

## Preventing Premature Deindustrialization in Sub-Saharan Africa: The Importance of the Road Transportation Sector

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### Abstract

Since independence in the early 1960s the countries of sub-Saharan Africa have generally viewed industrialization as an essential ingredient of economic development. Indeed, most of the world's advanced nations are often grouped as the "industrial economies" and the progression from agriculture-based economies to manufacturing and service-based ones has been seen as key to development strategy. However, there is a growing literature that suggest that this path is no longer one that can necessarily be followed. Indeed, there is strong evidence that for many countries deindustrialization is actually the problem.

Infrastructure will need to play an even great role if the region is to successfully industrialize and meet its development targets. Of course roads form only a part of transportation infrastructure in African countries --albeit the most important part, as road transport accounts for 85% of the region's passenger and freight and is the only form of access to most rural communities where 65% of the population live.

For the region to develop it must continue on its path of economic and political reform, but at the same time it must look at improving its basic infrastructure, especially good roads and find new means for increased mobility for the majority. Improved road infrastructure is vital if Africa is to escape the scourge of deindustrialization. This paper examines the phenomenon of deindustrialization and see how improved road transport might roll back that decline.

**Key words:** sub Saharan Africa deindustrialization; economic development; transportation; industrialization

### INTRODUCTION

*"Industry is the means by which rapid improvement in Africa's living standards is possible."*

-- Kwame Nkrumah, President of Ghana, 1965

*"Africa is not only under industrialized, but it has been de-industrializing."*

-- Haram Acyl, Commissioner for Trade and Industry, African Union Commission, 2014.

*"It is easier to move goods from African countries to Europe and the rest of the world than to trade between one African country and another."*

-- Goodluck Jonathan, President of Nigeria, 2014.

Since independence in the early 1960s the countries of sub-Saharan Africa have generally viewed industrialization as an essential ingredient of economic development (For this paper the terms industry and industrialization refers to firms which produce value added activities including light and heavy manufacturing, agro-processing, tradable services and information technology. Also, Africa and sub-Saharan Africa will be used interchangeably). Indeed, most of the world's advanced nations are often grouped as the "industrial economies" and the progression from agriculture-based economies to manufacturing and service-based ones has

been seen as key to development strategy (Rostow 1962, UNECA 2011, UNIDO 2009). However, there is a growing literature that suggest that this path is no longer one that can necessarily be followed. Indeed, there is some evidence that for many countries, deindustrialization is actually the problem (Rodrik 2014, 2013).

Sub-Saharan Africa has had impressive and unprecedented economic growth during the past several years. For example, in 2012 some 80 percent of African countries recorded GDP growth rates that exceeded the world average (ECA/AU 2013, World Bank 2013, Sparks 2014). Additionally, 16 countries in the region were among the top 30 highest growers worldwide. However, this growth is driven in large by a resources commodity boom and the region remains vulnerable to external shocks, nor has the GDP growth translated into significant job creation nor poverty reduction.

Industrialization is certainly one component of a growth strategy. However, Africa faces a number of problems that constrain industrialization, including: access to financing, perceived and actual risks, a technological and education gap, and cross border logjams. Growth also is hampered by poor infrastructure, especially roads (Bryceson et al, 2008, Foster 2010, Naude and Matthee 2007, Teraininthon and Raballand 2008, World Bank 1988). Indeed, the 2010-2015 AU/NEPAD African Action Plan clearly states that, "... transportation infrastructure is among the main bottlenecks to productive growth and development in Africa" (AU 2009).

Infrastructure will need to play an even great role if the region is to successfully industrialize and meet its development targets. Of course roads form only a part of transportation infrastructure in African countries --albeit the most important part, as road transport accounts for 85% of the region's passenger and freight and is the only form of access to most rural communities where 65% of the population live. Other components include ports, rail and airports and other sectors lay outside the scope of this paper.

Roads have been considered as an integral component to economic growth and for reducing poverty for decades (Chambers 1983, 1997, Minot et al 2003). An integrated and well-maintained road system is vital for a country's industries to take root and for economic growth and development. However, over half of the roads in sub-Saharan Africa are in very poor condition and in many countries the road network is woefully inadequate. For example, the Democratic Republic of the Congo, with an area one quarter the size of the United States, has just 1,736 miles of paved roads, slightly more than in the District of Columbia (with 1,500 miles). Even in countries where the road network is good, for example in South Africa, recent budgetary constraints have delayed much-needed maintenance and expansion. Poor transportation touches all facets of African life, from commerce, to health care to schooling. This paper will examine the phenomenon of deindustrialization and see how improved road transport might roll back that decline.

### **DEINDUSTRIALIZATION**

The African Union (and others) have long supported an African industrialization strategy (UNIDO 2006, UNECA/AU 2013). In 2008 the AU Assembly endorsed the Action Plan for Accelerated Industrial Development of Africa (AIDA) and subsequently adopted a strategy for its implementation (AU 2009). That report states clearly that, "No country or region in the world has achieved prosperity and a decent socio-economic life for its citizens without the development of a robust industrial sector." Indeed, as mentioned above, history is full of examples where resource-rich countries (Sweden, the US, Norway) have been successful in

fostering productivity and growth. However, “The problem is that Africa today faces a very different global and regional environment from that faced by earlier developing country entrants into industrial development” (UNECA 2013).

Many sub-Saharan African countries promoted rapid industrialization at their respective dates of independence. To achieve these objective they generally employed the import substitution industrialization (ISI) model, with protecting domestic industry form foreign competition as essential for success. However, the new governments had neither the institutional nor physical infrastructure resources necessary to achieve success. Further, as scarce resources were channeled into infant industries, agriculture was neglected.

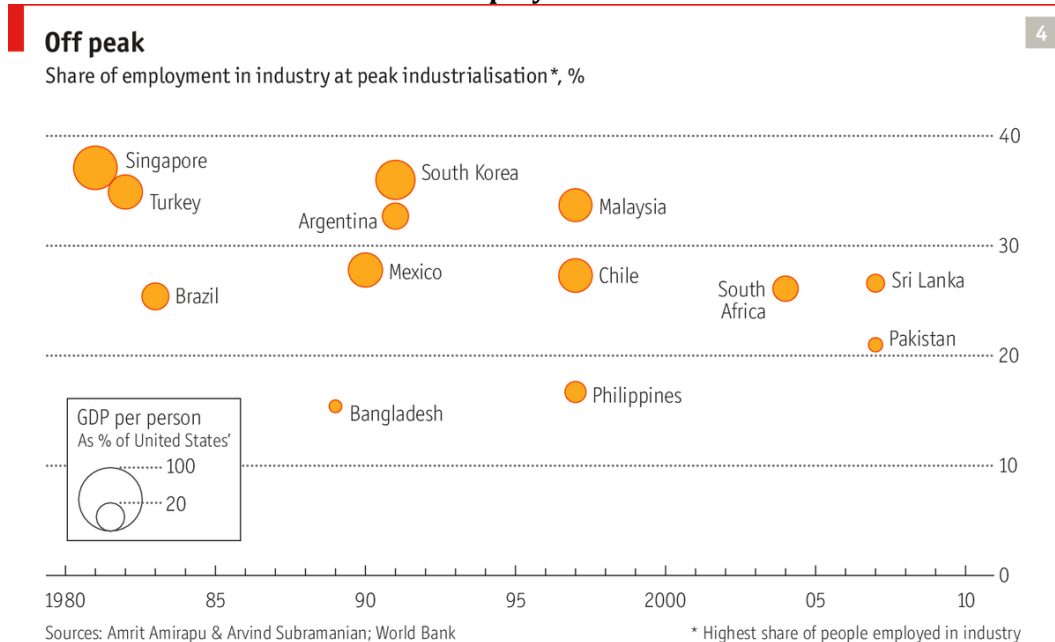
By the 1980s most counties had given up in the ISI strategy and adopted the Washington Consensus of Structural Adjustment stressing export-led growth (Sparks 2014). Since 1980 industry in Africa has declined both as a share of global output and trade (Page 2011, UNIDO 2009). Indeed, from 1980 to 2009 the share of manufacturing’s value-added to GDP declined from 16.6% to 12.7%, and, while other regions have increased their shares of manufactured exports, sub-Saharan Africa still exports raw materials to the industrialized world (including China) where they are processed and sold back at much higher prices (UNECA 2013).

Governments across the emerging world have visions of repeating the industrial West’s and now China’s success. However, the IT transformation now under way may be changing the economics of development. Much of the emerging world is facing a problem now known as “premature deindustrialization” (Rodrik 2014, Bigsten and Soderbom 2011, Amirapu and Subramanian (2014).

The Asian Tigers (and others) gradually moved from low-margin, labor-intensive goods such as clothing and toys to electronics assembly, then on to light manufacturing and, finally (and rapidly) into advanced manufacturing and design. After manufacturing became mature, that sector was overtake by services. For example in Britain manufacturing’s share of employment peaked at 45% prior to WWI and fell to around 30% in the 1970s to less than 10% today. A few developing markets have been able to follow this pattern: Korea’s manufacturing share of employment peaked at 28% in 1989 and has fallen since (Lawrence and Edwards 2013). Importantly, When the US and Germany began to deindustrialize, they had per capita incomes of \$11,000 (in 1990 dollars). In the developing world, however, manufacturing began to decrease while per capita incomes have been at much smaller levels (Brazil at \$5,000, China at \$3,000 and India at \$2,000) (Rodrik 2013). The level of income per person at which reliance on manufacturing peaks has also declined steadily (see table 1, below). When South Korea reached that point in 1988, its workers’ earnings were on average barely over \$10,000) per person. Thus the perceived problem is that manufacturing (and related activities) as a share of employment will peak (“prematurely”) before the country has had a chance to reap the benefits of manufacturing’s contribution to a diversified economy.

Nonetheless, in these examples the export success filtered out into the wider economy. As noted by one observer, “an industrialising export sector is like a speedboat that pulls the rest of the economy out of poverty” (Economist 2014). For much of modern economic history the driving force behind globalization was the falling cost of transport. However, since the 1980s cheap and powerful ICT has played a bigger role, allowing firms to co-ordinate production across great distances and national borders.

**Table 1. Share of Industrial Employment at Peak of Industrialization**



There has also been a shift in trade patterns due to rising incomes and tastes. As income rise, people spend a larger share of their income on services such as health care, education and telecommunications and this shift is reflected in trade. Manufactured goods accounted for 80% of world exports in 2008 (the most recent figure available), down only slightly from 83% in 1980 (Subramanian and Kessler 2013). Measured in value-added terms, however, the importance of goods trade declined from 71% of world exports in 1980 to only 57% in 2008, because of the increasing weight of services in the production of traded goods. In addition, manufacturing assembly accounts for a declining share of the value of finished goods. The region’s share of world exports have declined from around 3% to around 2% over the past three decades. Other advances are eliminating the need for human: the falling cost of automation makes the use of robots attractive even in India, where cities are swarming with underemployed young workers.

The rapid growth in emerging economies over the past 15 years was good for many very poor African countries, but most still they grew more slowly than richer developing countries in Asia and South America. Given the severe constraints to development, even very low wages may be insufficient to attract much manufacturing. Thus the dilemma: Africa’s population will roughly triple over the next half-century, to about 2.7 billion. A development strategy (like industrialization) that relies extensively on rapidly rising incomes which are limited to a highly skilled few is unlikely to be sustainable. Can Africa escape de-industrialization? An important part of the answer lies in transportation.

**THE IMPORTANCE OF ROAD TRANSPORTATION IN COMBATting DE-INDUSTRIALIZATION**

As discussed above, for industry to grow it needs infrastructure, especially roads (AU 2009). Road conditions have improved in most African countries in recent years, as governments have strived to increase the density of their road networks and carry out institutional reforms. Tremendous progress has been made in establishing institutions to manage and maintain Africa’s roads, for example, but still only one in three rural Africans has access to an all-season road. Unable to reach urban markets, millions are trapped in subsistence agriculture. In cities,

road construction has not kept pace with urbanization. In many countries, road maintenance remains inadequate. Even the Trans-African Highway, the symbol of modern Africa, has long gaps.

Thus, despite such progress, sub Saharan Africa lags behind the rest of the world's regions in infrastructure coverage, and the differences are particularly wide for paved roads, and this "deficit" is likely to widen. It is important to note that most of sub-Saharan Africa started out with road stocks not dissimilar to those found in South or East Asia in the 1960s (African Development Bank 2003, Foster and Briceno 2010).

The region has approximately 1,052,000 km of classified road network, another 492,000 km of unclassified roads and about 193,000 km of urban roads for a total of 1.75 m km, according to the World Bank making them some of the most valuable state assets. However, in spite of their importance, roads have been badly managed in Africa. Total road network of 4.3 km per 1,000 people, compared to a world average of 7.07 km per 1,000. South Asia has 3.19 km of roads per 1,000 people, and 3,88 for North Africa and the Middle East. Paved roads equal only .79 km per 1,000 people, less than half that of South Asia.

There is a large variation in the quality of national and rural roads. About half of the road in the main network are in good condition while only one quarter of the rural network is in good condition. Part of this is due to the fact that richer countries spend more on maintenance than do poorer ones. Topography and climate also play a role, for example mountainous and wet countries generally have poorer conditions. Good governance is critical for maintaining good quality road systems. Across the region 43% of the main networks are classified in good condition, 31% in fair and 27% are in poor condition (meaning they are in need of rehabilitation). The percentage in good condition ranges from a high of 90% in South Africa to a low of 4% in the DRC.

The African Union and the African Development Bank have identified infrastructure and regional integration as major components of economic growth and poverty reduction (African Development Bank 2003, African Union 2009). This emphasis has been part of the New Partnership for Africa's Development (NEPAD). However, no one has yet to be the political will to make this happen. Regional infrastructure involves a high level of trust between countries, and some countries (landlocked ones for example) have more to gain from regional integration. For example, for year planners in Kinshasa and Brazzaville have discussed a road-rail bridge over the Congo river. This is the only place in the world where two national capital cities are situated on opposite banks of a river, within sight of each other. Nonetheless, because there is not the political trust between the two governments, this project has remained stalled.

Fewer than 40% of rural Africans live within two kilometers of an all-seasoned road, the lowest level of rural accessibility in the developing world (the average is 65%). This isolation prevents large areas of the continent in reaching their agricultural potential (Teravinthorn and Raballand 2008). Because the population density is so low, reaching even 90% of rural accessibility is an unrealistic goal even in the medium term. Further, urban all surface road density lags behind those in other developing regions. Poor roads add to costs of production in a region with the world's highest poverty rates. The costs of transporting goods in Africa are the highest in the world. For example, for three Francophone countries (Cameroon, Cote d'Ivoire and Mali) road transport costs are 40% more expensive than in France (whose labor costs are much higher than in Africa). Poor road conditions can increase fuel consumption and

the need for vehicle maintenance due to damage, reduce the life of tires and of vehicles. Because of lower speeds, vehicles are not as efficient (Naude and Matthee 2007).

Lack of rural road connectivity seriously constrains agricultural production: in the absence of rural feeder roads, the cost of moving produce can be as high as \$2.00 per ton-kilometer (Teravaininthorn and Raballand 2008). As a result, some 85 percent of crop production takes place within six hours' travel time from the largest cities.

In rural areas people and vehicles move across a variety of unclassified and unrecorded paths and tracks, thus the size of the rural network is hard to estimate. The rural density ranges from 0.1 km per 1,000 people in the DRC to 21.6 in Namibia. A low density of rural roads limits access to agricultural production. Agriculture plays a vital role in the region, accounting for one third of GDP, 40 percent of exports and over half of employment (Liamo and Venables 2001, Dawson and Barwell 1993).

In rural areas about a quarter of the population lives in dispersed areas where densities are less than 15 per sq kilometer, thus the costs of providing roads are quite high. Improved road networks help isolated communities move into commercial agriculture and thus increase their incomes. By reducing the time and expense of moving goods, improved roads help competitiveness, creating more jobs and boosting incomes (Liamo and Venables 2001).

Rural roads typically carry low levels of traffic, generally no more than 10 percent of traffic on classified roads, although in a few countries, notably Malawi, Nigeria and Ethiopia, the amount is closer to 20%.

Off road residents are sometimes looked down upon by local professionals and exercise virtually no political power, and "To live off-road is to be invisible" (Porter 2002). Across Africa virtually all services (banks, clinics, extension agents, markets, schools) are located on paved roads (this is changing with banking). For women the time constraints and cultural restraints on mobility can be very restrictive (Kudat 1990). Trips on rural roads generally involve short distances and small loads such as firewood or water. Non-motorized transport (eg a bicycle) is often cost prohibitive. There are cultural issues that play a role, as women are often excluded from non-motorized modes. However, in some countries such as Uganda and Burkina Faso enough women are using bicycles and have gained social acceptance.

Off road inhabitants are often the most in need of medical help since water supplies are often poor and work is dangerous. Visits to clinics for more routine reasons drop off dramatically after 5 kilometers. Vaccination programs tend to miss off road settlements, making these communities more at risk. Off road residents are at special risk as water supplies are often poor and poverty levels are high. During the wet season health conditions are at their worst, while traveling is the most difficult, even for pedestrians. This causes a downward spiral (Porter 2002).

In rural areas generally the local authorities are responsible for the roads. Here are two categories: local government roads and community roads and tracks (Kudat 1990, Gwilliam et al 2006, Benmaamar 2006). The later are often neglected by local authorities. This can be a problem when NGOs build roads without proper coordination with the local agencies, as often the roads were built to good standards, can be allowed to deteriorate over time without maintenance. Local governments have limited budgets and qualified personnel to ensure such maintenance. Indeed, for most of Africa less than 5% of all government revenue is allocated to

the rural governments. Some countries centralize their control over rural roads but is often poorly connected to the local needs.

Community roads pose additional problems. In most remote off road settlements, the roads are maintained by the residents: women carry sand, stones and gravel and men fill potholes using their picks and shevels. During the rainy season roads may need weekly attention, and every able bodied resident is expected to take part. Because of the low population densities, raising this to 100% coverage would be virtually impossible. Access to 80% of the rural population would cost about \$2.5 billion annually, again according to the World Bank (2010). Of that, about half would be for maintenance (Bryceson et al 2008).

Poor rural roads limit access to markets, and transportation costs are extremely high. Population density and purchasing power play a major role in determining where, when and how roads can be placed. For example, if population density and purchasing power are both low, then bus service is unlikely to appear, especially in the absence of a subsidy. On the other hand, sealed roads can facilitate intermediate transport (eg bicycles) for low income people even in sparsely settled areas.

History has profound economic consequences for the transport sector, and for development. Incomplete networks (coast to hinterland for commodity extraction); national fragmentation; state enterprises were inefficient; corruption was widespread. Most continuous transport corridors link the hinterland to seaports, a heritage of colonialism when the European colonial powers were mostly interested in extracting unfinished raw materials, not to promote trade within or between countries.

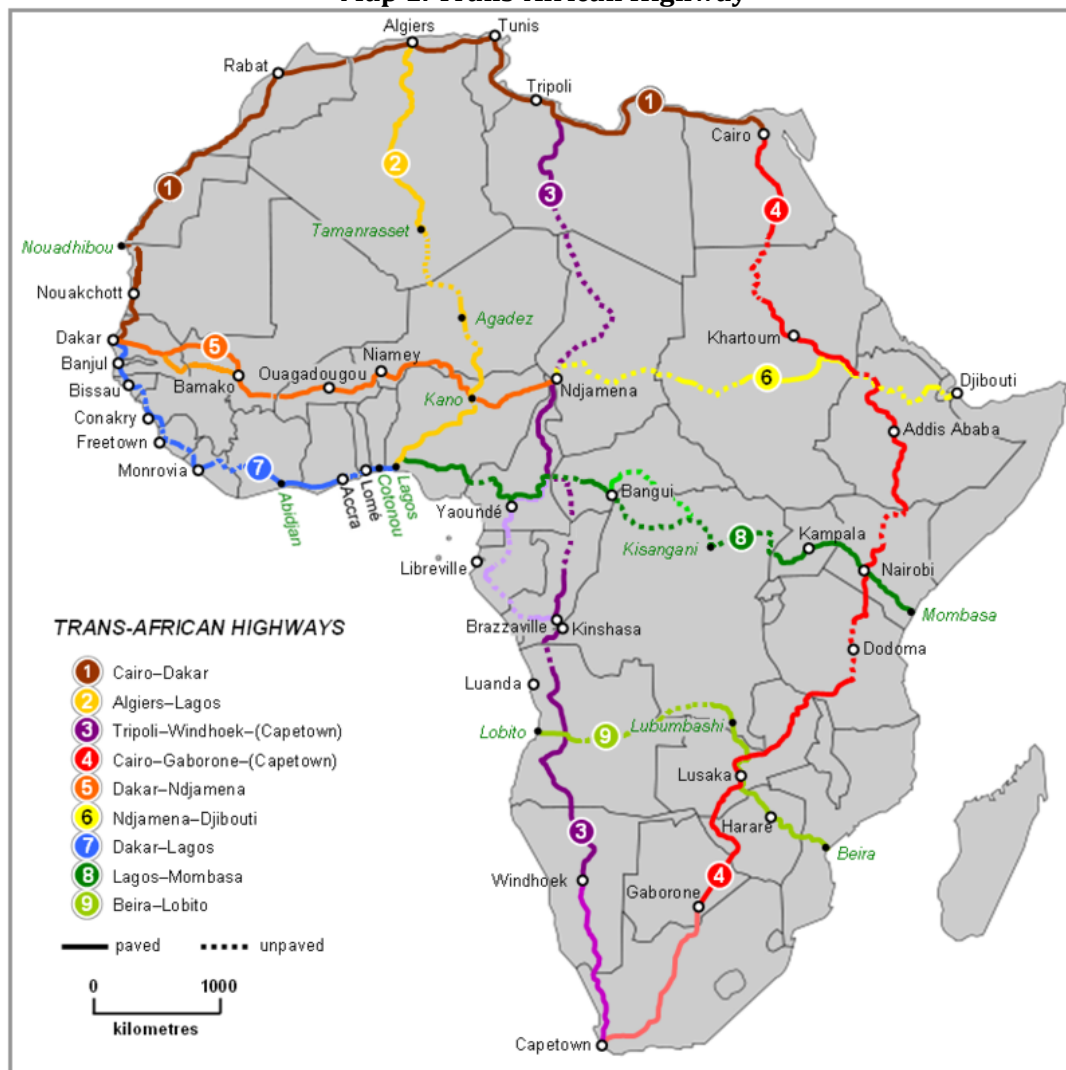
In general most power in Africa resides in the cities, people vote there in larger numbers and in the past it was in the cities where a coup would take place (Lipton 1977). This has led to what has been called "urban bias" in development. This means of course that those in the cities get better (if you can call it that) infrastructure than those living in the countryside. It has been a pattern of neglect, although this has changed in recent years to a degree. As part of that neglect, agriculture and rural areas were not generally thought of as a place where modern "development" would occur: that would be in the cities, with industrialization and manufacturing. We know now that this urban bias led to many disasters across the continent.

The World Bank began lending to African countries soon after their independence and by the 1960s its lending was heavily biased toward infrastructure, predominately roads. Roads were though to "bring" development to remote areas, although it soon became apparent that such investment was a necessary but not sufficient component of development (Riverson et al 1991, World Bank 1988). Much of the early investment were in truck roads but the focus shifted by the 1970s during a push for more rural development and a emphasis on the poorest of the poor initiatives by Western donors. By the 1980s road financing was being cut under various structural adjustment programs that had become popular with the Washington Consensus. During the period of "conditionality", many countries were forced to cut spending, and roads were easier targets (people get animated when schools or health clinics are closed but decaying roads don't generate much political excitement). Many leaders felt that road improvement could be done at some point in the future... kick the can down the road. In the meantime, governments cutting budgets are worried about what people see as more immediate in their lives.

During the 1990s many donors shifted to poverty alleviation and private capital flows weakened in the early 2000s in the aftermath of the Asian financial crisis. In a final irony, the Millennium Development Goals excluded roads from their list of goals, despite the generally held belief that poor roads remain perhaps the major impediment to improving access to rural health and education.

Relative to other developing areas, Africa has a low population density (36 people per sq kilometer), low rates of urbanization (35%), although rapid urban growth rates (3.6% annually). The region also had huge variability in rainfall patterns across areas and topography varies widely (African Development Bank 2003). There are 48 nation states in the region, many of which are very small (most having populations under 20 million and economies less than \$10 billion).

**Map 1. Trans-African Highway**



**Source: African Development Bank (2003).**

Although the goal of a Trans-African Highway is not new, it would take around 75,000k to provide a meaningful level of connectivity (see map, African Development Bank 2003). On a Pan-African level a network that would link all capital cities and also cities with more than 1 million people to deep sea ports or international borders would require a two lane network of about 100,000 kilometers, of which perhaps 70% is now in place. However, of that about one



quarter needs to be widened from one to two lanes and about three quarters needs to be improved to good quality. The World Bank estimates that such improvements would cost \$20 billion with maintenance of \$1 billion annually for the foreseeable future. The World Bank suggests that such improvements would triple intra-African trade, from \$10 billion to \$30 billion a year. Roads provide better connectivity in intraregional trade because the rail networks have incompatible gauges (a holdover from colonial times where Germany had different gauges than say Britain or France) and low traffic volumes (African Development Bank 2003, Foster and Briceno 2010, Buys 2006).

During the 1970s the Trans-African Highway system was proposed as a network of all weather roads to provide direct linkages between all capital cities, contribute to the region's political, economic and social integration, and ensure important linkages between areas of production and consumption. National governments have been slow to make the necessary investments to make this a reality. The system comprises nine main corridors with 50,000 kilometers, of which almost half is in poor condition. Also, about 24% of the network is not paved.

Road building peaked in the 1970s in most countries and that created thousands of miles of roadways which have long since passed their design life. Indeed, many countries had better roads in the 1960s and 1970s than they do now. For main road networks, maintenance spending ranges from \$200 per kilometer in Chad to \$6,000 in Zambia. Maintenance spending per kilometer on the main network is about twice that spent on rural roads (Buys 2006, Heggie 1994).

Road spending typically accounts for 5-10% of a government's recurrent budget and 10-20% of its development budget. In many countries a significant portion of the central government's outstanding debt is for road loans. Road funding is very dependent on foreign assistance, which is volatile. ODA funding ranges from 50% of total road funding in Senegal to 90% in Rwanda.

African countries have spent too little on maintenance during the past 20 years and as a result nearly one third of the \$150 billion invested in roads has been eroded through lack of maintenance (African Development Bank 2003). Africa has been living off its assets. The fiscal burden of road network per capita is high due to a combination of low population density, low GDP per capita and a number of topographical, climactic and cultural factors which will be discussed later.

Heavy rainfall can accelerate road deterioration, especially if there are design flaws (grading, ditches, run off control, etc). Vehicle overloading is one of the most serious and common causes of road deterioration. Economies of scale give incentives to load a vehicle to the maximum. Some countries, for example Kenya, have tried to ban heavy loads by limiting the number of axles permitted per vehicle (instead of the weights). Evasion by truckers has, however, been successful in thorwting these efforts.

When a road is not maintained and is allowed to deteriorate, each dollar saved on maintenance increases vehicle operating costs by \$2.50. Reduced maintenance results in increased overall costs to the economy: As just mentioned, The World Bank estimated that the extra costs of poor maintenance costs the region nearly 1% og GDP per year. (Heggie 1994). Poor maintenance today raises the cost for the future: maintaining a paved road for 15 years costs about \$75,000 per kilometer. If the road is allowed to deteriorate over a 15 year period it costs well over \$200,000 per kilometer to rehabilitate. The same for gravel roads: it takes perhaps

\$20,000 per km to maintain (varying with volumes and climate) for a 15 year period, but if allowed to deteriorate over 15 years the replacement costs is double that.

Road users are slow to see the linkage between poor road conditions and higher vehicle operating costs (VOCs). Excessive axle loads (especially in the 3.5-7.5 ton two axle category of trucks) are responsible for a large proportion of road damage. Road repair and upgrading works less well than they should. If these truckers did see the links they are not organized well enough to affect any change (Benmaamar 2006, Naude and Matthee 2007). Road authorities do not come under pressure to reform, and with reform added financial investment will not be effective. When a road is not maintained (allowed to deteriorate from good to poor condition) each dollar saved on road maintenance increases VOCs by \$2.50. Instead of saving money, this lack of maintenance ends up costing the region millions each year. Potholes cause immense damage to vehicles. The Federation of Zambian Road Hauliers estimates that potholes increase VOC by 17%. The direct costs are associated with extra tires, clutches, wheel bearings, break shoes, springs, steering assembly and shock absorbers. In addition to the downtime and damage to goods. Also, virtually all the spare parts for replacement must be imported from abroad, resulting in a loss of foreign exchange.

Maintenance is normally financed under the recurrent budget, and such revenues are almost always in short supply. Although this is changing, donors finance new road building and rehabilitation under a capital budget (often on a grant basis) and governments use these funds for building and rehabilitation rather than maintenance. Where roads are left to deteriorate, women bear the heaviest burden (Kudat 1990). According to the World Bank, a typical Ugandan woman carries the equivalent of a 10-litre (21-pint) jug of water for 10km every day, while her husband humps only a fifth as much. With better roads, both men and women can, if nothing else, hitch rides on trucks, thereby sparing their feet and getting their goods more swiftly to market.

Higher transportation costs raise the costs of doing business, impede private investment and add another barrier to Africa's ability to take advantage of the rapid growth in world trade (currently perhaps 3% of the world total). African truck operators have low fixed costs (due to low salaries, older cheaper trucks) but high variable costs (poor gasoline mileage from the old trucks). Poor road conditions reduce the life span of trucks, tires and increase vehicle maintenance costs and result in higher fuel consumption). Fuel and oil account for nearly half of the variable costs.

Trade is highly sensitive to transport costs: a 10% decrease in such costs could increase Africa's trade by 25%. Importantly, US trade with the region has grown significantly during the past decade: US exports have surged from less than \$7b. in 2001 to over \$74 b. last year. Africans would demand even more US products if they had a more efficient (and lower cost) transportation network. For Africa's landlocked countries, high transport costs means that even if they do everything else right, they will effectively remain landlocked. Of all the world's regions, intra-regional trade is lowest in sub-Saharan Africa. While there are many reasons for this (eg, tariff and non tariff barriers, cumbersome customs procedures, lack of product diversification, the similarity in production among neighboring countries), poor roads play a major role. "It costs \$1,000 to ship a 20-foot container from the UK", said John Ackum, president of Worldwide Movers in Cote d'Ivoire. "You need \$2,300 to transport the same container next door to Liberia. By road our drivers can be stopped five times in Ghana, six times in Togo, six times in Benin and easily 20 times in Nigeria"(The Economist 2012).

UNCTAD estimates the transportation costs in Africa are higher than anywhere else in the world, at 12.6% of the delivered value of exports (the world average is 6.1%, UNCTAD 2003). For landlocked countries it is even higher: 56% for Malawi, 48% for Rwanda.

The actual costs of trucking in Africa—even when road quality and corruption are taken into account—are not significantly higher than in other parts of the world. The main reason for the high tariffs paid in the region is the lack of competition in the trucking industry, which allows firms to sustain high profit margins. In Central and West Africa particularly, trucking industry cartels and restrictive practices in traffic allocation and dispatching are responsible for low vehicle mileages and poor fleet quality. In southern Africa, a more liberal regulatory environment and a greater prevalence of direct bilateral contracting between truckers and their clients keeps freight tariffs down. Because of closed borders, high import tariffs, restrictive rules of origin consumers cannot benefit from lower prices nor farmers cheaper inputs such as fertilizer. High transport costs limit the incentives for farmers to grow more food if they cannot charge a price high enough to cover all of their costs. Truck operators are able to sustain high profits margins (especially in Central and West Africa, where they reach levels of 160%) because of the lack of competition in heavily regulated markets. For example, freight is often allocated to transport firms via a central queuing method than allowing truckers to enter into bilateral contracts directly with customers. Road freight tariffs are more than double the dollar per ton- kilometer in Africa than in other developing regions.

Of equal concern are long administrative delays at border crossings. These keep the effective velocity of international road freight below 12 kilometers per hour, or about as fast as a horse and buggy or bicycle.

### **CONCLUSION**

International donors and national governments tend to underestimate the importance of appropriate roads. Although donors know that roads are essential to the development puzzle, they generally are constrained by the host government. If the minister of transportation wants a road paved to his house (or home region), that has been where the roads have been paved. Often road construction has been planned with little regard to need, witness the large number of prestige projects, and again donors have not spoken up forcefully about them. Oftentimes roads are over engineered. On average some 30 percent of main road networks are over engineered relative to observed traffic volumes (and 10% under engineered). Countries need to adapt road design standards to local conditions and materials to avoid excessive costs, particularly in low volume roads.

For example, it takes a minimum of 300 vehicles per day to justify a paved road. Many roads do not meet that threshold and are done for political reasons or because the expected traffic volume never materialized. Conversely, many roads that need to be paved are under engineered. Perhaps as much as 30% of the main road networks appear to be over engineered, according to the World Bank. On rural unpaved roads the threshold is 30 vehicles per day to justify crushed gravel treatment. Again, this is slowly changing but the road infrastructure backlog is tremendous.

Most of the transportation services are owned and operated by men. In areas where women are the major crop marketers they could gain by getting more access to transportation, especially intermediate transportation.

Toll roads do not appear to be a solution Buys et al 2006). Since 1990 there have only been 10, and most of them have been in South Africa. There is little scope for growth as the traffic flows are too low. The threshold is 10,000 vehicles per day, and only 8% of the region's road network rise to that level, and over 80% of those roads are in South Africa.

Low income countries devote almost three quarters of funding to road building, leaving a huge repair and maintenance deficit. This can be partially explained by the fact that low income countries are still building their networks, whereas middle income countries who already have their networks in place can devote more to maintenance. Those countries with significant topographical constraints also favor more capital expenditures.

Due to widely dispersed rural populations, doubling the current level of rural road accessibility from 40 to 80 percent would be very costly and entail more than doubling the length of Africa's road network—from 400,000 to 1,500,000 kilometers. This suggests the importance of carefully prioritizing rural road investments based on the potential agricultural value of land. For example, reaching the agricultural land that produces 80 percent of today's crop value could be done with a network of only 600,000 kilometers. Similarly, reaching the agricultural land with 80 percent of potential production value could be done with a network of little more than 900,000 kilometers.

Connectivity is not just about the physical conditions of roads, but must include the regulatory framework. Fuel levies (gasoline taxes) are generally not set at an adequate level. Less than 5% of public revenue is generally made available to local governments managing rural networks. General budgets usually do not allocate enough for main roads. Because the road networks in rural areas are often short, they do not justify employing an engineer in a local agency. In central and West Africa there is little political consensus on freeing up the markets. Operations to and from South Africa are governed by bilateral agreements and allows more market competition, resulting in more efficient and cheaper road transportation costs.

At the end of the day, simply building more roads is not necessarily the solution: many road projects are inappropriate, and are often geared to prestige high-profile, super highways instead of improved back roads that farmers so desperately need (Dawson and Barwell 1993). Even in places with roads people still have to walk a long distance to get access to a bus or matatu taxis. The mindset around the world has been to replicate the American car-centric model for transportation. Providing opportunities for private automobiles benefits some, for most in Africa it takes away resources that could otherwise be used for the majority.

Finally, in addition to helping boost industrialization, roads are essential in promoting health: one fourth of Africans are undernourished, and at least 250m Africans go to bed hungry. Getting food from farmer to table is difficult. Lack of good roads compounds the high poverty and low food security levels by impairing farmer connections to markets: according to the UN World Food Programme, only 25% of farmers in rural areas have access to markets within two hours and some 30% crops spoil before getting to market. Poor transportation adds to the costs of the farmer's inputs. Women farmers are marginalized because they often do not have access to inputs, credit and especially transportation. Due to poor road conditions, remote schools and health clinics are more expensive to build and harder for students and patients to travel to. Poor roads hamper food aid distribution, and this is especially important during periods of unexpected food crises.

For the region to develop it must continue on its path of economic and political reform, but at the same time it must look at improving its basic infrastructure, especially good roads and find new means for increased mobility for the majority. Improved road infrastructure is vital if Africa is to escape the scourge of deindustrialization.

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