

SUMMARY OF BACKGROUND PAPER 16

# **AFRICA INFRASTRUCTURE COUNTRY DIAGNOSTIC**

## **Air Transport: Challenges to Growth**

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## About AICD

This study is part of the Africa Infrastructure Country Diagnostic (AICD), a project designed to expand the world's knowledge of physical infrastructure in Africa. AICD will provide a baseline against which future improvements in infrastructure services can be measured, making it possible to monitor the results achieved from donor support. It should also provide a more solid empirical foundation for prioritizing investments and designing policy reforms in the infrastructure sectors in Africa.



AICD will produce a series of reports (such as this one) that provide an overview of the status of public expenditure, investment needs, and sector performance in each of the main infrastructure sectors, including energy, information and communication technologies, irrigation, transport, and water and sanitation. The World Bank will publish a summary of AICD's findings in spring 2008. The underlying data will be made available to the public through an interactive Web site allowing users to download customized data reports and perform simple simulation exercises.



The first phase of AICD focuses on 24 countries that together account for 85 percent of the gross domestic product, population, and infrastructure aid flows of Sub-Saharan Africa. The countries are: Benin, Burkina Faso, Cape Verde, Cameroon, Chad, Congo (Democratic Republic of Congo), Côte d'Ivoire, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Uganda, and Zambia. Under a second phase of the project, coverage will be expanded to include additional countries.



AICD is being implemented by the World Bank on behalf of a steering committee that represents the African Union, the New Partnership for Africa's Development (NEPAD), Africa's regional economic communities, the African Development Bank, and major infrastructure donors. Financing for AICD is provided by a multi-donor trust fund to which the main contributors are the Department for International Development (United Kingdom), the Public Private Infrastructure Advisory Facility, Agence Française de Développement, and the European Commission. A group of distinguished peer reviewers from policy making and academic circles in Africa and beyond reviews all of the major outputs of the study, with a view to assuring the technical quality of the work.



This and other papers analyzing key infrastructure topics, as well as the underlying data sources described above, will be available for download from [www.infrastructureafrica.org](http://www.infrastructureafrica.org). Free-standing summaries are available in English and French.



Inquiries concerning the availability of datasets should be directed to [vfoster@worldbank.org](mailto:vfoster@worldbank.org).

## Summary

The air transport market in sub-Saharan Africa presents a strong dichotomy. In southern and eastern Africa the market is growing, with three strong hubs and three major African carriers dominating international and domestic markets which are becoming increasingly concentrated. In contrast, in central and western Africa the sector is stagnating, with the vacuum created by the collapse of Cote d'Ivoire and the demise of several regional airlines, including Air Afrique, still unfilled. Throughout, there are many unviable small state owned operations depending on subsidy and a monopoly in the domestic market. There are some promising signs. Growth in air traffic has been buoyant. The number of routes and size of aircraft are being adapted to the market and a number of large carriers are viable and expanding. However, in spite of this overall connectivity has been declining. As oil prices rise, the role of air transportation will be looked at even more critically. Africa is a poor continent, and some countries face the potential of further isolation as the cost of flying increases.

Infrastructure is not at the heart of the problems of the sector. The number of airports is stable and there are enough runways to handle traffic in the near future with better scheduling and relatively modest investment in parallel taxiways and some terminal facilities. The safety problem is more one of pilot capability and safety administration than unsafe aircraft, though air traffic control facilities are admittedly poor. Revenues from airports and air traffic are probably high enough to finance the necessary investments, but are not currently captured by the sector.

At a time when Africa's infrastructure requirements are being widely debated, a more complete inventory of air transport capabilities is sought. This report will focus on industry organization within Africa, overall accessibility, quality of oversight, and infrastructure installations countrywide and at selected airports, with their related capacities.

Beyond data collected from questionnaires sent directly to the civil aviation authorities in each country, this report relies considerably on data collected through a variety of other sources, especially from the providers of flight schedules to global reservation systems, for an independent analysis of trends.

### A continental divide in air traffic

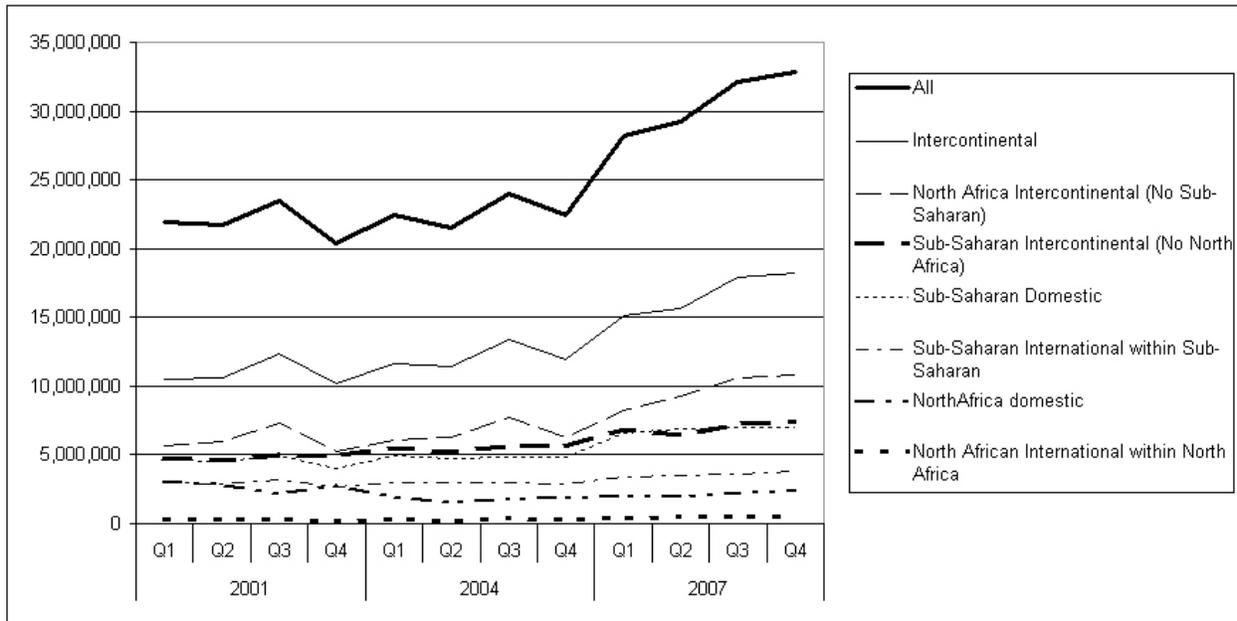
Following a significant global decline in 2001, Africa's air transport industry grew at a healthy 5.76 percent per year between 2001 and 2007. Growth between 2004 and 2007 rose 10.68 percent, to roughly 123 million seats annually. The aggregated figures for Africa show growth in all types of scheduled air travel: intercontinental traffic, international traffic within Africa, and domestic travel (figure A).

*Intercontinental* traffic in the region relies heavily on the three major hubs of Johannesburg, Nairobi and Addis Ababa. It has grown at an annual average rate of 6.2 percent between 2001 and 2007. While the South Africa routes to the U.K. and Germany are still the most heavily trafficked, the most notable feature of this growth is the significant rise in service through the Middle East from all of the main hubs. North African intercontinental grew 8.3 percent during the same period, with the most dominant routes being between France and Morocco, Algeria, and Tunis. Egypt serves as another important entry point from Germany, the Russian Federation, and the Middle East.

## AIR TRANSPORT: CHALLENGES TO GROWTH

*International* traffic within Sub-Saharan Africa grew more rapidly, at an average of 6.5 percent between 2001 and 2007, with traffic between the region and North Africa growing at 25 percent per year. The same three major hubs handle 36 percent of this international traffic (figure B). In each case the inter-SSA traffic of these hubs is dominated by the national airline. South African Airways, Kenya Airlines, and Ethiopian Airlines provide 33 percent, 70 percent and 83 percent respectively of the international traffics through their hubs. Both Kenyan Airlines and Ethiopian airlines are active in developing new routes on which they are the sole carrier, while most of the South African international routes have more than one carrier in competition.

**Figure A Air traffic by markets, 2001–07**

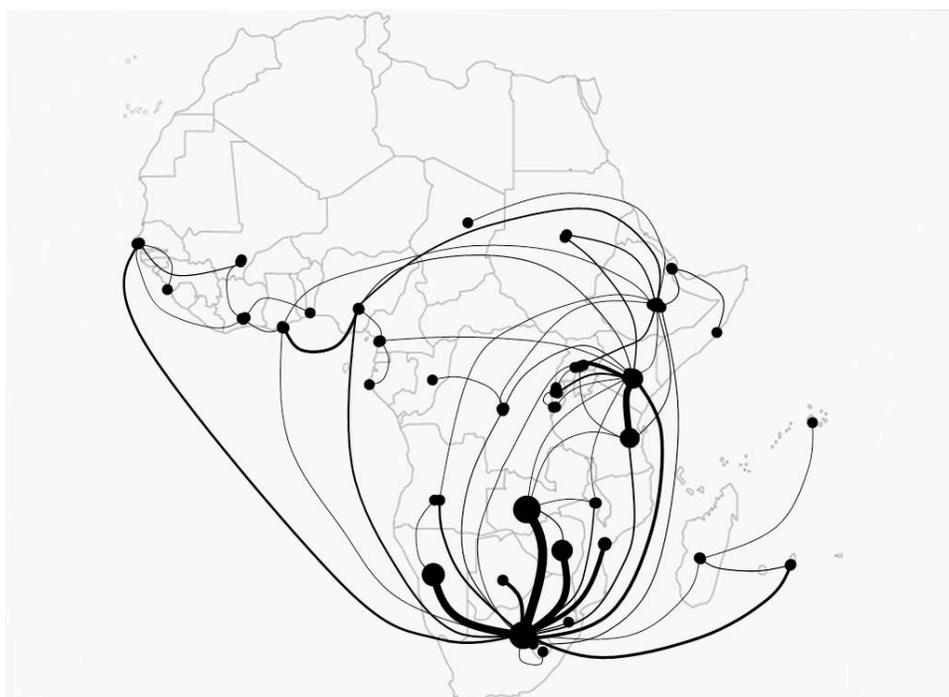


East Africa has the more developed network. In West and Central Africa only Nigeria has a significant number of connections, both inter-continently and internationally. With the collapse of national and regional carriers, the region recently suffered an absolute decline in service. North African international travel showed some of the most significant gains of over 9.5 percent per annum between 2001 and 2007.

Notwithstanding the growth in traffic, the number of city pairs served in SSA has dropped by 229 between 2001 and 2007, and if South Africa, Nigeria and Mozambique are excluded there has been an average annual decline of 1 percent per annum and a loss of 137 routes between 2004 and 2007.

The impact of the Yamoussoukro Decision of 1999, an effort to liberalize international air travel within Africa, is best measured by the amount of top-level traffic between countries (freedom level 5 or above in the Decision scheme). The percentage of international flights conducted by carriers not part of either country being served is highest in countries where the implementation

Figure B Top 60 international routes within Sub-Saharan Africa.



score of the Yamoussoukro Decision is highest (table A). Except for the Arab Maghreb Union, which is not a party to the Yamoussoukro Decision, all countries have shown an increased market proportion of these airlines between 2004 and 2007.

Table A Percentage of flights between country pairs by airlines that are not based in either country of the pair

	AMU	BAG	CEMAC	COMESA	EAC	SADC	WAEMU
Seats 2001	7.6%	45.3%	38.0%	25.4%	33.0%	18.7%	47.7%
Seats 2004	8.3%	36.3%	11.8%	9.9%	12.2%	2.3%	43.7%
Seats 2007	4.1%	43.3%	28.5%	14.1%	16.4%	5.7%	43.8%
YD Score	1	4	5	3	3	2	5

Note: YD = Yamoussoukro Decision of 1999. AMU = Arab Maghreb Union; BAG = Banjul Accord Group; CEMAC = Economic and Monetary Community of Central Africa; COMESA = Common Market of Eastern and Southern Africa; EAC = East African Community; SADC = Southern Africa Development Community; WAEMU = West African Economic and Monetary Union.

*Domestic* Sub-Saharan African traffic grew at the fastest rate of all Sub-Saharan African traffic – at over 12 percent per annum between 2001 and 2007. On the one hand, Nigeria has experienced annual growth in domestic traffic as high as 67 percent in Nigeria. On the other hand, about half of the countries studied experienced an absolute declines in domestic air transport. Domestic air transport varies strongly from country to country, and is dependent on many factors, including topology, income per capita, and types of services available. Ethiopia, home to one of the most important airlines in Africa, has relatively little domestic air transport. The growth in Nigeria’s domestic travel figures are so significant that they

skew the overall growth figures for West and Central Africa. North African domestic traffic declined nearly 4 percent. With some notable exceptions, domestic travel in most countries is serviced by the country's flag carrier, and features high market concentration.

Overall, a striking dichotomy emerges between the eastern and western sides of the continent. Eastern and Southern Africa, on the one hand, have developed major hubs, are home to the three most important airlines in Sub-Saharan Africa. These airlines are an engine of growth, with the denser network of Sub-Saharan traffic. West and Central Africa went through very strong declines shortly after 2001, experienced smaller, in some cases negative, growth and development since, and is characterized by a less developed hub system.

The uneven growth patterns in Sub-Saharan Africa are caused in part by the decline and collapse of major carriers in the Western portion, most notably Air Afrique, Air Gabon, Ghana Airways, and Nigerian Airways. The drop in capacity is slowly being rebuilt by the major carriers in the South and the East. Ethiopian Airways and Kenyan Airways are expanding towards the declined routes and east-west traffic is slowly growing. The shock of the collapse of the traditional carriers in the region, and the expansion of South African Airways, Ethiopian Airlines, and Kenyan Airways, is leading towards much needed consolidation of the industry in Sub-Saharan Africa.

Contrary to what is often reported in the public media, Africa's fleet of aircraft used for advertised scheduled services is being renewed, and is adjusted for the types of markets served. In virtually all regions wide-bodied aircraft have been replaced with more recent, smaller jets such as the Boeing 737. These aircraft are more efficient for short to medium haul distances. Though the accident rates involving older, often Eastern-built aircraft is the highest in the world, the portion of the seat miles flown in these aircraft on regularly schedules services is now very small.

Air travel within Africa is considerably more expensive per mile flown than intercontinental travel, especially on routes of less than 2,000 nautical miles (figure C). This reflects larger markets and higher competitiveness among intercontinental routes. Domestic pricing is most likely skewed by subsidized or fixed pricing on some routes, keeping fares artificially low. Another recent study by Intervistas for IATA concludes that the price elasticity of air transport within Africa is relatively high.

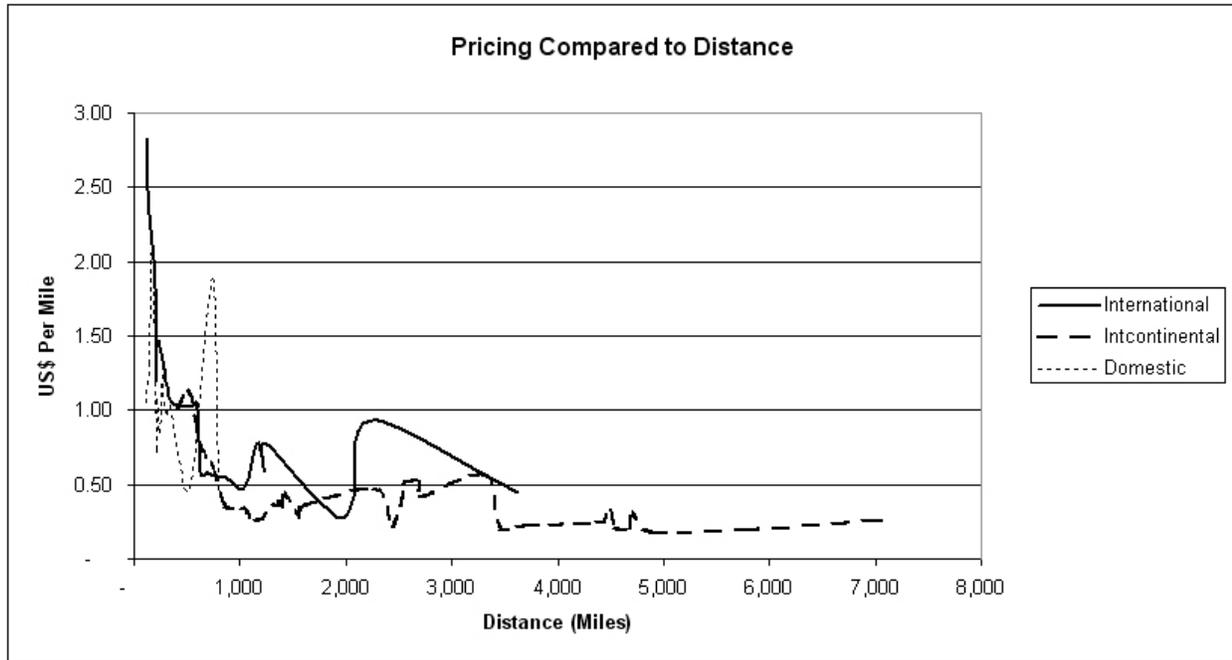
### Airside versus landside infrastructure

As of November 2007, of an estimated 2,900 airports in Africa, there are 280 airports receiving regularly scheduled services. There are two massive gateways (Egypt and South Africa) and six additional important entry points (Morocco, Algeria, Tunisia, Senegal, Ethiopia, and Kenya). The number of available runways and their general condition does not seem to be a constraint in traffic at current levels, though the condition of the airport infrastructure varies widely. We did an informal analysis of runway conditions using commonly available

Rating	North Africa		Sub-Saharan Africa	
	Airports	%	Airports	%
Excellent	28	60%	31	18%
Very Good	17	36%	50	29%
Fair	2	4%	46	27%
Marginal			10	6%
Poor			36	21%
Totals	47	100%	166	100%

satellite images (table B). Fortunately the 27 percent of runways in marginal or poor condition only handle an estimated four percent of Sub-Saharan traffic.

Figure C Air fares on African routes



Notes: Includes North Africa.

Runway capacity in Africa is not a limiting factor for traffic. Limiting factors for traffic include the ability to enter or leave the runway via taxiways, the amount of apron space for parking, and the amount of terminal space for processing passengers. North African countries planned and developed their airports for expected increases in passenger traffic, with capacities now well capable of handling current and future numbers of travelers. Sub-Saharan airports show clear constraints even at main airports such as John Kenyatta International Airport in Nairobi, Kenya. The land-side infrastructure of airports in Sub-Saharan Africa shows signs of needing large capital investments.

Evidence suggests that larger airports in general in Africa are financially sustainable, with excess revenues going either to airports in the system that are not self-sufficient, or to non-airport related budgets. The revenue stream for airports is somewhat different from those found in the West. Car rental booths and other concessions supply the larger portion of revenues in much of the U.S.'s system, whereas Africa's airports rely heavily on passenger charges. Overall the airport charges in Africa do not seem excessive. There are outliers, and the overall level of charges makes these outliers stand out even more. In some cases excessive charges may be levied in order to finance a new airport rather than upgrading existing facilities at a much lower overall investment cost.

Private sector participation in airports is limited throughout Africa, though some interesting examples, such as the airports company in South Africa, do exist. In most cases, private sector involvement has been limited to some concessions and management contracts, usually involving small investments.

Air navigation services and air traffic control throughout Sub-Saharan Africa is spotty and concentrated in a few centers. South Africa and Kenya have several radar installations and are able to actively monitor traffic. Ethiopia, the third most important airport in Sub-Saharan Africa, has no air traffic surveillance technology.

The most important airports feature instrument landing systems and basic traditional navigation aids. Away from the centers, navigation aids, as well as communication stations, become rare or non-existent. African airspace and airports may not necessarily be in need of radio-based navigation and surveillance infrastructure such as VOR or radar technology, but will be in need of investments in the less costly, satellite-based replacements such as GNSS approaches and ADS-B surveillance technologies.

### Institutions: don't forget the software

Sub-Saharan Africa's civil aviation authorities on a per country basis are generally underfunded. They cannot fulfill their duty as safety regulators because of lacking capacity, especially in safety inspectors. There is anecdotal evidence that political influence has hampered those authorities that were not established as autonomous. In many cases, revenues received by the civil aviation authorities, such as overflight charges, are handed to the state treasury. This causes the authority to rely on state allocations for financing.

Current accident rates in Africa reflect this lack of capacity. Africa has the highest accident rate of eastern-built aircraft. It also has the highest accident rate of western jets outside the former Soviet Union (figure D). The accidents are due to lack of training, and the unknowing or willful lack of following procedures, and rarely can be chalked up to equipment failure alone. A recent accident involved a plane that was less than a year old.<sup>1</sup>

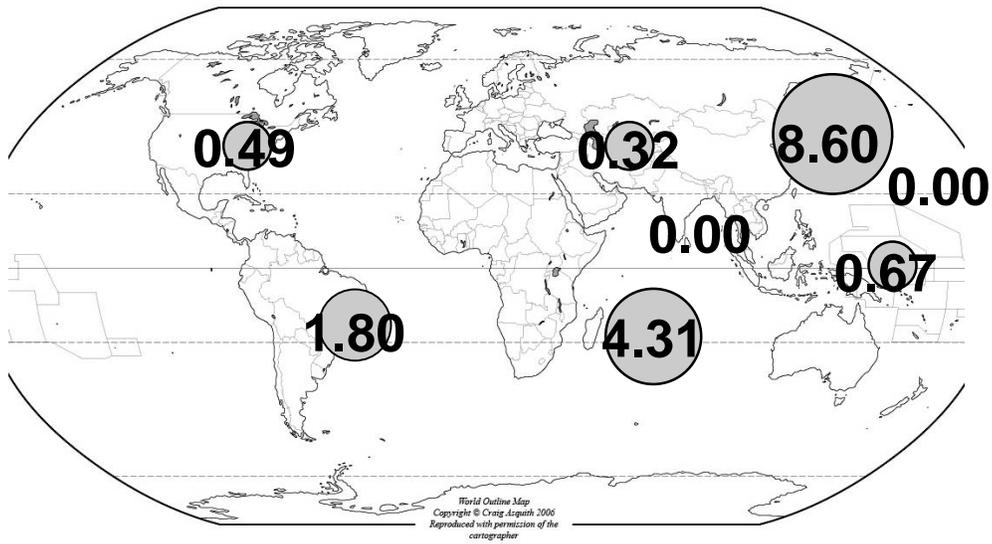
Figure E shows a rating of the quality of oversight according to several criteria. Only a handful of countries are rated as having good oversight—Egypt, Ethiopia, Morocco, South Africa and Tunisia. As many as 24 countries are rated as having poor oversight.

To introduce better oversight, various programs such as COSCAPS are being proposed and implemented. Regional organizations that pool resources from individual countries and oversight agencies can train and share qualified technical personnel, such as flight inspectors. Because these efforts are in the beginning stages, the effectiveness of these programs for oversight in Africa are not known. Similar programs have been highly effective in other regions, such as Latin America.

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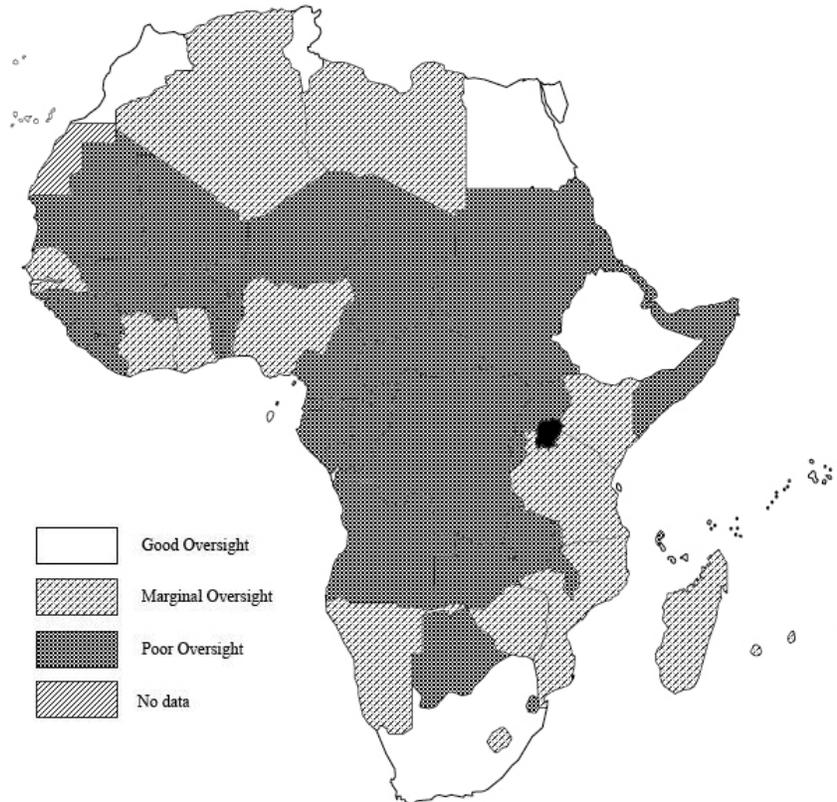
<sup>1</sup> The validity of the calculations behind the rate for the former Soviet Union are a matter of controversy. It is commonly accepted that Africa is still the least safe continent.

Figure D Western-built jet aircraft hull loss rate by operator region in 2006



Source: 2006 Safety Report, IATA

Figure E Quality of African safety oversight



Note: Since this map was produced, Gabon has been added to the list of countries with serious concerns about oversight.

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