086 268	8 808 227	9 565 745	11 206 821	15 667 655
Ghost	37 045	11 029	...	16 374	10 982
TOTAL DEBARKING	**5 130 027 4**	**4 570 829**	**3 759 612**	**4 086 629**	**5 169 557**
Food products	515 186	506 351	830 772	1 250 128	1 631 899
Fishing products	52 371	58 390	71 278	70 346	71 985
DRINK	12 512	9 519	56 358	43 993	430 709
Construction materials	1 471 625	1 454 813	679 975	351 377	310 084
Manufacturing and various articles	2 460 760	1 898 182	1 570 005	1 761 051	1 880 687

River transport

The Oubangui River and its tributaries comprise most of the Congo's 2 187 km navigable rivers. Only during the rainy seasons is navigation possible. The public corporation "the autonomous port of Brazzaville and secondary ports" (PABPS) is in charge of managing the port of Brazzaville, while the commercial company Terminaux Des Bassins Du Congo (TBC) is in charge of managing the port of Brazzaville. Private firms employ smaller whales , pumps, and barges for passenger and commercial traffic.

Forming a trans-equatorial axis of the international river network alongside the Oubangui River, the Congo River is a crucial component of the Republic of Congo's inland transit network. Including 2,076 km of domestic navigable waterway and 5,200 km of international navigable waterway, the Congo River is the second biggest navigable river system in the world par discharge, and it is navigable all the way to the border with the Central African Republic. Among the navigable waterways in the domestic network are the Lefini, Likouala Mossaka, and Alima. However, in the nation's multimodal transportation network, interior travel is still underdeveloped in spite of this infrastructure.With 95% of the country's inland commerce handled by the autonomous port of Brazzaville, it is the principal port, but due to port Siltation and competition from unlicensed ports, it is experiencing financial difficulties. The river's low water depth limits navigation to six or seven months of the year, especially during the dry season. Due to funding constraints, the Economic Interest Group in charge of preserving the navigable rivers finds it difficult to carry out its mandate. Moreover, despite a management concession awarded to the private operator Terminals of the Congo Basin in 2014, substantial debt impedes modernization efforts for port infrastructure. It is challenging to properly promote the Congolese corridor given this environment and the growing level of competition.

CHAPTER IV
DATA AND DISCUSSION

Findings

Latitude 4° 47' 0" S, longitude 11° 49' 0" E is the location.
Quay Length: The port's commercial zone and oil logistics zone have a combined quay length of 2,135 and 726 meters, respectively.
Draft: The port can accept bigger ships (up to 337 meters in length and with capacities between 16,000 and 18,000 TEUs) since it can handle vessels with a draft of up to 16 meters. 12. Traffic Volume: More than a million TEUs were handled by the Port of Pointe-Noire in 2021. Congo Terminal said that they surpassed this level once more in 2022, indicating that this number has been steadily increasing.

Current Development

New Container Terminal Project: The Môle Est terminal, which Congo Terminal is investing around 400 million euros in, is anticipated to open by 2027. The goal of this project is to raise the port's yearly capacity from more than 1 million TEUs to more than 2.3 million TEUs. There will be 750 meters of quays at the new port.
A maximum draft of 17 meters Cutting-edge handling tools, such as sixteen electric gantries 34.Operational Improvements: With a handling capacity of around 115.5 movements per hour, the port now operates around the clock and has reduced the average turnaround time for big boats from 23 days to 14 days.

Present-Day Activities

The port is now home to about 48 boats as of late October 2024, and another 16 are anticipated to arrive in the following month.
Congo Terminal, which oversees the port, is a member of a public-private partnership with the goal of increasing operational effectiveness and satisfying the expanding demands of commerce. Nearly 900 Congolese employees work for the firm, which also participates in a number of community projects.

Inland waterways

The DRC has a vast network of navigable rivers that might be used to provide cost-effective transportation options. However, investment in dredging and maintenance is important to improve navigability and provide dependable service.

Waterways
Due to its large river systems, the Republic of Congo relies heavily on water transport. The Congo River is a significant transit route, supporting trade and mobility between vital cities. However, navigational obstacles continue owing to silt and poor upkeep.

1. Water Resources
With notable variances across sub-basins, the Congo Basin's estimated Total Drainable Water Storage ranges from 476 km³ to 502 km³. For instance:
Sub-basin of Kasaï: 220–228 km³
Lualaba Underbasin: 109–169 km³
Only around 173 km³ are contributed by the northern sub-basins.

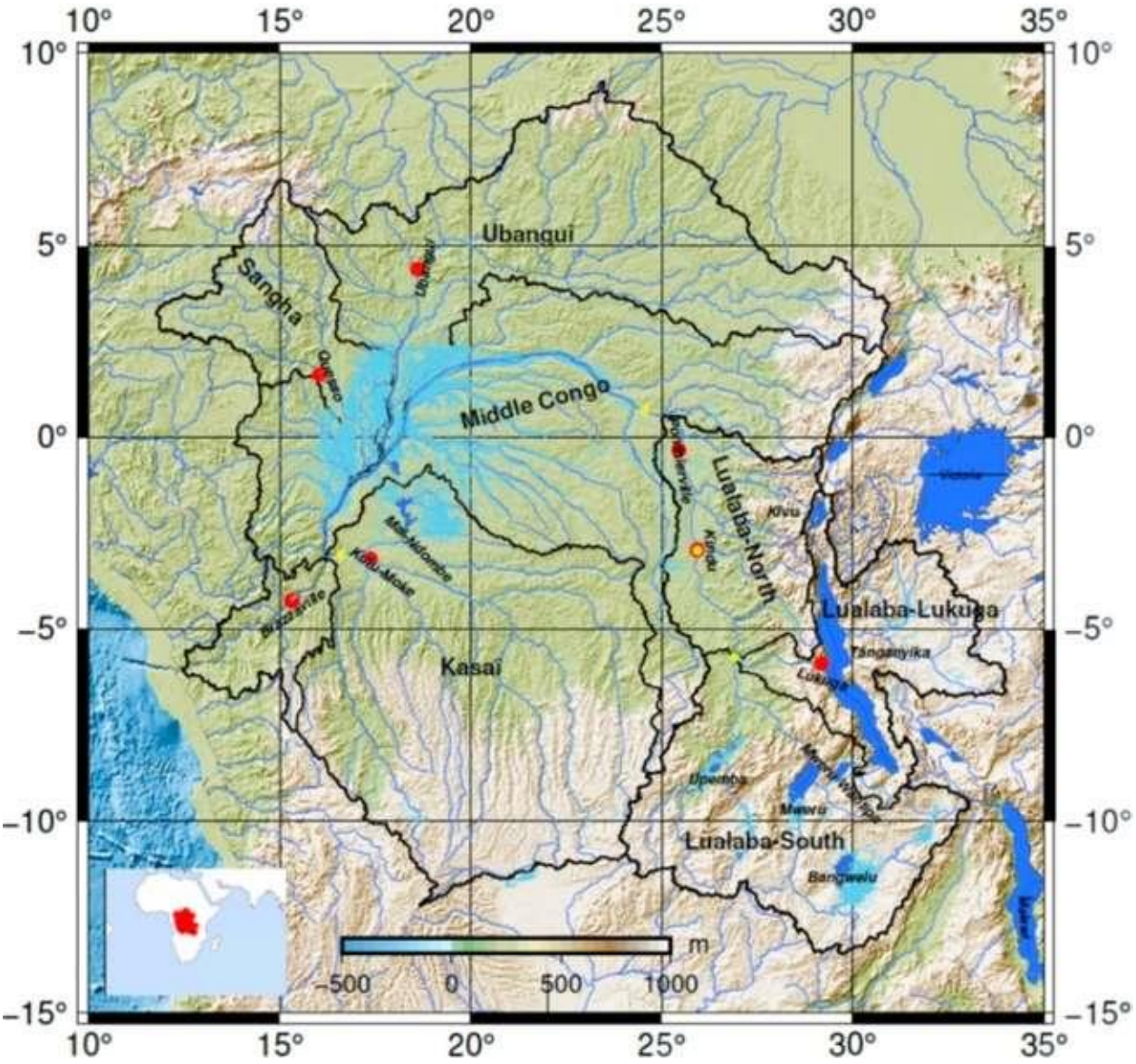
2.Difficulties with Navigation
In the past, until the 1980s, inland transportation was effective. Political unrest has since resulted in declining infrastructure and safety issues.
These waterways are managed by the Régie des Voies Fluviales (RVF), however at the moment, it is unable to adequately maintain infrastructure and navigational charts.

Enhancement Initiatives
The goal of the Fluvial and Lacustrine Navigability Support Project (PANAV) is to improve infrastructure and safety for navigation. Using current hydrographic data to update navigation charts is one example of this.
supplying RVF soldiers with resources and training

3. Dredging Projects
To make room for bigger ships, a group led by International Container Terminal Services Inc. (ICTSI) intends to deepen the Congo River. With a 40-foot depth goal, this project will allow direct access to ports like Matadi and Boma.

Visualization of Data
Distribution of Water Storage in the Congo Basin
Figure A: The Congo Basin's primary sub-basins' estimated total drained water storage.
Seasonal Differences
Water Level Variations by Season
Figure B: Time series illustrating how water levels vary seasonally in several sub-basins.

FIGURE A


10°
15°
20°
25°
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Ubangui
Sangha
Middle Congo
Kasai
Lualaba-North
Lualaba-Lukuga
Lualaba-South
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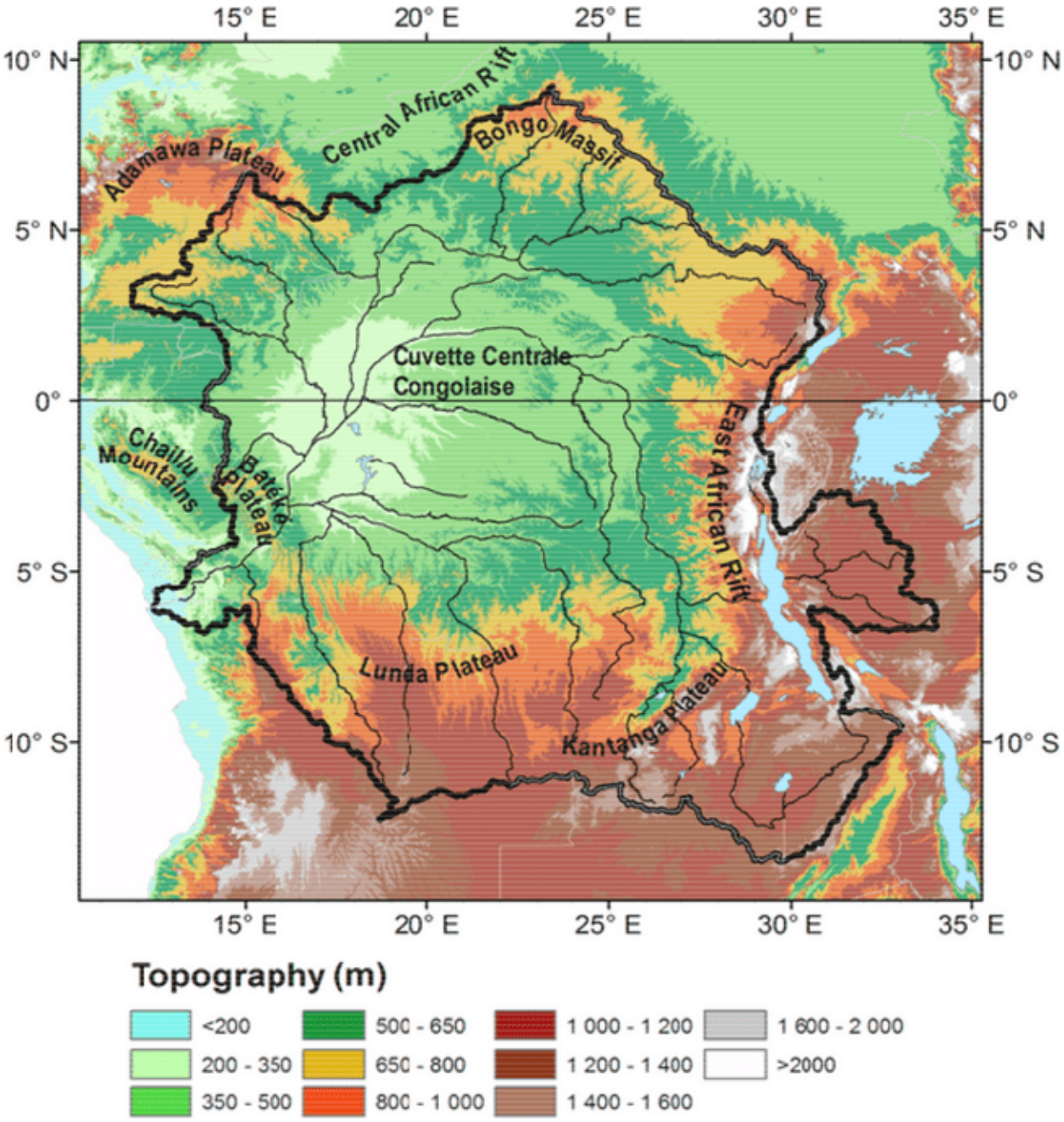
FIGURE B


15° E
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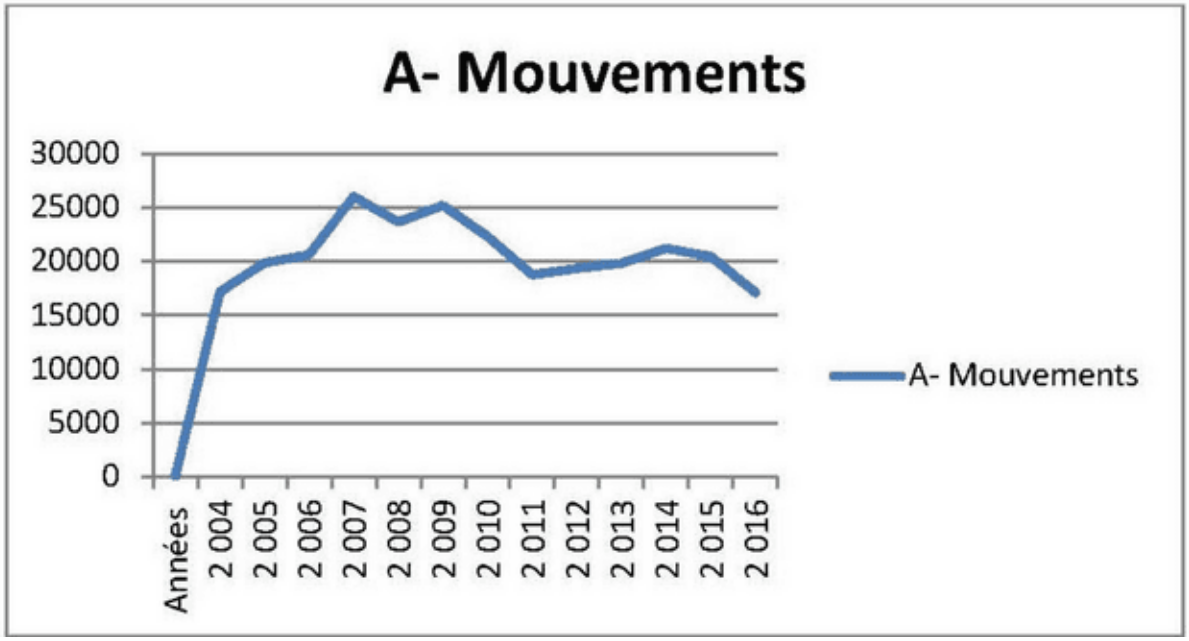
Central African Rift
Bongo Massif
Adamawa Plateau
Cuvette Centrale
Congolaise
Chaillu
Mountains
Bateke
Plateau
East African Rift
Lunda Plateau
Kantanga Plateau
Topography (m)
<200
200 - 350
350 - 500
500 - 650
650 - 800
800 - 1 000
1 000 - 1 200
1 200 - 1 400
1 400 - 1 600
1 600 - 2 000
>2000

Air transport

The aircraft fleet has been renewed, and the number of domestic air transport routes served has skyrocketed since 2000. The air transportation system is crucial to passenger travel because of the DRC's enormous area, its dispersed population centers, and the shortcomings of its land transportation infrastructure. Between 2001 and 2007, the nation's total air transport capacity remained constant at about 1 million seats. However, throughout the same time frame, connectivity has significantly increased, with the number of city pairs served increasing from 13 in 2001 to 24 in 2007. There are presently scheduled, advertising services at eight airports and fourteen carriers. The percentage of seat-kilometers flown in aircraft of recent vintage increased from 40 percent in 2001 to 74 percent in 2007, indicating a significant renewal of the aircraft fleet during this time. With a 42 percent market share, Hewa Bora is by far the biggest airline operating in the nation.

Table 12.1 Air transport agreements, 2022

Partenaire	Date	Entrée en vigueur	5ème	7ème	Cabotage	Coop	Désignation	Refus	Tarification	Capacité	Stat	ILA
Burkina Faso	17.07.1984		O	N	N	N	M	PSCE	DA	PD	O	10,0
Algérie	08.04.1973		O	N	N	N	M	PSCE	DA	PD	O	10,0
Burundi	20.10.1980		N	N	N	N	M	PSCE	n.a.	PD	O	4,0
République démocratique du Congo	28.05.1979		N	N	N	N	M	PSCE	n.a.	PD	O	4,0
Danemark	27.02.1967		O	N	N	N	S	PSCE	DA	PD	O	6,0
France	02.05.1962		O	N	N	N	M	PSCE	DA	PD	O	10,0
Allemagne	30.10.1962		N	N	N	N	S	N/A	n.a.	n.a.	N	1,0
Ghana	21.05.1964		O	N	N	N	M	PSCE	DA	PD	O	10,0
Guinée	19.02.1983		O	N	N	N	S	PSCE	DA	PD	O	6,0
République populaire démocratique de Corée	29.05.1978		N	N	N	N	S	N/A	n.a.	PD	N	1,0
Mali	10.03.1964		O	N	N	N	M	PSCE	DA	AR	N	13,0
Pays-Bas	03.02.1969		O	N	N	N	S	PSCE	DA	PD	O	6,0
Nigeria	02.2018											
Portugal	03.07.1979		N	N	N	N	S	PSCE	DA	PD	O	0,0
Roumanie	21.07.1978		O	N	N	N	S	PSCE	DA	PD	O	6,0
Fédération de Russie	28.09.1964		O	N	N	N	S	PSCE	DA	PD	N	7,0
Sao Tomé et Principé	20.07.1984		N	N	N	N	M	PSCE	n.a.	PD	O	4,0
Espagne	08.01.1986		N	N	N	N	S	PSCE	DA	PD	O	0,0
Suède	27.02.1967		O	N	N	N	S	PSCE	DA	PD	O	6,0
Suisse	24.10.1964		O	N	N	N	S	PSCE	DA	B1	O	10,0
États-Unis	12.2018											
Maroc												
Kenya												
Togo												
Mauritanie												
Ethiopie												
Guinée Equatoriale												
Côte d'Ivoire												
Angola												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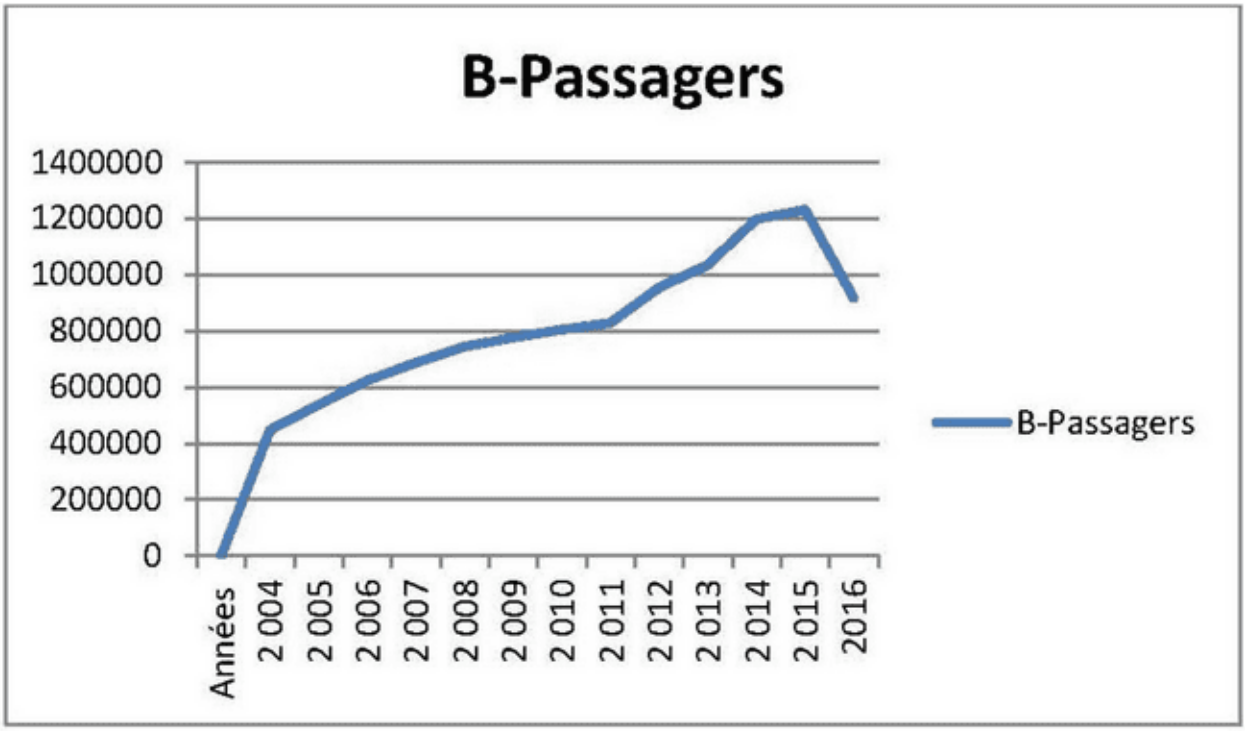
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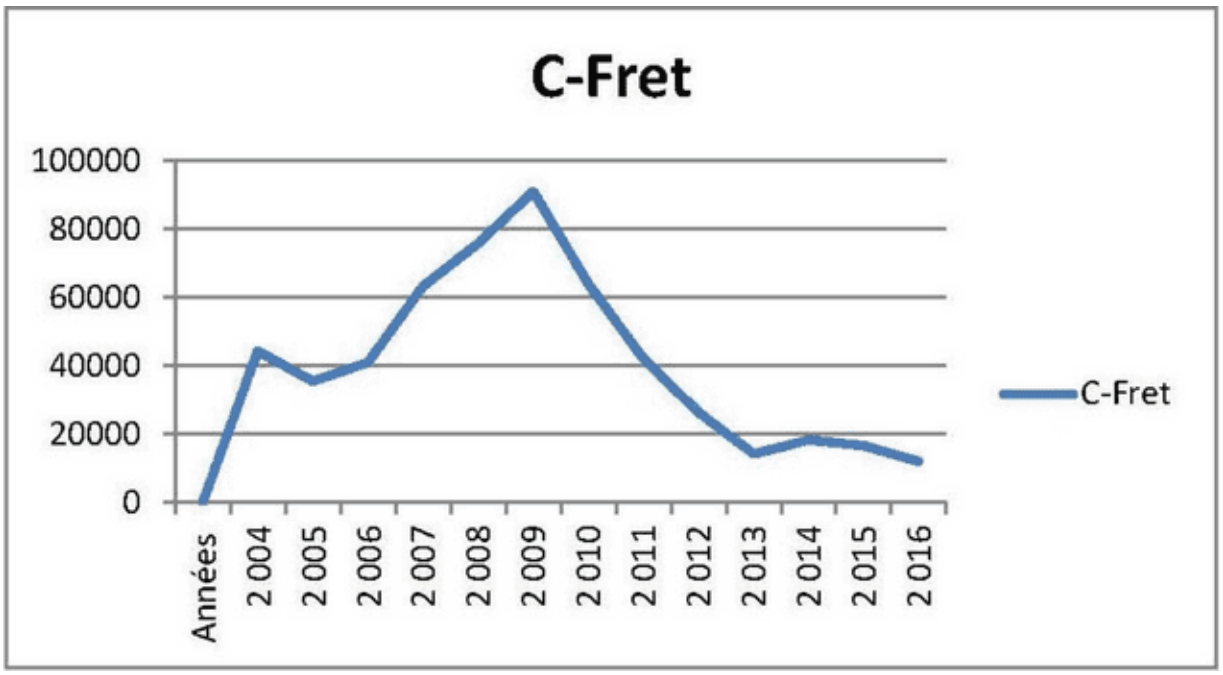
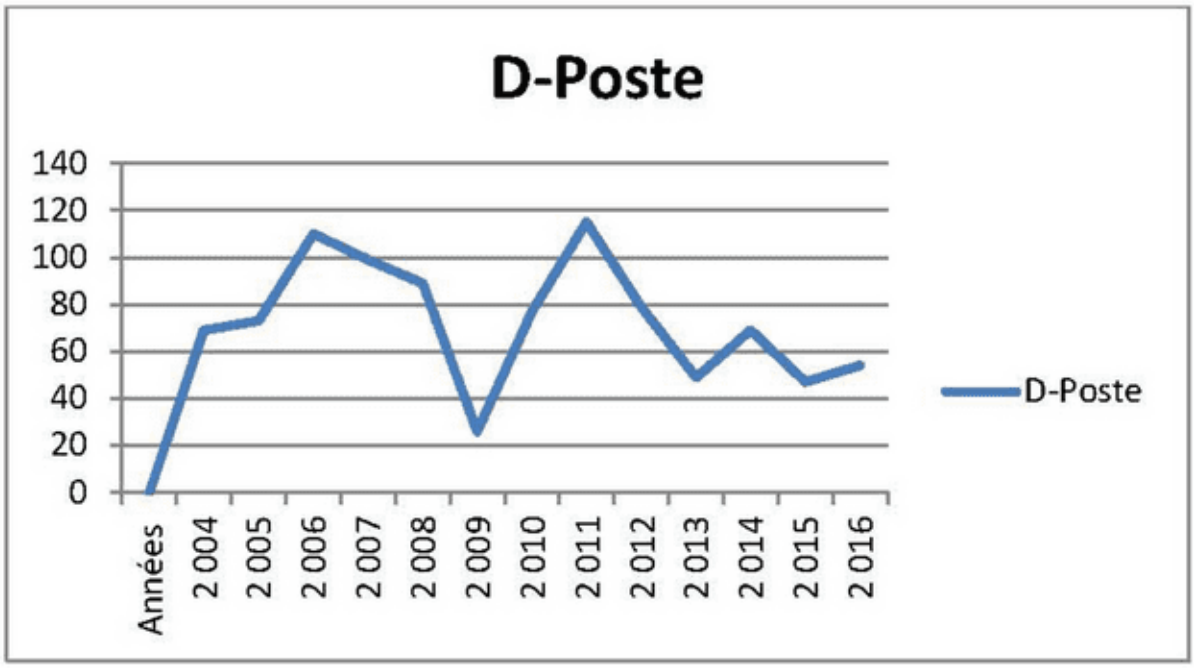
2016
B-Passagers





Assessment and Future Prospects

Data Visualization

Investment Potential Assessment

The following chart illustrates the investment potential across various sectors in the Republic of Congo's transportation infrastructure:

Sector	Investment Potential
Roads	High
Railways	Medium
Ports	High
Inland Waterways	Medium

Infrastructure Condition

A bar chart representing the condition of different transport modes:

Transport Mode	Good Condition (%)	Poor Condition (%)
Roads	54	46
Railways	30	70
Ports	60	40

Calculations

Road Network Analysis

To better understand the road network's condition:

Total Road Length: Ltotal=146,000 kmLtotal=146,000 km

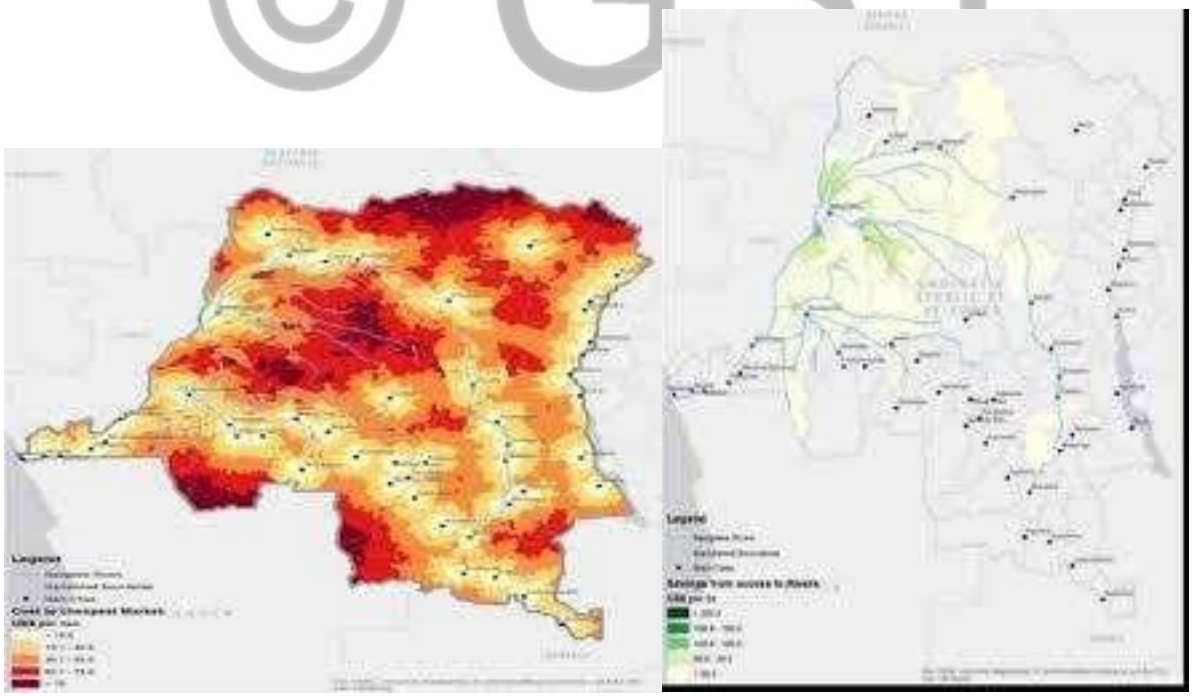
Paved Road Length: Lpaved=2,250 kmLpaved=2,250 km

Percentage of Paved Roads:

Ppaved=(LpavedLtotal)×100=(2,250146,000)×100≈1.54%Ppaved=(LtotalLpaved)×100=(146,0002,250)×100≈1.54%
Port Capacity Projection
With the new terminal project at Pointe-Noire:
Current Capacity: $C_c$urrent=1,000,000 TEUsCcurrent=1,000,000 TEUs
Future Capacity: $C_f$uture=2,300,000 TEUsCfuture=2,300,000 TEUs
Increase in Capacity: ΔC=$C_f$uture−$C_c$urrent=2,300,000−1,000,000=1,300,000 TEUsΔC=$C_f$uture−$C_c$urrent=2,300,000−1,000,000=1,300,000 TEUs

Costs of travel

In the first stage a geospatial model is developed which identifies costs and bottlenecks to travel. It simulates how individuals and traded goods are moved around. The Congolese transport system is intrinsically multi-modal with the River Congo as its spine. The left image (below) shows the costs of transporting goods to the cheapest market from every location 6 within the DRC (a market is defined as a city of at least 50,000 residents), using a multi-modal model with access to both roads and rivers. 11. The image on the right (below) shows the difference in costs between a uni-modal, model with only roads, and the multi-modal model with land and river transport included. It thus shows the areas that are most likely to use, and benefit from, the river for transport to reach the nearest market.



It is clear from the map that, aside from some isolated areas in the northwest part of the country, rivers are used relatively infrequently for local transport. Specifically, 14% of DRC individuals live in areas where it would be cost effective to use river transport for any portion of their trip to the local market. Further, these individuals live in areas which only account for approximately

7% of the country's GDP, implying that investments in river transport will not have a significant impact on local market transport, given the current economic geography of the country. The implication is that the road network is likely much more cost effective for shorter distance local transport. This is a well-established result and reflects the fact that river transport is typically most economic for low-value and high-volume goods that need to be transported over longer distances.

On the other hand when Kinshasa is the desired destination, approximately 80% of DRC's population would prefer to utilize river travel, at least in part (figure on right). These individuals live in areas that accounts for nearly 60% of DRC's GDP. The northern part of the DRC is particularly dependent on river transport for reaching Kinshasa, which is not surprising when one considers that much of this region has no direct road access to Kinshasa.

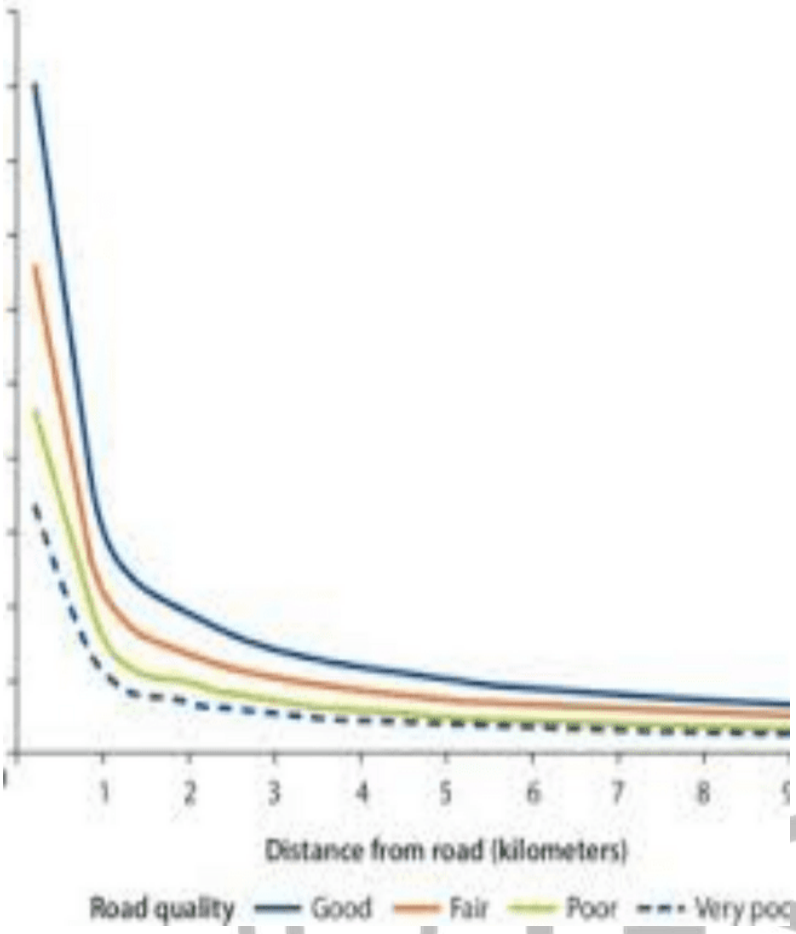
Economic Gains

This study employs cutting-edge econometric techniques to ascertain the economic impacts of lowering local transport costs after estimating the costs of transportation from each site.One The findings imply that lowering local transportation expenses would have major advantages, particularly in the most expensive and highly inhabited areas. In particular, a 10% decrease in local transportation expenses would, on average, result in a 0.46% rise in local GDP. According to a related World Bank (2015) study, lowering transportation costs in the DRC may significantly improve economic growth and poverty alleviation.

Ecological Consequences

The paper then looks at how highways have changed the forest canopy. According to the calculations, road upgrades have a major impact on the degree and scope of forest removal in clearly defined corridors. Although the predicted consequences of deforestation in upgraded road corridors vary greatly depending on locational economics and previous road conditions, increases in deforestation of 10–20% are common.

The image below shows two remarkable patterns. First, a narrow corridor (of around 1 to 1.5 km radius) spanning the road experiences nearly total deforestation when roads are upgraded from extremely bad to good condition. Second, the effect is nonlinear, and the intensity of deforestation decreases quickly with increasing road separation.



Transport costs effect on economic activity

In order to determine the effect of transport costs on economic activity, this report relies on regression analysis. The analysis follows very closely the approach taken by Ali et al (forthcoming) and Ali et al (2015). The entire DRC is divided up into gridcells of approximate size 10km x 10km. Each gridcell is a unit of observation in the following model:

$$\ln(y_i)=\beta_0+\beta 1 n(TM_i)+ X'_i y+\varepsilon_i$$

In gridcell I, where Yi represents the local GDP, X_i is a vector of regional restrictions, and TM_i s the cost of transportation to the local market, as per Ghosh (2010). Len(population), len(population)^2, en(cassava potential yield), len(distance to nearest mine), and a measure of conflict close to the gridcell and the local market are some of these controls. In accordance with Ali (2015), this research employs an instrumental variable method to account for the endogeneity of both the market cost and the conflict variables (for more information on the instrumental factors utilized and a discussion of the conflict measures, see Ali (2015)).

Table 12.2 below presents the findings. The calculated coefficients can be read as elasticities as all variables are in log form. A 10% drop in transportation costs to the local market would result

in a 0.46% gain in local GDP, according to the 2SLS model's results (column 2). Furthermore, the regression indicates that there is a concave but increasing relationship between local GDP and agricultural land suitability (measured by the land's potential cassava yield), that there is a high conflict near the market and the cell that lowers local GDP, that GDP is higher near mines, and that GDP tends to increase with population size.

Table 12.2 below presents the findings.

Dependent Variable: Local GDP (2010)	(1) OLS	(2) 2SLS
ln(Cost to market)	-0.016***	-0.046***
	(0.0047)	(0.012)
Indicator: High Conflict Cell	0.020***	-0.250***
	(0.0072)	(0.079)
Indicator: High Conflict Market	-0.023***	0.175***
	(0.0066)	(0.02)
ln(Distance to nearest mine)	-0.067***	-0.024***
	(0.006)	(0.0094)
ln(Population)	0.528***	0.528***
	(0.0031)	(0.0032)
ln(Population)^2	0.036***	0.036***
	(0.00027)	(0.00029)
ln(Cassava potential yield)	0.240***	0.197***
	(0.03)	(0.04)
ln(Cassava potential yield)^2	-0.019***	-0.016***
	(0.0026)	(0.0028)
N	26,535	25,523

Several important factors are highlighted in the preceding study. The DRC's present road system is not enough for long-distance travel. A multimodal strategy that makes use of both roads and waterways is frequently required for travel to Kinshasa from most regions of the nation (or, conversely, transit from Kinshasa to most sites inside the nation). The best approach for getting to local markets usually exclusively uses roads; river transportation is seldom ever employed. Above, two projects were suggested. In order to enhance long-distance transportation in the near future, the first one concentrates on expanding port accessibility. Understanding that depending just on the river for transportation is not a viable, long-term option, a different idea is put out that

aims to use a fully integrated road network to link Kinshasa with major urban areas. Chapter 4 revisits this project and estimates the economic advantages of doing so based on the findings of the regression analysis conducted in this chapter.

Government Initiatives and Investments

Recognizing these challenges, the Congolese government has started initiatives to improve transport infrastructure. They've partnered with international organizations to bring in funds and expertise. These efforts can make a real difference, but progress takes time. It's like planting seeds; you must care for them before you can reap the harvest.

Community Involvement: The Power of Local Voices

Communities are stepping up to voice their transport needs. Local leaders are advocating for better roads and railways, emphasizing that infrastructure isn’t just about construction—it's about livelihoods. When communities engage in planning, solutions are often more effective and t

ailored to their unique challenges. After all, who knows better than the locals themselves?

The Future Looks Bright

Though challenges exist, the future of transport infrastructure in Congo is on a positive path. With investment, community involvement, and a focus on maintenance, the country can build a network that connects its people and resources. Picture a Congo where families can travel easily, businesses thrive, and farmers bring their crops to market without hassle.

CHAPTER V
CONCLUSION

Summary and Conclusion

The Republic of Congo has a lot of potential for growth, but it also has a lot of obstacles with regard to its transportation system. Ongoing initiatives and foreign investment, especially from Chinese and European companies, have the potential to revolutionize logistics and boost regional connectivity and economic growth. A sustained emphasis on public-private partnerships will be necessary to achieve these infrastructure objectives. The transportation system of the Democratic Republic of the Congo is one of the most inadequate and decrepit in the world. While enhancing the transportation system alone won't spur economic growth and lift millions of Congolese out of abject poverty, infrastructure expenditures are an essential part of any successful development strategy. Therefore, the goal of this study is to provide a number of methods that may be applied to assess routes to sustainable growth in the DRC through the development of transportation infrastructure. This paper made an effort to assess the effects of improving the road network holistically. analyzed the potential for deforestation that could result from infrastructure

investments, specifically estimating total losses and potential biodiversity impacts that this may have on the local biome; recommended two potential transport investment opportunities; and provided an econometric model to estimate the economic benefits from lowering local transportation costs. They used the information from the earlier chapters to model the outcomes of two distinct road investment projects: enhancing a national road network that links Kinshasa with key cities and enhancing a much smaller road corridor close to Virunga National Park. Economic gains from lower local transportation costs as well as costs from further forest degradation were calculated.
In order to replicate the movement of people and traded products around the DRC, a geospatial model was created. This model uses population data, land topography, and the road and river network (including location and quality information) as inputs. It then makes a number of simplistic but realistic assumptions about how local farmers, traders, and other economic agents will travel across the nation in light of these inputs. The end result is a model that makes it possible to calculate the prices of transportation to and from any place in the DRC as well as the routes that a cost-cutter would use to deliver goods to consumers.

The research shows that rivers are utilized for local transportation very seldom, with the exception of a few remote locations in the northwest of the nation. In particular, only 14% of DRC citizens and 7% of the nation's GDP live in areas where using river transportation for any part of their trip to the local market would be cost-effective. This suggests that, given the current economic geography of the country, investments in river transportation will not significantly affect local market transportation. Thus, it is clear that road networks are probably far more crucial for local transportation than river systems. However, over longer distances and for commodities that have a low value to bulk ratio or are particularly perishable, having access to river transportation becomes more crucial. Furthermore, an estimated econometric model illustrates how lowering local market transportation costs might affect GDP. Reducing transportation costs by 10% can, on average, raise local GDP by 0.46% when a number of significant aspects are taken into account, such as the local population, the quality of the agricultural land, the closeness to mining areas, and the existence of conflict. Although it may seem obvious that lowering transportation costs will boost the economy, impact evaluations can be carried out more effectively if these advantages are quantified.

Lastly, a map that shows which regions of the nation would gain most from the proposed project and which areas represent the biggest dangers in terms of deforestation is created by combining the findings from the main metropolitan center road network project. These kinds of maps may be used to assist plan the locations of future transportation investment projects and make sure they minimize environmental problems while maximizing anticipated economic gains.
Highlighting the limitations of this approach is crucial for the conclusion. First, there would be value in repeating the research with better data because the evaluation was carried out in a setting with inadequate data. Secondly, no effort has been made to perform a comprehensive cost and benefit analysis.
This partially reflects the challenges in identifying the costs and benefits of the environment, particularly those associated with biodiversity. Third, the simulations are predicated on the idea that all advantages occur instantly, but in practice, advantages would change as the economy finds a new balance. Fourth, we are unable to determine which economic sectors are more environmentally harmful or responsive to increases in transportation costs since we are dealing with aggregate benefits. Once more, this reflects the lack of data at the desired spatial scale.

Finally the focus here is on benefits that derive from reductions in transport costs to local markets. It would be straightforward to extend the analysis to other markets or complement the estimates with those derived from gravity models of inter-regional trade.

When it comes to enlisting outside assistance for the road network's restoration, the DRC has made great strides. After years of violent war, the DRC's road system deteriorated, making it extremely difficult to link the nation's population and economic hubs. Rebuilding the road network has been a major priority in the years after the conclusion of the conflict, and the nation has obtained significant financial pledges from China as well as from bilateral and multilateral donors in order to achieve this goal. These funding cover highways throughout the country's eastern side as well as several of the main road corridors that connect Kinshasa and Lubumbashi. The country's small paved network (less than 3,000 km) has therefore reportedly improved significantly and is now on pace with other LICs in the area, according to current road quality measures. Only 42% of the network's 30,000 km of unpaved roads are in good or fair condition, indicating that they are in severe deterioration.

References

Ali, R., A.F. Barra, C.N. Berg, R. Damania, J. Nash, and J. Russ (forthcoming) “Agricultural Technology Choice and Transport,” American Journal of Agricultural Economics.

Ali, R., A.F. Barra, C.N. Berg, R. Damania, J. Nash, and J. Russ (2015). Infrastructure in conflict-prone and fragile environments: evidence from the Democratic Republic of Congo (No. 7273).

The World Bank. Angelsen, A. et al. Environmental Income and Rural Livelihoods: A Global-Comparative Analysis, World Development (2014), http://dx.doi.org/10.1016/j.worlddev.2014.03.006 Bahwere, Paluku, and Philippe Donnen.

"Nutritional status of the populations of the Congo Basin: Today and tomorrow." Population X1000 (2008). Block, Steven.

The decline and rise of agricultural productivity in sub-Saharan Africa since 1961. No. w16481. National Bureau of Economic Research, 2010. Chomitz, Kenneth M., and David A. Gray.

"Roads, land use, and deforestation: a spatial model applied to Belize." The World Bank Economic Review 10.3 (1996): 487-512. Cropper, Maureen, Jyotsna Puri, and Charles Griffiths.

"Predicting the location of deforestation: The role of roads and protected areas in North Thailand." Land Economics 77.2 (2001): 172-186. Debroux, Laurent, et al.

"Forests in post-conflict Democratic Republic of Congo: Analysis of a priority agenda." Selected Books 1 (2007).

Deininger, Klaus W., and Derek Byerlee. Rising global interest in farmland: can it yield sustainable and equitable benefits?. World Bank Publications, 2011.

Dorosh, Paul, et al. "Crop production and road connectivity in Sub-Saharan Africa: a spatial analysis." World Bank Policy Research Working Paper Series, Vol (2010).
FAO and IIASA (Food and Agriculture Organization of the United Nations and the International Institute for Applied Systems Analysis). 2000.

"Global Agro-Ecological Zones (GAEZ)." FAO, Rome; and IIASA, Laxenberg, Austria.
Gaveau, David LA, et al. "The future of forests and orangutans (Pongo abelii) in Sumatra: predicting impacts of oil palm plantations, road construction, and mechanisms for reducing carbon emissions from deforestation." Environmental Research Letters 4.3 (2009): 034013.

Growth, Reconciling Economic, and Forest Protection. "Deforestation Trends in the Congo Basin." (2013).

HarvestChoice. 2012. "Spatial Allocation of Agricultural Production." International Food Policy Research Institute, Washington, DC, and University of Minnesota, St. Paul, MN. http://harvestchoice.org/node/2248. Ulimwengu, John, et al.

"Paving the way for development." The impact of transport infraestructure on agricultural production and poverty reduction in the Democratic Republic of Congo. International Food Policy Research Institute Discussion Paper 840 (2009).

World Bank. Democratic Republic of the Congo River and Urban Transport Review. Report. no. ACS9800. Washington, DC: 2014.Bullock, Richard. 2009. "Off Track: Sub-Saharan African Railways." AICD Background Paper 17, Africa
Region, World Bank, Washington, DC.

Carruthers, Robin, Ranga Rajan Krishnamani, and Siobhan Murray. 2009. "Improving Connectivity:

Investing in Transport Infrastructure in Sub-Saharan Africa." AICD Background , Africa Region, World Bank, Washington, DC.

Gwilliam, Ken, Vivien Foster, Rodrigo Archondo-Callao, Cecilia Briceño-Garmendia, Alberto Nogales,
and Kavita Sethi. 2008.

"The Burden of Maintenance: Roads in Sub-Saharan Africa." AICD
Background Paper 14, Africa Region, World Bank, Washington, DC.