Chapter 11

Railways: Looking for Traffic

African railroads have changed greatly in the past 30 years. Back in the 1980s, many railway systems carried a large share of their country's traffic because road transport was poor or faced restrictive regulations, and rail customers were established businesses locked into rail either through physical connections or (if they were parastatals) through policies requiring them to use a fellow parastatal. Since then, most national economies and national railways have been liberalized. Coupled with the general improvement in road infrastructure, liberalization has led to strong intermodal competition. Today, few railways outside South Africa, other than dedicated mineral lines, are essential to the functioning of the economy.

Rail networks in Africa are disconnected, and many are in poor condition. Although an extensive system based in southern Africa reaches as far as the Democratic Republic of Congo and East Africa, most other railways are disconnected lines reaching inland from the ports, serving small markets by modern railway standards. Most were built relatively lightly, and few, other than Spoornet in South Africa, have invested in rehabilitating and renewing infrastructure and rolling stock. Moreover, various conflicts and wars have rendered several rail sections unusable. As a result, some networks have closed and many others are in relatively poor condition, with investment backlogs stretching back over many years.

Few railways are able to generate significant funds for investment. Other than for purely mineral lines, investment has usually come from bilateral and multilateral donors. Almost all remaining passenger services fail to cover their costs, and freight service tariffs are constrained by road competition. Moreover, as long as the railways are government operated, bureaucratic constraints and lack of commercial incentives will prevent them from competing successfully. Since 1993, several governments in Africa have responded by concessioning their systems, often accompanied by a rehabilitation program funded by international financial institutions.

For the most part, concessions have improved operational performance. Although results have been mixed, many concessionaires have increased traffic volumes and have generally performed more efficiently, and there has been little evidence of monopolistic behavior. Relations with governments have often been

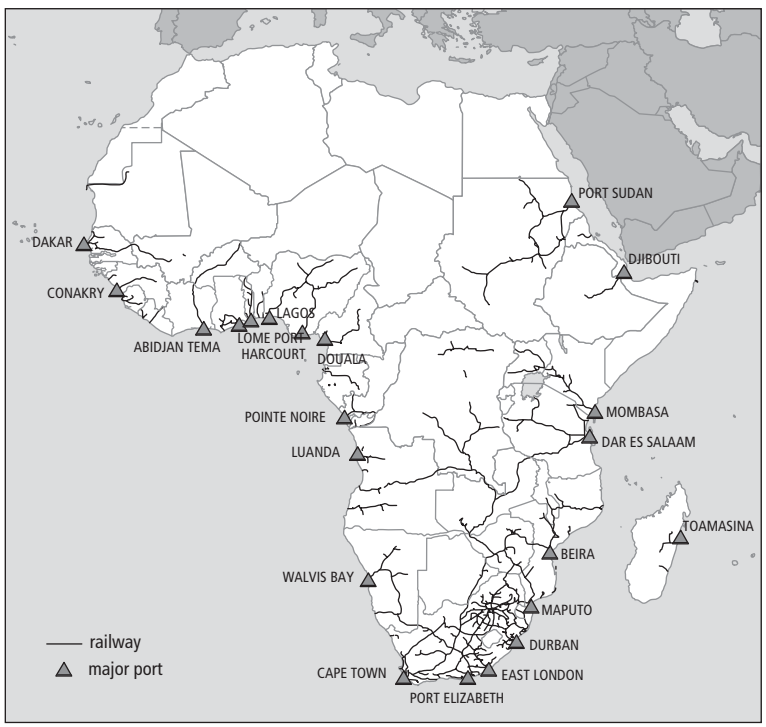
uneasy, however, especially concerning adequate compensation for loss-making passenger service obligations, and many governments clearly had unrealistic expectations about the private sector's ability to improve operations and generate investment.

Concessionaires appear willing to spend their own funds only on day-to-day maintenance, not on infrastructure. Financing asset renewal and upgrading remains an open question for most of the African rail network. Without infrastructure investments, the competition from road networks will thwart railway survival except to carry large-scale mineral traffic. Although concessioning has generally improved service and reduced the financial burden on governments, it does not appear to be a full solution to financing the investment needs of African railways.

Africa's Rail Networks

At the end of 2008, 47 railways were operating in 32 countries in Africa. Railway development has followed a similar pattern in almost all African countries. Typically, isolated lines headed inland from a port to reach a trading center or a mine, and over time, a few branch lines were built. Many of the lines were state owned, but some were constructed as concessions or, in the case of some mineral developments, as part of a mining company's operation. Although continental rail master plans have existed for over a century, most of the African network remains disconnected, operating within a single country or linking a port and its immediate regional hinterland. The only significant international network is centered in South Africa and stretches north to Zimbabwe, Zambia, and the Democratic Republic of Congo (figure 11.1). Trade between African countries (other than to and from South Africa) has always been minimal, largely because of the similarity in the products exported, which suggests that interregional links would be lightly used even if they existed.

Figure 11.1 Map of African Rail Networks



Source: Bullock 2009.

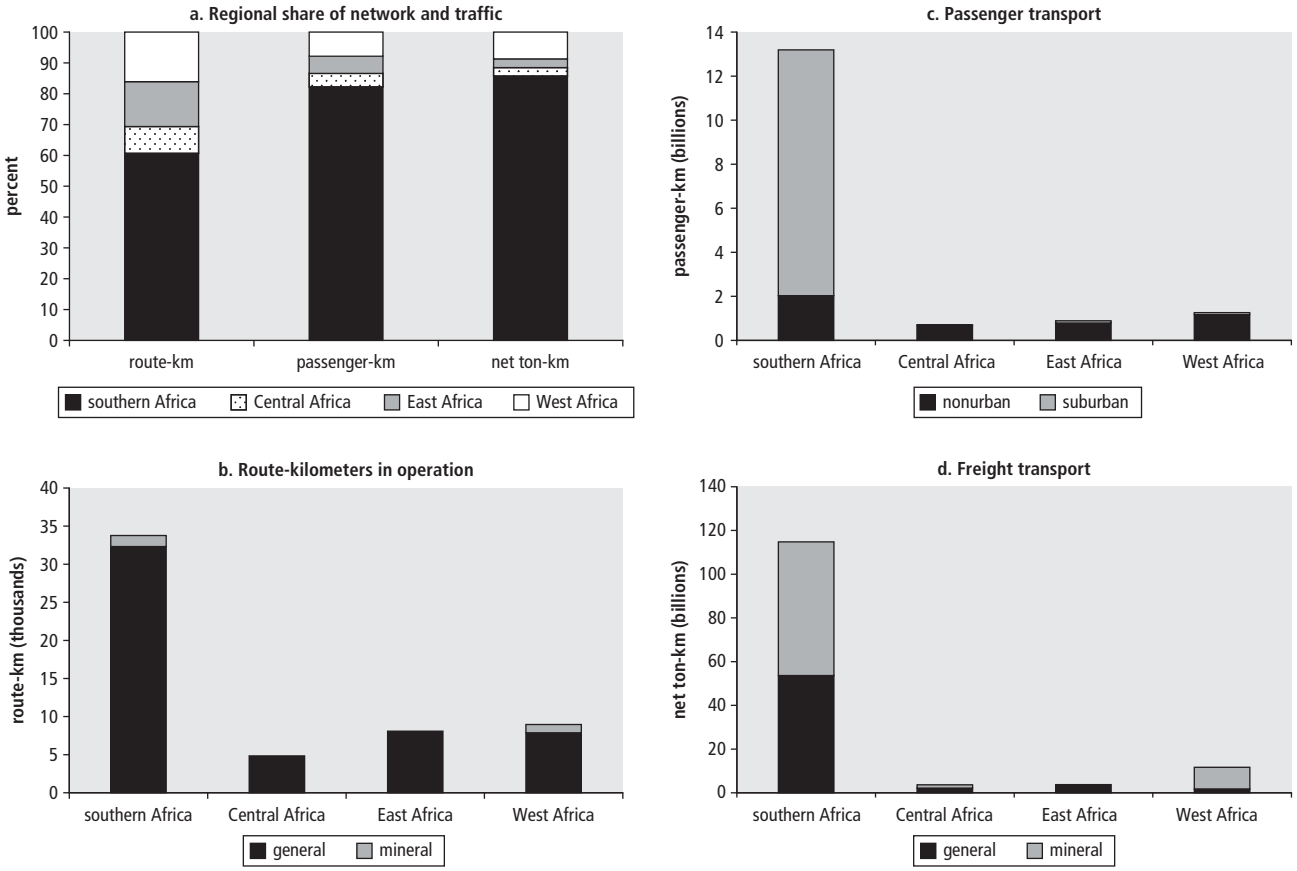
Low Rail and Traffic Density

African railway networks' spatial density, a metric that compares track mileage with the size of a country, is low (UIC 2008).[1] The highest measurement of spatial density is 16 in South Africa, but most other countries fall in the range of 1 to 6, and 13 countries have no operating railway at all. Too much should not be read into this indicator, however; network density is strongly affected by the pattern of population. Australia, Canada, China, and the Russian Federation, all with vast undeveloped and sparsely populated areas, have densities of between 5 and 7, whereas most European countries range from 20 to 100.

A complementary indicator is the network density per million inhabitants, which is highest in Gabon (520) and Botswana (480), followed by South Africa (460). Most other African countries range from 30 to 50. European countries range from 200 to 1,000, and Australia and Canada exceed 1,500. China is much lower, at 50.

These metrics alone cannot justify network expansion in Africa. To be an economical investment, a new line needs a minimum level of traffic, and the geographical distribution of potential customers within a country and the

Figure 11.2 Rail Network Size and Traffic by Region



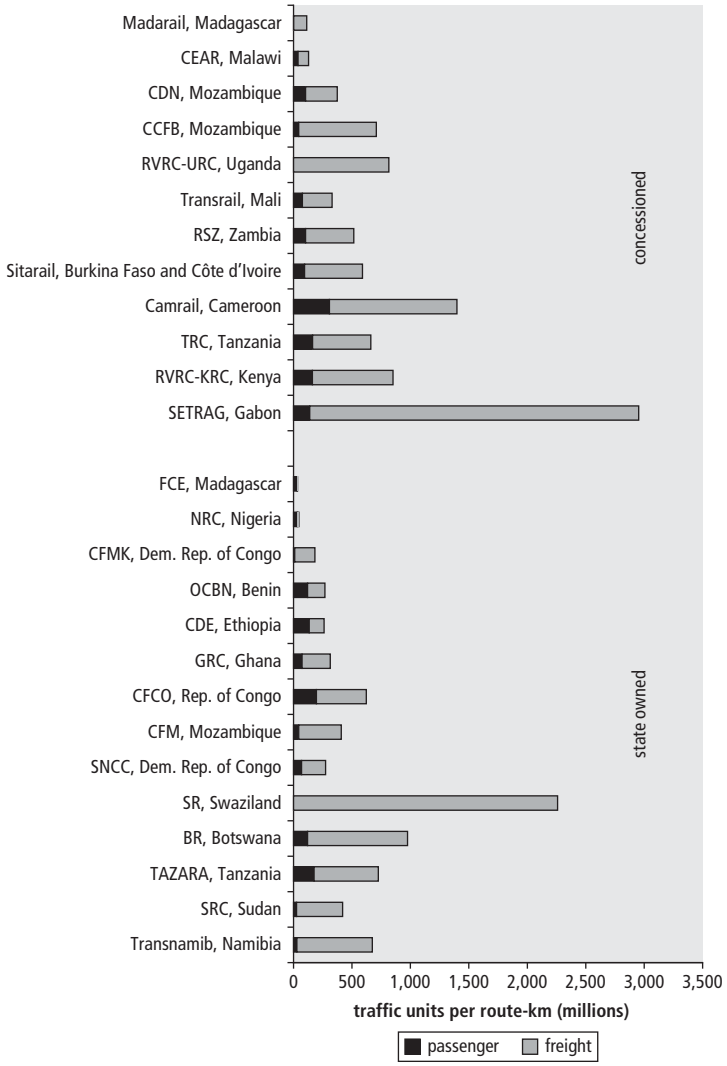
Source: Bullock 2009.
Note: Southern Africa = Angola, Botswana, Madagascar, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe; Central Africa = Cameroon, the Democratic Republic of Congo, Gabon, and the Republic of Congo; East Africa = Djibouti, Eritrea, Ethiopia, Kenya, Sudan, Tanzania, and Uganda; West Africa = Benin, Ghana, Guinea, Mali, Mauritania, Nigeria, Senegal, and Togo.

level of usage that can be expected are more important than these national averages.

South Africa has the most important network (figure 11.2). Specialized mineral lines in western and southern Africa carry over half of the region's freight, most of it on the Spoornet coal and ore export lines. Southern Africa dominates general rail freight, handling over 80 percent of the freight traffic on the nonmineral lines. Southern Africa also dominates the passenger business, with over 70 percent of passenger traffic, largely because of its heavy commuter passenger business in cities. Some other African cities also operate commuter services, but with the exception of Dakar, Senegal, they mostly provide one or two trains at peak hours along a short line.

Traffic density on African railways is generally low.[2] The highest average network traffic density outside Spoornet is in Gabon (2.7 million traffic units), with Cameroon and Swaziland having the only other railways over 1 million; many railways average fewer than 300,000 units (figure 11.3). By comparison, the average traffic density of the Maghreb systems (Algeria, Morocco, and Tunisia) is nearly 2 million units, and the Arab Republic of Egypt, with its heavy passenger traffic, exceeds 8 million. Most European systems average 2 million to 5 million, with densities under 1 million found only in Albania and Montenegro. With such light usage, many networks struggle to generate enough funds just to maintain, much less renew, their infrastructure.

Figure 11.3 Average Railway Network Traffic Density, 2001–05



Source: Bullock 2009.
Note: The overall traffic units carried by a railway are the sum of the passenger-kilometers and the net tonne-kilometers of freight carried. This simple standard measure is widely used as a means of aggregating freight and passenger traffic. The relative weighting of passenger and freight is conventionally taken as 1:1. BR = Botswana Railways; Camrail = Cameroon Railway Corporation; CCFB = Companhia dos Caminhos de Ferro da Beira (Mozambique); CDE = Chemin de Fer Djibouto-Ethiopien; CDN = Corredor de Desenvolvimento do Norte (Mozambique); CEAR = Central East African Railways Corporation (Malawi); CFCO = Chemin de Fer Congo-Océan (Republic of Congo); CFMK = Chemin de Fer Matadi-Kinshasa (Democratic Republic of Congo); CFM = Caminhos de Ferro do Mocambique; FCE = Fianarantsoa Côte Est (Madagascar); GRC = Ghana Railways Corporation; NRC = Nigeria Railways Corporation; OCBN = Organisation Commune Bénin-Niger; RSZ = Railway Systems of Zambia Ltd; RVRC-KRC = Rift Valley Rail Corporation-Kenya Railways Corporation; RVRC-URC = Rift Valley Rail Corporation-Uganda Railways Corporation; SETRAG = Société Transgabonnaise (Gabon); SNCC = Société Nationale des Chemins de Fer du Congo (Democratic Republic of Congo); SR = Swaziland Railways; SRC = Sudan Railways Corporation; TAZARA = Tanzania-Zambia Railway; TRC = Tanzania Railways Corporation.

Dilapidated Infrastructure

Most networks outside South Africa still operate with their original facilities. Limited upgrading has occurred, but the lines can still be characterized as relatively low axle-load, low-speed, small-scale, undercapitalized networks ill suited to modern requirements. Many structures and some of the track work are now over 100 years old. Many sections of track have deteriorated almost beyond repair. Although this situation can be tolerated on low-volume feeder lines, and indeed may be the only way some can be viably operated, it is a major handicap when competing against the modern roads being constructed in major corridors.

Most rail systems have considerable sections of track in need of repair or replacement. Some have major sections that are not in operation and will require rehabilitation before operations can resume. Even where service exists, poor track condition forces speed restrictions, resulting in lower railway competitiveness and rolling-stock productivity.

In some countries, parts of the network are not operated because of war damage, natural disaster, or general neglect. Much of the Mozambican central and northern networks and railways in Angola, Côte d'Ivoire, Eritrea, Ethiopia, and the Republic of Congo either have been damaged or have had to suspend operations for as long as 20 years. The total African rail network is about 69,000 kilometers, of which some 55,000 kilometers is currently being operated (see figures 11.1 and 11.2). Almost all the network is single track, except for sections of the Spoornet network. Much of the South African network is electrified, but the only other electrified sections in Sub-Saharan Africa are in the mining region of the Democratic Republic of Congo and a short section in Zimbabwe (the latter is not in use).

Signaling on many networks still relies on manual systems. On lines with low train density, mechanical signals are adequate from a capacity viewpoint, but significant safety problems can result from human error. Where power signaling has been installed, it often does not operate because of short circuits, lack of electrical power, and dilapidated cable networks. Telephone exchanges in many companies are similarly obsolete, with limited capacity and the need for spare parts that are virtually impossible to find.

Most African railways use either the Cape gauge (1.067 meters or 3 feet, 6 inches) or the meter gauge. The main network in southern

and central Africa uses the Cape gauge, which is also used in some anglophone countries farther north. The meter gauge is used in most of francophone Africa and much of East Africa. A number of isolated standard-gauge lines are used primarily for mineral traffic, although Nigeria is developing a new standard-gauge network to serve its capital, Abuja. Narrow-gauge lines have operated at various times, but most are now derelict. Apart from the network in East Africa and the one extending north from South Africa, few railways cross international borders. Instead, they reach railheads from which traffic can be carried farther by road.

Despite the multiplicity of gauges, interoperability is not a major problem in Africa. Two gauges exist in the same location in only three places—two in Tanzania and one in Guinea. However, mixed gauges will become a problem if some of the proposed connecting lines are constructed.

In summary, most African railways are confronting major infrastructure problems primarily associated with aging track: insufficient ballast, rail wear, deteriorating earthworks and formation, decrepit structures, and rail signaling and telecommunications with obsolete equipment and lack of spare parts. The cost of rehabilitating the networks is large compared with the existing traffic volumes and revenues. The means by which rehabilitation can be done on a sustainable basis is the central question faced by most African railways.

The African Rail Market

Typically railways in Africa are small, carrying no more traffic than a moderately busy branch line in other parts of the world. African railways carry far more freight than passengers, with freight averaging about 80 percent of traffic between 1995 and 2005. Almost all railways carry passenger traffic; only Swaziland and Uganda have freight-only railways. The passenger business is steadily shrinking, however, and several of the railways still retaining a reasonable passenger business do so only because competing road networks are in poor condition or do not exist.

Traffic—Low and Growing Slowly

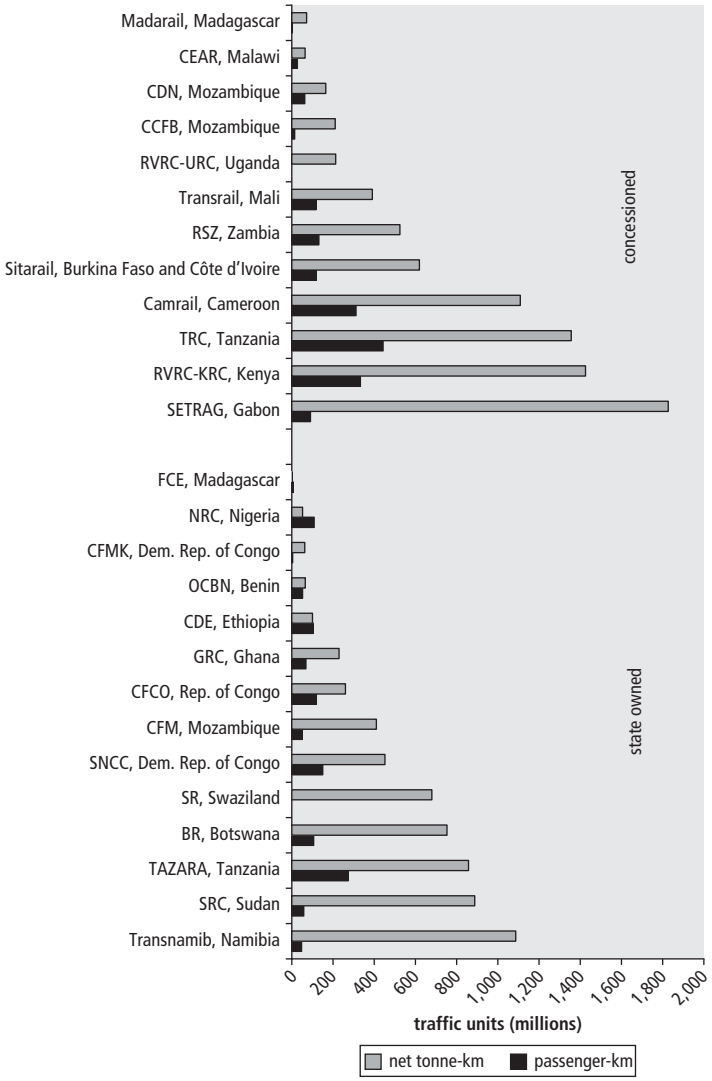
Outside South Africa, the traffic volumes serviced by African railways are very small; about half of the 26 railway operators surveyed carried traffic of less than 500,000 traffic units annually, while only 5 of them exceeded 1 million traffic units annually—a volume comparable to a moderately busy branch line on other railways (figure 11.4). By comparison, Spoornet in South Africa carries 1 million traffic units every three days (Thompson 2007). In some cases, the light traffic is caused by a lack of demand; in others, it is caused by shortages of rolling stock, particularly locomotives.

Although the average haul on African networks is relatively long with regard to their size, it is not especially so vis-à-vis road transport. Some railways carry mostly end-to-end traffic; Tanzania Railways Corporation, Tazara (Tanzania-Zambia Railway Authority), and Transrail (Dakar-Bamako Railway) all haul freight an average distance of 1,000 kilometers, and some smaller railways, such as Uganda Railway or CEAR (Central East African Railways), act as feeders to other systems, which carry the traffic a few hundred kilometers farther. These systems have a good chance of competing for general freight traffic, even as a road network improves, as long as satisfactory service levels can be achieved, but the shorter systems that require transshipment to road at railheads will generally find they can compete effectively only for bulk traffic.

Most systems operate only limited passenger commuter services, if any, and the average distance of passenger trips is the distance between the capital of a country and major provincial centers. The only significant cross-border flows are on the Sitarail (Côte d'Ivoire), Tazara, and Transrail networks.

Since the mid-1990s, most African countries experienced steady economic growth. Average annual GDP grew 4 percent, with corresponding increases in trade. Per capita GDP grew by about 1.5 percent a year. Countries such as Mali, Mozambique, and Tanzania that avoided political upheaval grew as much as 50 percent faster. Despite the generally favorable economic background, only four African railways increased both their passenger and

Figure 11.4 Average Railway Traffic Volumes, 2001–05



Source: Bullock 2009.
Note: Traffic units are passenger-kilometers in the case of passenger traffic and net tonne-kilometers in the case of freight traffic. BR = Botswana Railways; Camrail = Cameroon Railway Corporation; CCFB = Companhia dos Caminhos de Ferro da Beira (Mozambique); CDE = Chemin de Fer Djibouto-Ethiopien; CDN = Corredor de Desenvolvimento do Norte (Mozambique); CEAR = Central East African Railways Corporation (Malawi); CFCO = Chemin de Fer Congo-Océan (Republic of Congo); CFMK = Chemin de Fer Matadi-Kinshasa (Democratic Republic of Congo); CFM = Caminhos de Ferro do Mocambique; FCE = Fianarantsoa Côte Est (Madagascar); GRC = Ghana Railways Corporation; NRC = Nigeria Railways Corporation; OCBN = Organisation Commune Bénin-Niger; RSZ = Railway Systems of Zambia Ltd; RVRC-KRC = Rift Valley Rail Corporation-Kenya Railways Corporation; RVRC-URC = Rift Valley Rail Corporation-Uganda Railways Corporation; SETRAG = Société Transgabonnaise (Gabon); SNCC = Société Nationale des Chemins de Fer du Congo (Democratic Republic of Congo); SR = Swaziland Railways; SRC = Sudan Railways Corporation; TAZARA = Tanzania-Zambia Railway; TRC = Tanzania Railways Corporation.

freight traffic over the period, two of which had been concessioned. One other railway saw an increase in average passenger traffic, and all others saw a reduction. Fifteen railways increased their freight traffic. Where railways have been concessioned, freight traffic has generally increased, whereas passenger traffic has generally stagnated or declined.

The growth or decline of traffic on many systems over the last decade often had little to do with changes in the underlying demand. War or natural disaster has had a major effect in some cases; on other railways, the volume carried reflects the availability of rolling stock, particularly locomotives. Many railways are short of locomotives. When this situation improves with new or secondhand locomotives or through a locomotive rehabilitation project, traffic will increase accordingly.

Passenger Services—in Decline

Several African cities have announced plans to introduce modern heavy-rail suburban commuter networks. Such services are currently limited to South Africa and Dakar, Senegal. Experiences elsewhere in the world suggest that any new services will need substantial external financial support for both capital and recurrent operating costs and should be operated by new independent transport authorities. Almost all other passenger services face strong competition from buses and shared taxis in both price and service frequency, and few corridors remain in which rail passenger services are the only means of transport. Bus fares are typically about 30–50 percent higher than the economy rail fare, but on most routes buses are faster (sometimes twice as fast) and more frequent. Buses have the lion's share of the market, although they suffer from the same problems as rail: unreliable departures, delays and breakdowns, and overcrowding.

The long-term prospects for nonurban rail services are generally poor (Amos and Bullock 2007). Rail services start competing with roads at speeds higher than 70 kilometers per hour. However, the cost of maintaining track and signaling systems that would enable these commercial speeds is significantly more than the cost of maintaining the 30- to 40-kilometer-per-hour commercial speed needed for a freight railway. In addition, a very large capital investment would be required to construct new medium-speed (for example, 200 kilometers per hour) interurban railways. Such investment is justified

only on the basis of substantial demand (several million passengers a year) and relatively high-income passengers who can afford to cover at least operational costs. Few, if any, corridors in Africa could justify such investments, at least for the medium term.

Formal compensation schemes, such as public service obligations, have been introduced in a few cases to support passenger rail services, but they rarely provide timely compensation for service operations. Payment may be delayed several years or may otherwise take the form of a subsidy calculated to break even, limiting the ability of railways to increase their maintenance and negating any attempts to improve the financial performance of the freight services. As a result, most long-distance passenger services in Africa are trapped in a cycle of minimal investment, deteriorating services, declining patronage, and financial losses.

The few instances in which local trains serve villages with no road connection pose a different problem. These trains are used by traders bringing goods to and from regional centers, and although heavily loaded with passengers, they nonetheless incur major losses. Although such services can be funded through government subsidy, the long-term solution is to create feeder roads for motorized access, enabling more cost-effective means of transporting goods and greatly improving accessibility to such locations.

Freight—Needs Improving

Freight traffic on railways is mostly bulk and semibulk commodities, principally to and from ports. The actual commodities transported by rail reflect the economic structure of countries served by the railway, with mining products important in several countries and timber and export crops important in West Africa. Imports are mostly manufactures, such as cement and petroleum products, and general freight. On some systems, much of the general freight is containerized (cash crops with high value are increasingly traveling this way), particularly when the trip involves crossing an intermediate border before reaching the port. Unlike passenger services, significant imbalances between traffic in the two directions are common. Even where tonnage is approximately balanced, the differences in the commodity mix, with many requiring specialized cars, mean freight trains are rarely fully loaded in both directions. In some cases, this natural imbalance in traffic is accentuated for rail because road vehicles delivering imports tend to backload freight at marginal cost, leaving rail to transport the remaining freight without a compensating return load.

Average freight tariffs range from $0.03 to $0.05 per net tonne-kilometer, similar to tariffs on other general freight railways in comparable countries. Tariffs are generally constrained by competition, either from road or alternate routes (particularly in the Great Lakes region, Malawi, West Africa, and Zambia) and are also influenced by the traditional value-based tariff structures, the relative cost of carrying different commodities (as reflected in net tons per railcar round-trip), direction of travel, and volume. Although most rail rates are well below comparable road rates, especially for containers, rail typically carries only 20–50 percent of the traffic in a corridor, and some of the smaller state-owned railways have an even smaller share.

Line-haul tariffs are only part of the cost equation for freight traffic. Much is often made of the inherent lower cost of rail compared to road. This is true where minerals must be transported from a rail-connected mine to a rail-connected port but is not so clear for medium-distance general freight that also must be transported by road to and from railheads. Haulage between the railway and the ultimate origin and destination can be surprisingly expensive, often as much as the equivalent of 200–300 kilometers of line-haul transport, negating any advantage rail may have in pure line-haul tariffs. New sidings are sometimes constructed, but they need a certain amount of traffic to be economical. Traffic that needs to be collected at a central depot before being dispatched by rail is more vulnerable to road competition, and even bulk traffic is not immune if distances are not too long. In many countries, collection and distribution chains are being streamlined, often eliminating upcountry depots and distribution centers, and marketing channels have become more diversified. The railways have often been slow to respond, steadily losing market share.

Level of service is a key factor in the freight business. For rail to play a significant role in the general freight transport system, it must improve its service (specifically, overall transit time, reliability, security, and service frequency) and ensure that it is addressing the needs of customers. Too often, what rail has offered as transport has been quite different from what the competing road hauler can offer, and road carriers can charge a significant premium. In general, freight markets in Africa require reliable services (a commercial speed of 40 kilometers per hour is usually sufficient) rather than high-speed services, with (a) rail infrastructure and rolling stock maintained for service, (b) operating discipline to ensure that schedules are maintained, and (c) commercial arrangements that ensure that customers fulfill their contractual responsibilities.

Most railways can win bulk mineral traffic when it is offered, but general freight requires a reasonable level of service from rail if it is to compete with road without offering a significant price discount. By 2025, any remaining monopolies for general freight will have run their course, and the only traffic on which African railways will have an undisputed grip will be minerals (although mining companies are increasingly running even this traffic directly, either as third-party operators or on their own private networks). Experience in many countries has shown that general freight transport requires operators to be flexible, responsive, and adaptable. Fewer customers are fellow parastatals under order to use a state-owned railway, and few government-owned organizations, no matter how corporatized they may be, have the commercial freedom to operate effectively in a fully competitive environment.

Rail in Africa must become a transport business in the broadest sense and must be able to adapt to new markets. The predicaments of the remaining government-owned railways, however, show that rail cannot compete effectively while it is handicapped by the bureaucratic constraints and lack of commercial incentives and accountability of a government organization. Achieving an acceptable level of service, combined with flexible pricing policies and a strategy of providing a transport service as opposed to merely a line-haul operation, can reduce the price discount between rail and road, increasing the contribution that freight can make to the maintenance and renewal of infrastructure. This improvement is one of the major benefits a concessionaire can offer a state-owned railway.

Moreover, because of the lack of interconnection services and cross-border service contracts, rail freight suffers huge delays in crossing national borders. For example, a rail freight journey of 3,000 kilometers from Kolwezi on the Democratic Republic of Congo border to the port of Durban in South Africa takes 38 days to complete, an effective speed of only 4 kilometers per hour. Only 9 of these days are spent traveling, with the remainder (a staggering 29 days) taken up primarily with loading and interchanging freight, as well as some time for customs clearance. Each day of delay costs $200 per railcar. The main cause of the problems in the rail sector is the absence of reliable interconnection services when trains cross borders. Locomotives from one country are currently not allowed to travel on another country's network, mainly because of the inability to provide breakdown assistance to foreign operators. As a result, rail freight crossing borders must wait to be picked up by a different locomotive. The delays are often extensive, partly because of the lack of reliable, well-maintained locomotives. Delays also reflect the lack of clear contractual incentives to service traffic from a neighboring country's network. Reducing such delays would therefore require totally rethinking the contractual relationships and access rights linking the railways along the corridor. It would also likely require the establishment of a regional clearinghouse to ensure transparency and fairness in reciprocal track access rights.

How Much Investment Can Be Justified?

Providing an estimate of the investment needed by African railways is a daunting task (Carruthers, Krishnamani, and Murray 2009). In addition to building detailed inventories and assessments of infrastructure and determining how much needs to be repaired or replaced, the question of

how much investment is economically justified must be asked. Lines that have been superseded by road developments and those with low traffic levels will rarely merit reconstruction and investment, and funds should instead be directed to those parts of the network with long-term value. Although a government's desire to reinstate such links is understandable, doing so is often extremely expensive.

Investment has historically been used for new construction and rolling stock, for replacement of rolling stock, and sometimes for rehabilitation and replacement of track. Long-term maintenance neglect has caused a huge backlog investment of up to $3 billion for Africa's railways. In practice, this one-time expenditure needed to eliminate the rehabilitation backlog could be spread over a 10-year period at an annual rate of $300 million.

After the network is restored to good condition, the annual bill would fall substantially to cover only what was needed for ongoing track rehabilitation and renewal. Excluding South Africa, the Sub-Saharan network consists of about 44,000 kilometers of track, of which about 34,000 kilometers is operational. The infrastructure on this network will have a life of at least 40–50 years, given the generally low traffic volumes; the cost of periodic reconstruction (about $350,000 per kilometer) is thus equivalent to an annual cost of about $8,000 per kilometer. Few lines with an average density of fewer than 1 million net tons a year are likely to warrant this kind of major rehabilitation expenditure, because traffic would need to earn $0.08 per net tonne-kilometer to fund the reconstruction, whereas typical rail freight tariffs are no more than $0.05 per net tonne-kilometer. Lines with a density under 250,000 tons a year probably cannot support anything more than routine maintenance. Even if low-volume lines are reconstructed using cheaper, secondhand materials, this level of expenditure is unlikely to be justified for more than 20,000 kilometers of the network. Overall, the ongoing annual cost of track reconstruction would thus average approximately $100 million a year.

Sustaining an adequate fleet of rolling stock will cost an additional $80 million a year. The cost of replacing rolling stock can be estimated by using assumed average asset lives. Excluding South Africa, the Sub-Saharan network carries about 15 billion net tonne-kilometers a year, excluding the mineral lines, and about 4 billion passenger-kilometers. That level of traffic will require, on average, replacing 500 freight cars, 20 passenger cars, and about 20 locomotives a year. As with infrastructure, much of that stock will be secondhand (from India or South Africa), but the estimated cost will still average about $80 million a year, equivalent to about $0.04 per net tonne-kilometer or passenger-kilometer. The steady-state investment in the African network north of South Africa should thus be about $200 million a year (allowing $20 million for facilities, maintenance, equipment, and other costs).

That amounts to a combined annual program of about $500 million for 10 years, after which investment would drop to the steady-state level of $200 million (Bullock 2009). The $500 million a year requirement refers to the period during which the rehabilitation backlog is being cleared. These calculations are only broad order-of-magnitude estimates. However, the amount needed to overcome these problems is large, equal to the annual revenues of some of the railways and well beyond their capacity to self-finance. The only option in most cases is to seek large concessional loans or grants from third parties.

In addition to reinvestment in the current network, investment in new projects is a possibility. For years, proposals have been floated to create new routes for landlocked countries and to integrate the isolated networks. The most comprehensive proposal was the 1976 master plan of the Union of African Railways for a pan-African rail network that included 26,000 kilometers of new construction. Designed to create a grid to support intra-African trade development and regional economic integration, the plan was approved by the Organization of African Unity in 1979, but few, if any, of the proposed links have gone beyond the drawing board. The Union of African Railways is now concentrating on a revised plan containing a subset of 10 corridors, some of which are already partially constructed, and the proposal has generated a number of regional studies and action plans.

Several proposals for individual segments have been made, and mining companies have proposed a number of dedicated mineral lines.

Few of these projects will be financially or economically viable. The cost of new construction of a single-track, nonelectrified railway on relatively flat terrain is at least $1.5 million per kilometer, increasing to about $5 million in more rugged country. In many cases, the proposed new routes would compete with existing road and rail routes, which would constrain the rates that typically could be charged to at most $0.05 per net tonne-kilometer. In the case of export mineral traffic, the potential rate is generally constrained to about $0.02–$0.03 per net tonne-kilometer by the long-term delivered market price. Because a serviceable two-lane road can generally be constructed for approximately $1 million per kilometer, the additional rail investment would be economically justified only if expected traffic was at least 2 million–4 million tons a year. If the capital costs of the infrastructure do not have to be recovered, the lines can probably be operated successfully at 0.5 million–1.0 million ton.

Institutional Arrangements and Performance

Until the 1980s, almost all African railway companies were publicly owned corporations, with varying degrees of financial and management autonomy. Attempts at commercialization while retaining public ownership were generally unsuccessful, and concessions were introduced in the 1990s. Under concessional arrangements, the state remains the owner of all or some of the existing assets, typically the infrastructure, and transfers the other assets (normally the rolling stock) and the responsibility to operate and maintain the railway to a concessionaire.

Most countries in Central, East, and West Africa have moved all or part of the way to concessioning, often under the pressure of multilateral and bilateral organizations that have until recently been the only source of large loans for asset rehabilitation and renewal. With the exception of southern Africa (Botswana, Namibia, South Africa, and Swaziland) and countries suffering or recovering from civil disruption (Angola, the Democratic Republic of Congo, and Zimbabwe), most countries are at various stages of reform. Of the 30 African countries with publicly owned railways, 14 have opted for a concession arrangement and 1 operates under a management contract (figure 11.5). Four others have begun the process.

Concessions—Becoming the Norm

The introduction of concessions has required substantial changes in the legal and regulatory framework in many countries. In the francophone countries, concessions can generally be done within the existing legal system, but most anglophone countries have had to amend their railway acts. Arrangements have also been made for the economic and safety regulation of concessions, and new government bodies have been established to own the assets leased to the concessionaires.

Those railways that have not been concessioned remain subject to significant political and governmental influence. Arrangements vary across countries, but the sectoral ministry (normally transport) exercises political and administrative control, while the ministry of finance exercises financial control. Board directors are generally a combination of ministry officials and internal senior management, who are often appointed by the government. Oversight is nominally assigned to the parliament, but in practice such control may be limited to an audit of the company accounts in its annual report (often several years in arrears). Although the governing regulatory frameworks nominally provide financial and management autonomy, in practice this arrangement is considerably limited by the many opportunities for state intervention permitted under the legal and regulatory frameworks at both the institutional and jurisdictional levels. This conflict between the control and decision functions, as well as frequent reviews by political authorities of initiatives taken by the government's authorized representatives in the corporation, discourages management initiative and effectiveness.

The first railways to be concessioned were in West Africa, beginning in 1995 with the Sitarail concession linking Burkina Faso and Côte d'Ivoire and followed in the late 1990s by

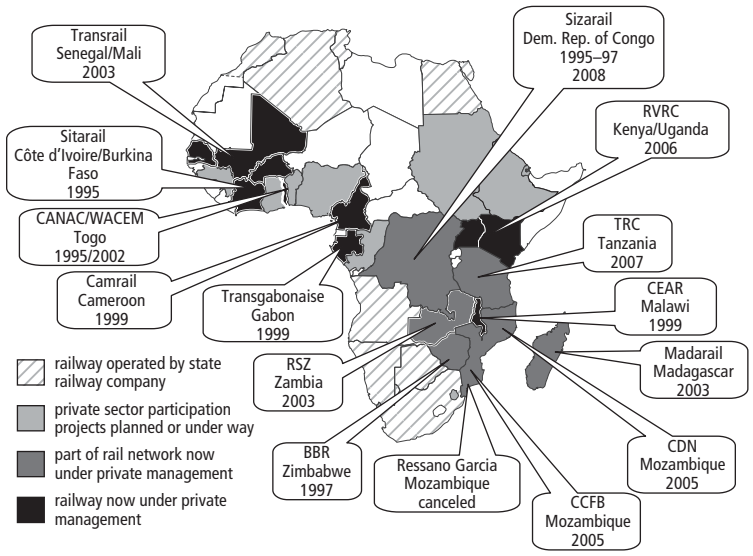
Cameroon, Gabon, and Malawi. The reform momentum accelerated in the 2000s, but implementation has often been a slow process, typically taking three to five years, sometimes much longer.

Most African networks leave little room for competition, and few governments have seriously considered the European model of full vertical separation. However, third-party operators run on government lines in Kenya and Senegal, and a through freight service has operated for some years from South Africa to Tanzania. Concessions do not always include the entire network, with lightly used branch lines sometimes excluded.

The initial duration of concessions varies from 15 to 30 years, and the concessionaire is free to operate its activity as a business, with freight tariffs generally determined by supply and demand, and passenger fares subject to some form of indexation. Formal regulatory structures with real teeth are rare in Africa, and many rail concessions are potentially open to market abuse, even though concession agreements generally include some protection, at least on paper. For example, the Zambian rail concessionaire flagrantly price-discriminates by charging freight tariffs of $2.00 per tonne-kilometer on transit traffic from the Democratic Republic of Congo to Dar es Salaam, Tanzania, while charging only $0.05 per tonne-kilometer on other freight. The reason is to divert the Democratic Republic of Congo traffic southward toward the port of Durban in South Africa and over the Beit Bridge, which the same concessionaire operates. As a result, most of the Democratic Republic of Congo's copper exports end up going to Durban by road.

A number of consumer protection devices exist, but they are rarely invoked. The two most common protections are (a) the power to refer rail tariffs to either the government or an independent authority and (b) the power to allow third-party operators onto the railway to compete with the concessionaire. Where a concessionaire fails to comply with the terms of the concession, whether by design or by force of circumstance, procedures exist for terminating the concession. These procedures have rarely been applied. Only one or two concessions have been terminated (for example, Ressano Garcia in Mozambique), and two concessions (Transrail and Rift Valley) changed the operator.

Figure 11.5 Private Participation in African Railways since 1990



Source: Bullock 2009.
Note: BBR = Beitbridge Bulawayo Railway; CANAC/WACEM = CANAC Railway Services Inc./West African Cement; CCFB = Companhia dos Caminhos de Ferro da Beira; CDN = Corredor de Desenvolvimento do Norte; CEAR = Central East African Railways Corporation; RSZ = Railway Systems of Zambia Ltd; RVRC = Rift Valley Rail Corporation; TRC = Tanzania Railways Corporation.

Rail concessions in Africa have attracted a limited pool of mostly foreign private operators. These operators fall into two distinct groups: (a) those seeking vertical integration of the distribution chain by acquiring dominant positions in specific production and transport sectors, and (b) those specializing in a single transport activity (such as railways or ports). The business cases for these rail investments often appear weak, however, suggesting that the companies that seek these concessions focus on the financial benefits that can be extracted from managing large investment plans (financed for the most part by governments) rather than concentrating on business cash flows.

Private companies are the majority shareholders in all concessions to date. State participation is highest in Mozambique, which holds 49 percent of both CCFB (Companhia dos Caminhos de Ferro da Beira–Mozambique) and CDN (Corredor de Desenvolvimento do

Norte–Mozambique) and is also a significant shareholder in the adjacent CEAR concession. In Madagascar, the government holds 25 percent of Madarail, while governments own 10–20 percent in Abidjan-Ouagadougou Railway (Sitarail), Dakar-Bamako Railway (Transrail), and Cameroon Railway Corporation (Camrail). Local private participation in concessions has generally been relatively low and is often fraught with problems during the bidding process. Employee shareholding remains under 5 percent where it exists at all.

Operational Performance—Concessioning Helps

Both labor productivity and asset productivity (locomotive and railcar use) are low in most African networks, compared with railways elsewhere, because of the poor condition of the infrastructure and rolling stock, low traffic levels, and government ownership. Under concessions, however, these indicators have improved sharply, partly because of growth in traffic but mostly from major reductions in the workforce.

Since about 1990, almost all railway companies have streamlined their workforces. This measure has often been the prelude to concessioning, but in some cases, it has also been a general policy to improve efficiency. Still, labor productivity on most African systems is relatively low by world standards, with few railways achieving over 500,000 traffic units per staff a year, compared with an average 3.3 million traffic units per staff a year for the South African operator Spoornet (figure 11.6). This low productivity not only reflects the continuing use of labor-intensive methods with relatively little outsourcing, but it is also the consequence of a decline in traffic without adjustments to staff levels. With low wages, the direct financial impact is not always catastrophic, but having a large number of underemployed staff members corrodes morale and is a strong disincentive for those who wish to improve efficiency. An important effect is that railways have difficulty recruiting and retaining technically competent staff or introducing the technology required to improve service levels, for which a better-paid and more skilled workforce is essential. Asset productivity is similarly low, with the source generally being low availability caused by a lack of spare parts.

Labor and asset productivity have improved steadily in most concessions, typically doubling because of workforce reductions either before or at the time of concessioning, the scrapping of obsolete rolling stock, and increased traffic volumes (figure 11.7).

Safety is also an important aspect of operational performance. Rail travel is still safer than road travel, but rail's record in Africa is much worse than that of comparable railways elsewhere, caused by obsolete track infrastructure, poorly maintained rolling stock, and lack of operational discipline. As with productivity, however, safety has generally improved following concessioning.

Financial Performance—Generally Unsustainable

Most state-owned railways in Africa just about break even cashwise after receiving government support. Often, this balance occurs only because a significant amount of maintenance has been deferred; when the maintenance backlog becomes too great, it is typically addressed by a loan that is treated as investment. The two companies that have been concessioned the longest (Camrail and Sitarail) make modest operating profits. The performance of RSZ (Railway Systems of Zambia) is unknown, and the cases of Kenya and Tanzania are too early to judge.

Passenger services generally do not contribute significantly to the cost of maintaining infrastructure or to covering corporate overhead. In a few cases, they cover their marginal costs (train crew, rolling-stock maintenance, fuel or traction electricity, and passenger-handling costs). Passenger tariffs on many railways are essentially regulated, often within a framework that includes only a subset of total costs. However, many of the poorer performing systems in Africa would be unable to cover above-rail working expenses on a systemwide level even if they could set their own tariffs.

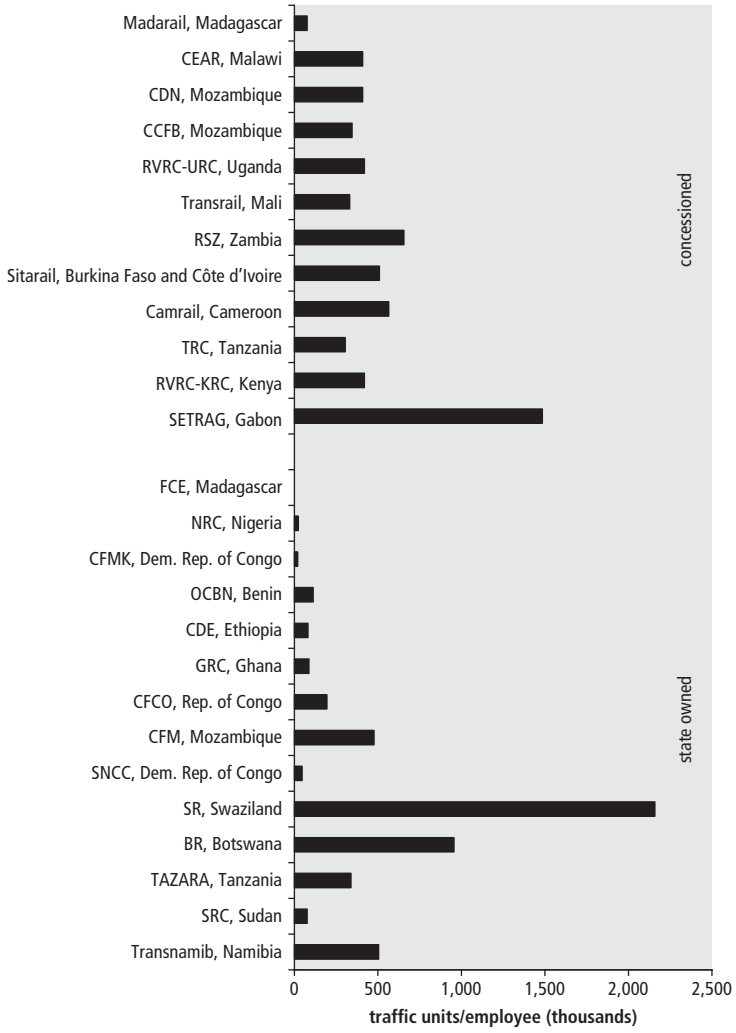
Freight services normally cover their avoidable operating costs. Some also earn enough to cover infrastructure costs and even capital

costs for rolling stock. Earnings are a function of the tariff rate and the average carload on the revenue side, and factors such as train size, commercial speed, and rolling-stock use and availability on the cost side. In general, freight can earn enough to make operating services worthwhile, but only in some cases can it fund replacement of rolling stock, and very rarely can it earn enough to finance infrastructure renewal.

Where railways have been concessioned, low-interest sovereign loans to concessionaires have usually made a substantial contribution to the financing of investments. Concessionaires provide a relatively low proportion of the equity. Most plan to finance over 80 percent of their investment with debt, and the share of the privately financed investments is in many cases well below 50 percent. Concessions that planned a substantial contribution from commercial borrowing have faced consistent criticism for their lack of investment in practice. Because the value of the rolling stock transferred to the concessionaire more than compensates for the equity put into the concessions in most cases, the result is a significant transfer of the financial risks associated with infrastructure investment from the private sector to the public sector. The business fundamentals of many concessions are insufficient to support major investment on a commercial basis, and they are all too prone to significant liquidity problems. Major asset maintenance and reinvestment are thus likely to be problems.

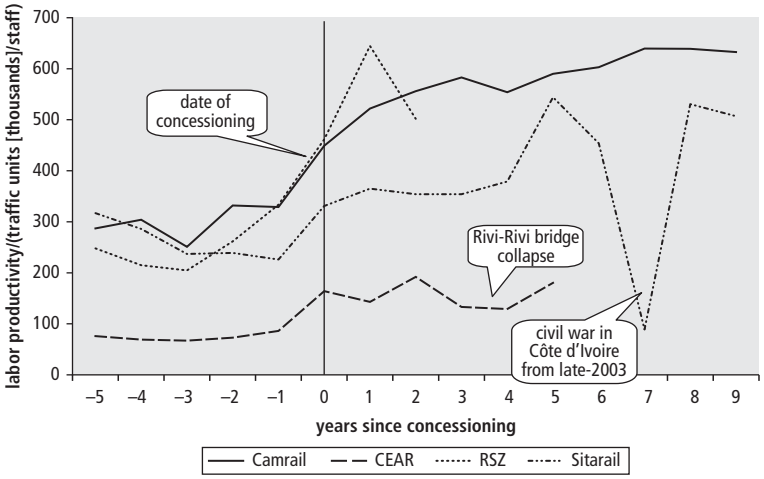
Concessions normally pay the government concession fees as well as a series of taxes (for example, value added tax, personnel social taxes, income tax), often of the same order of magnitude. Given the relative size of taxes (largely income tax) and concession fees, governments should consider the combined effect of both revenue streams when negotiating a concession. Regardless of the mix of fees and taxes and of any promises made during the bidding process, a concessioned railway's strategy will always be constrained by the business fundamentals of the proposed railway privatization deal. A concessionaire will be able to bear only a finite level of charges, whether they are concession fees, borrowing costs, or rolling-stock acquisition costs, and concessions with high levels of both debt and concession fees will be prime candidates for renegotiation.

Figure 11.6 Labor Productivity on African Rail Systems



Source: Bullock 2009.
Note: Common averages have been used for Kenya and Uganda, which are included in a single concession, and for Nacala (Mozambique) and Malawi, which share common resources.
The overall traffic units carried by a railway are the sum of the passenger-kilometers and the net tonne-kilometers of freight carried. This simple standard measure is widely used as a means of aggregating freight and passenger traffic. The relative weighting of passenger and freight is conventionally taken as 1:1. BR = Botswana Railways; Camrail = Cameroon Railway Corporation; CCFB = Companhia dos Caminhos de Ferro da Beira (Mozambique); CDE = Chemin de Fer Djibouto-Ethiopien; CDN = Corredor de Desenvolvimento do Norte (Mozambique); CEAR = Central East African Railways Corporation (Malawi); CFCO = Chemin de Fer Congo-Océan (Republic of Congo); CFMK = Chemin de Fer Matadi-Kinshasa (Democratic Republic of Congo); CFM = Caminhos de Ferro do Mocambique; FCE = Fianarantsoa Côte Est (Madagascar); GRC = Ghana Railways Corporation; NRC = Nigeria Railways Corporation; OCBN = Organisation Commune Bénin-Niger; RSZ = Railway Systems of Zambia Ltd; RVRC-KRC = Rift Valley Rail Corporation-Kenya Railways Corporation; RVRC-URC = Rift Valley Rail Corporation-Uganda Railways Corporation; SETRAG = Société Transgabonnaise (Gabon); SNCC = Société Nationale des Chemins de Fer du Congo (Democratic Republic of Congo); SR = Swaziland Railways; SRC = Sudan Railways Corporation; TAZARA = Tanzania-Zambia Railway; TRC = Tanzania Railways Corporation.

Figure 11.7 Rail Concession Labor Productivity



Source: Bullock 2009.
Note: The overall traffic units carried by a railway are the sum of the passenger-kilometers and the net tonne-kilometers of freight carried. This simple standard measure is widely used as a means of aggregating freight and passenger traffic. The relative weighting of passenger and freight is conventionally taken as 1:1. Rivi-Rivi bridge refers to the Rivi-Rivi River bridge in Balaka, Malawi. Camrail = Cameroon Railway Corporation; CEAR = Central East African Railways Corporation (Malawi); RSZ = Railway Systems of Zambia Ltd; Sitarail = railway operator for Burkina Faso and Côte d'Ivoire.

The Verdict on Concessions—Generally Beneficial but Not the Full Answer

Since 1992, there have been 16 rail concessions in Africa. Two of the 16 have been canceled, 1 has been badly affected by war, and 1 has suffered from natural disasters and procedural delays. Six have operated for five years or more but only 2 of those without a significant dislocation of some sort.[3]

Except for the railways immediately adjacent to South Africa, those that have not been concessioned have deteriorated continuously since the mid-1990s. In a number of cases, these declines will prove to be terminal. Many governments in Africa will consider concessions only as a last-ditch solution, but in many cases, the railways have been left to deteriorate for too long, and rectifying the situation will be a struggle.

The concessions have not been without their problems. In many cases, finding more than a few bidders has been difficult, and in several cases, bidders' financial resources have been insufficient to finance the major investments required. As a result, the state has had to guarantee investments; even then, mobilizing the financing has been slow. Concessionaires have generally been unenthusiastic about running passenger services, which do not generate the same revenues as freight; this situation has not been helped by delays and disputes about the payment of government compensation for unprofitable services. Further problems have arisen over the level of concession fees, the length of the concession, and arrangements for redundant staff. In some cases, these issues have led to renegotiation of the concession contract.

Despite these vicissitudes, the results to date are encouraging. Even if not all expectations have been met, most of the concessioned railways have improved their traffic levels and their productivity and are providing better service to users, albeit after a solid injection of investment by donors and international financial institutions. Arguably, some of this improvement might have occurred anyway. In addition, responsibility for the ongoing rehabilitation and maintenance of track is rapidly emerging as a key issue between concessionaires and governments. A key government objective in many railway concessions is to obtain finance (whether private or through international financial institutions) to rehabilitate track infrastructure. For most private operators, however, track rehabilitation, especially track renewal, is a major expense that drains available funds, but it is also one that can be easily deferred.

The greatest effect of concessionaires has been improved operations. Given the weak investment and regulatory climate in many African countries, investment flows have been limited. Under concessioning, operations have been positive, and efficiency has clearly improved. Labor productivity has increased steadily in all the concessions in operation for over five years, and similar figures will likely come from recent concessions. Asset productivity has also generally increased. Although concessionaires in Africa typically have a more appropriate cost structure than their predecessors, it is rarely the ideal cost structure. Operating costs on railways are a function of capital invested, as well as operating efficiency, and many African railways have been starved of capital, substantially increasing overall operating costs.

Allocative efficiency is difficult to measure directly, but the evidence is generally positive.

Improved productivity, an active search for new traffic by concessionaires, and better internal business practices have all improved railway cost and pricing structures and lifted the level of service, thus helping attract traffic to the mode that can carry it most efficiently and improve intermodal competition.

Most concessionaires have fulfilled the passenger service requirements in their concession agreements, even where it has been operationally difficult or where agreed public service obligation payments have not been forthcoming. Many of these services were inherited, and passenger service would often be more economical with a road-based system.

A recent review of four concessions found little evidence of monopolistic behavior by concessionaires (Pozzo di Borgo and others 2006; World Bank 2006). This review examined freight rates and whether services were being reduced so resources could be redeployed to favored users, beyond changes in services that any commercialized railway undertakes in response to changing traffic patterns. Few concessions are immune from road competition, except in the few cases where roads still must be constructed or where heavy mineral movements occur. No evidence exists that personal travel has been made more expensive for the poor.

The greatest disappointment for governments has been the lack of infrastructure funding from sources other than international financial institutions. Concession agreements clearly put the responsibility of financing track maintenance and renewal on private operators. Likewise, rolling-stock financing has been left to concessionaires under their contracts. However, most concessionaires initially rely on loans from international institutions, with below-market borrowing costs, lengthy loan terms, and grace periods to finance infrastructure. (The exceptions are the Beitbridge Railway [Zimbabwe to South Africa], which relies on take-or-pay clauses that guarantee minimum revenues; the Nacala Railway in Mozambique, which is being funded at semicommercial rates; and Zambia and the Rift Valley Railways [covering Kenya and Uganda], where the investment program is modest and is funded directly by the concessionaire.) Loans have been provided for rolling stock in some cases, but for many of the low-volume operators, the sensible choice is to find secondhand equipment. Much of the investment to date has been for maintenance and renewal backlogs, without which the railway often would not function, and can be characterized as one-time investment to get the systems running. Even that investment has been slow, more than four years in Cameroon and five years on the Nacala line—a long time to wait when a business is barely breaking even.

Are concessions a long-term answer? Or are they merely quick fixes that are living off investment by third parties and will prove unsustainable in the long term? What more must be done to ensure a sustainable sector? Many of the answers to those questions must come from governments.

Key Issues for Governments

Classic concession schemes[4] in Africa are unlikely to be financially attractive to bidders other than those who can secure financial benefits not directly linked to the railway operations.[5] Consequently, unless the structure of African rail concessions changes or the market environment in which they operate alters favorably, private operators will continue to show limited interest in African railway concessions. Two key areas need to be addressed: the financing of passenger services and major track renewals and rehabilitation, both requiring substantial public funding in most concessions. If this funding is provided, governments will also need to strengthen their regulatory capacity to ensure that the conditions are met and that the effect on the rail sector in general, and concessionaires in particular, is properly considered when policies in other sectors of the economy are developed.

Passenger Services

If governments want the concessionaire to operate passenger services, they should make clear compensation arrangements that can be monitored. Few passenger train services will likely cover even their above-rail costs. Their financial contribution to infrastructure costs is minimal, and few services would justify investment in rolling stock, whether hauled by

locomotive or self-propelled. If these services are to operate for more than the initial years of a concession, governments need to develop a simple compensation scheme with timely payments. Any scheme should enable the concessionaire to keep all the revenue, which will encourage maximum operation, and should include a public contribution, possibly per carriage-kilometer, toward the cost of running unprofitable passenger services. The scheme should be easily audited and should be reviewed periodically, perhaps every five years.

If such schemes are not introduced, passenger services will be a constant source of conflict between the government and the operator. Moreover, the issue will divert the focus of the concessionaire from the freight services, where improvement is far more important economically for the country.

Capacity or Willingness of Private Operators to Finance Track Renewal

Few, if any, concessions are generating significant profits for their operators and certainly not enough to fund long-term renewals. Although most concessionaires pay fees into general government revenue, none can afford to do so and accrue funds for future renewals at the same time. Whether a purely privately financed rail concession model is sustainable in much of Africa remains doubtful. Track structures have (or should have) lives of several decades, given the traffic volumes typically carried on an African railway. On a small system, track renewal is needed somewhere on the network only about every 20 years. It is almost always possible to defer renewals for several years, albeit at the cost of deteriorating track conditions and reduced operating speeds. For any concessionaire who is uncertain about the future, the safest decision is to do as little track renewal as possible.

Even if they do want to renew track, private operators will often struggle to generate sufficient cash flow for it. Few concessions are strong financially. If a government makes the level of the concession fee or rolling-stock purchase price the ultimate measure of a successful deal, it will limit the successful bidder's ability to renew infrastructure. Even if an operator has sufficient cash, on a small network when the expenditure may not occur for 5 or 10 years, a concessionaire is unlikely to reserve funds annually and hold them in reserve that long. Furthermore, raising debt financing for rail repair will generally be possible only through a general corporate loan, which is almost impossible for a small standalone railway.

Profits to the concessionaire need to be boosted, or supplementary funding sources need to be developed, or both. Today, African railway concessions offer two models for financing infrastructure. In the first, governments finance initial track rehabilitation and renewal costs, generally by securing loans from international financial institutions. These loans are then made to private operators and tend to cover only the initial five-year investment plan in the hope that they will propel each concessionaire's traffic to a level that will then enable it to self-finance future track investments. This approach is commonly used for railways with a high ratio of initial track investment compared with revenues and that are thus unlikely to be able to mobilize sufficient private financing. In the second model, governments do not finance initial track renewal but commit to compensating concessionaires for their investment by the end of the concession (for example, Kenya, Uganda, and Zambia railways). In such cases, the initial amount to be invested is relatively small in relation to expected revenues, and private operators are assumed to be able to secure private financing on the merits of their business case. Under both models, governments usually agree to purchase at the end of their concessions the nonamortized portion of any infrastructure investment concessionaires have financed. However, the ability of many governments to make such a payment is uncertain, which often affects infrastructure investment in the later stages of a concession, although a partial risk guarantee can strengthen the government's reimbursement commitment.

Three conditions must be met to secure privately financed track investment: (a) governments ensure that the concession (and thus the proposed track investment) is financially sound, (b) the nonamortized value of the assets owed to the concessionaire at the end

of the concession period remains reasonable, and (c) the concession agreement allows for a possible extension of the concession period.

Often, however, governments will still need to assist. Notwithstanding the likely improvements in efficiency from concessioning, many agreements will probably fail the first hurdle of financial soundness. If the government still wishes to pursue a concession because of the benefits of rail transport, it will need to contribute grant funds regularly. One option is to partially finance infrastructure renewal independently of the concessionaire through a land transport renewal fund, which could be an extension of a road fund, created as a common pool of funds by both the road and rail sectors. For example, concession payments could be paid into the fund rather than into general revenue. A rationale for this option can be developed from the external costs avoided by the carriage of passengers and freight by road rather than rail.

Effective and Efficient Regulation of Private Rail Operators

In practice, many concessions ignore many or all of their reporting obligations under the concession agreements. In some cases, this situation obtains because of operator intransigence, in others because of a lack of expertise or initiative. Not surprisingly, both politicians and bureaucracies are often ill informed about the problems facing a concessionaire and the remedies being attempted. Most concessions have a long list of requirements for the concessionaire to meet, and allowing reporting to be ignored inevitably creates plenty of scope for later disputes. Regulatory bodies must strengthen their capacity and impose annual independent financial and operational audits as part of concession contracts. One solution for funding the regulatory bodies is to use the concession fees, but funding from a land transport fund, if one can be established, may be preferable.

Consistent Government Behavior toward Railway Concessionaires Aligned with Good Business Practice

Uncoordinated actions from ministries within governments have negatively affected the performance of a number of concessions. Examples range from administratively imposed salary levels to restrictions on access to container facilities and unfunded public service requirements. Most of these actions could be avoided by establishing a properly staffed and funded oversight body (the concession counterparty is generally the obvious choice for this). A government should ensure that such a body has the necessary political and technical powers to coordinate and control government actions toward private rail operators. In practice, that means the agency should meet regularly to discuss pending issues with the concessionaire. The oversight body should include, or have ready access to, a railway technical expert and a railway financial expert, and someone should head it whose sole responsibility is to monitor the railway concession and who reports directly to the transport and finance ministers at least.

Consistent Government Approach to Infrastructure Cost Recovery

Governments should also develop a coherent and realistic policy regarding infrastructure cost recovery. The road sector has an articulate and organized lobby. Advocates for government railways, where they exist, have generally been ineffectual and poorly prepared, although concessionaires are generally able to make aggressive representations. The lower the road costs are and the greater the degree of overloading permitted, the lower the freight rates by both road and rail will be—and less money will be available from a concessionaire to maintain and upgrade the railway infrastructure.

Road competition is strongest in southern Africa, which has the most liberal market structure, the largest trucks, and the best roads. In addition, the level of road user charges and the prevalence of overloading heavily affect rail. Requiring rail to fund all its long-term maintenance and upgrades, while tolerating road cost underrecovery and overloading on arterial routes, may help government budgets in the short run, but it is an almost impossible handicap for most general freight railways to overcome.

The Way Ahead

A wide gap often exists in the minds of government officials between their expectations of what concessioning can achieve and what actually happens after they award the concession. Service volumes on most African railways are low, often about that of a moderately busy branch line in many countries. These low volumes can commercially justify no more than the minimum infrastructure maintenance, which allows operation at a speed of 40–60 kilometers per hour. That speed does not permit an attractive passenger service except where no practical alternative exists—an increasingly rare situation. Governments that are unprepared to invest substantial sums of their own funds in upgrading and maintaining infrastructure should therefore expect only a "fit for purpose" freight railway operating at moderate speeds but doing so reliably and safely. This type of railway can be operated successfully under concession at typical African traffic densities. If traffic volumes are very low (250,000 tons a year or less) or if a high standard of passenger service is expected, continuing financial support from the government will be necessary.

After a concession is awarded, the government must monitor concessionaire behavior and ensure that the government's interests are fulfilled. Most important, a government must ensure that the infrastructure does not deteriorate over the life of the concession, as is often the case. Deterioration generally occurs when concessionaires have short- or medium-term financial objectives that do not align with the longer-term economic objectives of the government. A concession agreement should try to reconcile these two objectives as much as possible, and compliance should then be monitored regularly.

Despite these problems, well-run railways should still offer the most economical solution to transporting general freight that is not time sensitive in major corridors for distances over 500–800 kilometers and bulk commodities over shorter distances. The revival of a railway through concessioning is warranted when the business fundamentals supporting it are sound. At the same time, better solutions must be devised to ensure that while governments continue to reap the substantial potential economic benefits of concessions, private operators' financial returns are high enough to attract broad and competitive investor participation.

Notes

The authors of this chapter are Dick Bullock and Kenneth Gwilliam, who drew on background material and contributions from Pierre Pozzo di Borgo.

1. Spatial density is measured in route-kilometers per 1,000 square kilometers.
2. Traffic density is expressed as traffic units per route-kilometer. The traffic units carried by a railway are the sum of the passenger-kilometers and the net tonne-kilometers of freight carried. It is a simple standard measure that is widely used, although it has some limitations as an indicator (for example, a first-class passenger-kilometer in a commercial high-speed TGV train is treated identically with a passenger-kilometer in a crowded suburban train). The relative weighting of passenger and freight is conventionally taken as 1:1, although alternative weightings have been used on some railways from time to time, usually trying to reflect relative costs.
3. For more detailed discussions, see Bullock 2005.
4. Classic concession schemes require the private operator to take on a significant debt burden in relation to revenues.
5. That is, by controlling the entire distribution chain or through the supply of rail equipment and services.

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