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Infrastructure & Cities for Economic Development

ICED Transportation Note

The purpose of this note is to highlight linkages between improved transport services and development. It summarises how these are essential to individual access to opportunities, business and industrial connectivity, and economic growth at local, national and regional levels. It considers areas of comparative advantage for DFID and the UK more widely, and concludes with potential areas of ICED support.

Making the Connections - Reaching the Opportunities

Transport is all about **making connections**. It makes a city's markets accessible (labour, goods and services) to other cities and other neighbourhoods in the city, as well as to outside export markets.

- Between cities – connectivity gives firms access local, regional and global markets. This enables cities to trade with each other; boosting local productivity and making places more attractive to private sector investment.

- Within cities – connectivity provides access to jobs, and services, and assists firms to attract workers, source other inputs and sell products to local markets. This increase in economic activity means more income for workers and firms. It also leads to further investment in business and the economy, thus increasing the sustainability of good economic outcomes.

The World Bank[1] suggests that while in the past transport investment has focused on movement and speed, the challenge today is one of accessibility – where the focus is on **reaching the opportunities**, not the movement itself. In some contexts, gaining access to opportunities can require lengthy multi-modal journeys, whereas in others access may involve very short trips. Recognising the range of access, needs transport planners should consider the specific requirements of a range of different users (including the marginalised, women and those with disabilities).

Connecting populations, agriculture and natural resources, and employment centres, enables job creation and improves economic competitiveness. Conversely where transport links are lacking economic activity, and output, employment and other socio-economic benefits are stifled or not realised.

The table below summarises different levels of transport, some of the potential modes of engagement and the outcomes to which these contribute.

Transport level	Example Modes	Example outcomes
Urban	• Bus rapid/mass transit • Traffic management	• Employment • Congestion - Reduction of economic losses • Environmental health

[1] Lall,S. Presentation at World Bank Transport and Urban Development Conference 2017.

		• Equality of access/disability inclusion
Rural-urban	• Feeder and rural roads • Natural Resource corridors (roads/rail)	• Access to public services (health, education) • Market access • Better access to opportunities • Food security and agricultural productivity • Poverty eradication • Natural resource processing and export • Road safety
Inter-city	• Highways (construction and maintenance) • Railways	• Growth corridors • Distribution of growth • Urban and industrial strategies • Road safety
Regional	• Border posts • Ports • International/Transnational highways • Railways • Natural Resource Corridors (road/rail)	• Regional Trade • Trade based Growth • Regional Security • Natural resource exports and imports

Leaving no-one behind in an increasingly interconnected world

Transport is an essential part of our everyday lives and is central to sustainable development. It enables access to employment, trade, business, education, health services, and social interaction. The developing and developed world's prosperity and wellbeing are inextricably linked to transport and the choices made available to them. Leave No One Behind is integral to achieving the Global Goals and the four Strategic Objectives of the UK Aid Strategy, and is in the UK's national interest by creating the conditions for a more secure, sustainable, fairer and prosperous world.

The number of vehicles globally is expected to double to two billion by 2050. However, while motorization is on the rise, one billion people still lack access to an all-weather road.

Sustainable, efficient, and well-maintained transport infrastructure allows urban and rural dwellers the opportunity to participate in economic opportunities and access essential services.

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Increasing accessibility is key to economic development. For example, a new or improved road not only creates new jobs and gives a short-term boost to a nation's economy, but such investment also helps build and facilitate economic activities for decades and generations to come. Governments' priority for developing sustainable transport infrastructure should be to clearly define the outcomes required from transport systems and align strategy, funding decisions and other policy measures to those outcomes. To deliver inclusive prosperity this should also include assessing the potential for co-benefits.

> Ensuring a comprehensive and integrated transportation system is essential to sustain economic and social development.
>
> Arup, Resilient Urban Mobility

Sustainability and reliability of services is essential to effective transport systems. Planning for the future and making the right technology choices with save in terms of long terms capital costs. An essential part of these choices is to factor in the whole-life asset management of all transport infrastructure, with regularly updates asset management plans, and operations and maintenance systems.

Recognising the importance of rural/small town/urban linkages, rural households will continue to need access to paved or all-weather roads to take products to market and reach essential services. This should therefore be considered as part of the overall transport and spatial planning strategy.

Transport is an important policy lever. It needs to be part of a cohesive planning package (including energy, telecommunications/digital, water, waste and housing[2]) to boost local and regional productivity and make places more attractive to private sector investment.

All transport infrastructure plans must, at the outset, consider whole-of-life costs including both capital investment, and funding requirements for asset operations and maintenance. Too often the benefits from donor investment are not sustained, and as roads crumble due to lack of maintenance, value for money is diminished. ICED has developed guidance on infrastructure delivery options for achieving sustainable options.

Integrating Transport and Urban Development

Population growth poses great challenges today. 'Virtuous circles' of agglomeration and productivity go a long way to explaining why and how cities have developed for hundreds of years. Congestion is now a major concern for policy makers as it is curbing current and future economic productivity and growth. Actions to reduce congestion include both large and small-scale investments, and some demand management initiatives.

> Sitting in traffic in Nairobi costs $4m/day in lost productivity WB (2014). 42% of people walk to work access 11% of jobs within 1 hour. 28% use matatu and access 20% of jobs within 1 hour. Travel costs by distance compared to the US are 3.5 times higher in Ethiopia and 5.3 times higher in Nigeria.

[2] Hall, J. The Future of National Infrastructure: A system of systems approach. 2016.

People's access to job opportunities and accessibility expands with their increasing proximity to each other. Adequate transport investment – for example ring roads, bus rapid transit systems – is vital for cities to remain productive and competitive.

However, it is also important to think about how land is organised, zoned and used – linking land use and transport planning is essential. The growth of Transit Oriented Development (TOD) highlights that transportation is one of the most sensitive elements between spatial structure and planning of metropolitan areas (e.g. Curitiba BRT and associated density zoning corridors). The goal is to provide a more flexible transportation ecosystem that better suits future mobility challenges.

Accessibility and mobility are tied into how the spatial planning and physical organisation of a city as below[3]. Well planned transport investment can unlock possibilities for greater urban residential and commercial density, making cities more efficient and productive.

Nature of Spatial/Physical Planning	Characterised By:
Mixed/Random Land Use	High cost/time for commute Limited agglomeration externalities
Monocentric	Lower cost/time of commute, Some agglomeration benefits
Polycentric	Moderate cost/time of commute Spatially localised agglomeration externalities

Cities' increasing populations and ever greater mobility demands force cities to assess and invest in the deployment of modern infrastructure. This needs to include sufficient suitable transport for interchange of people and freight in multimodal supply chains. However, the combination of transport for freight and people in urban areas is a major challenge and supply of new transport systems is not moving at the same pace as mobility demands.

Reshaping the city, by encouraging greater density and walkability so that the basic needs of life are available with less travel, has the effect of increasing access even as it reduces the need for mobility. This includes linking transport, spatial-planning and land-use policy to reduce the need to travel long distances and/or promote low-carbon options such as walking, cycling and public transport (e.g. Bogota cycle routes).

UN Habitat[4] has espoused the concept that mobility is not just about developing transport infrastructure and services, but about overcoming the social, economic, political and physical barriers to movement. Roads provide access for motorised and mechanised transport but it is important not to lock people into future car or motorcycle dependency.

Smart Cities - Big Data and Smarter Technology for Cities and Transportation

[3] Lall,S. Presentation at World Bank Transport and Urban Development Conference 2017.
[4] UN Habitat. 2013. Sustainable Mobility

Smart cities make use of available information and communications technologies to provide information and data for those planning and managing the transportation systems – as well as users.

Cities are becoming increasingly complex. Integrated, intelligent IT systems will become increasingly significant in helping to plan and manage journeys within cities more effectively. Big data analytics are potentially significant – but with the massive size of the data there are challenges to process, analyse and prioritise to inform an appropriate course of action[5]. Free, universal access to digital maps and satellite images is a game changer for both urban and transportation planning. With the leapfrogging of mobile phone and IT technology over the last decade, a range of smart technologies are now available to developing countries – for both those planning and managing the system, as well as users. New and innovative technologies that collect and share real time data on road congestion and public transport services, can help to improve connectivity for individuals without the need for investment in large scale infrastructure.

Leapfrogging to cleaner transportation through electric vehicles

Electric vehicles (EVs) are the next big thing in transport. Many developed countries have pledged to completely ban sales of fossil fuel powered vehicles by a certain timeline. In the UK, this is 2040. In the Philippines, the government is modernising their transport system and is phasing out the popular Jeepneys, their popular means of public transportation – those over 15 years will need to be replaced by electric powered vehicles. Other developing countries may find it difficult because EVs are more expensive than conventional vehicles and many of these countries still rely heavily on second hand cars imported from developed countries.

There is an opportunity for developing countries to plan for this transition to ensure the supporting systems are in place to embrace electric vehicles. This will need to include integrated planning involving transport infrastructure and the electricity grid:

- fit for purpose transport infrastructure include suitable roads and sufficient charging systems; and

- the electricity grid needs to be prepared to take on ‘movable loads’ which makes demand unpredictable. This will require planning, and better grid management on the transmission and distribution side. The electricity grid will also need to be prepared to link in with the usage of car batteries that could potentially help balance the grid instead of destabilising it. There needs to be conscious planning on including renewable energy sources onto the grid to meet the additional demand from electric vehicles to ensure the benefits to climate and health are realised.

International connectivity, markets and jobs

[5] Houbing, S. 2017. Smart Cities.

Just as the global economy depends on the movement of goods within international supply chains, so countries depend for their economic development on being part of the global market for imports and exports.

Africa is seriously lagging in terms of intra- and inter-continental trade. Africa's intra-regional trade is currently at 18% of total exports – far lower that other continents. 82% of African countries' exports go to other continents, and consist mainly of commodities. By contrast, over half of inter-African trade is in manufactured products. Negotiations have now begun to establish a Continental Free-Trade Area (CFTA). However, the largest gains are likely to come not from reducing tariffs, but from cutting non-tariff barriers and transport times[6].

The low levels of connectivity between African economies are largely due to an incomplete legal architecture for regional integration, poor physical infrastructure and one-way trading relationships. Infrastructure systems reflect the continent's colonial past with roads, ports and railroads built for resource extraction and political control, rather than to bind territories together economically or socially. 65% of the missing links in the Trans-African Highway network are situated in Central Africa. Of existing sections only one third is paved in this part of the continent. These issues indicate the particular difficulty that land-locked countries face in establishing international transport and trade. The average costs of inland transportation for exports and imports is far higher in Africa than other continents. For example, Zambia and Uganda pays twice the global average and Central African Republic four times the global average. The AfDB has a vision is to slash regional transport costs with expected efficiency gains of $172bn[7].

Climate Change Mitigation/Adaptation and Environmental Considerations

Road transport today is heavily reliant on fossil fuels and the challenge is therefore to better align development and low-carbon transport. The developing world should not be impeded in its growth or penalised by the environmental damage caused historically by developed countries. However, the international community and funding agencies should support governments in making decisions in favour of low-carbon growth and provide alternatives to fossil-fuel based transport. Transport is responsible for 64% of global oil consumption and 23% of energy-related greenhouse gas emissions—a proportion that is quickly increasing. Around 185,000 deaths a year are directly attributed to pollution from motor vehicles.

Road Safety

Globally, 1.24 million people are killed in road crashes every year and up to 50 million are seriously injured. Low and middle-income countries are most affected and typically, 1-3% of GDP is lost through road traffic crashes. It is the leading cause of death globally for 15 - 29 year olds. Pedestrians and cyclists are often involved in these accidents. Improved safety should be integrated within all transportation programmes.

Transportation – Economic Appraisal

Robust economic assessment of options for transport investment is vital to ensure good value for money projects are undertaken, and to encourage private sector investment. The integrated nature of transport with other areas of the economy increase the complexity of the investment question, especially when urbanisation, social and economic upheavals, and climate change and other environmental issues are included in the analysis.

[6] Economist. Africa Unite. 9 December 2017.
[7] Harris, E. Africa Forum, Chartered Institute of Logistics and Transport. 2016

We have the tools to undertake cost benefit analysis and impact assessment of transport projects spanning all modes. We have developed our own unique approach that we call 'Total Appraisal'. This can be used to help policymakers and transportation planners understand the myriad of impacts and trade-offs between different options for investment in transportation, and identify which options provide good value for money.[8]

The Total Appraisal framework comprises three main types of impact – **welfare** (incremental costs and benefits to society from the investment such as from reduced travel time and improved reliability for road users, or reduction in greenhouse gases and noise), **economic** (impact of a project on GDP and jobs), and **fiscal** (total capital and recurrent costs of a project and tax impact). The welfare benefits are summed and compared to the costs of the project to determine the project's benefit cost ratio (BCR)[9]. This approach also enables policy makes to make comparisons between options.

Gender and Inclusion

Adequate, affordable and well-designed infrastructure can serve as the first step for poor and marginalised groups to access expanded opportunities[10]. Poorly planned and managed transport infrastructure can exclude these groups from socio-economic gains and drive a wedge between the rich and the urban and rural poor, worsening inequality and reinforcing harmful social norms. Decisions on roads and transport provision can also be politically motivated on grounds of ethnicity, political alignment, or because they are at the margins (of a city or country) leading to under-provision and exclusion.

The evidence shows that ignoring gender differences in transport planning and operation is a missed opportunity for growth and women's economic empowerment[11]. The infrastructure investment becomes less effective and has less impact particularly on poor and excluded people, many of whom are women. It may result in increased exposure to violence and harassment for women (and for other vulnerable groups including the elderly, children and people with disabilities). Extended journey times can also do harm to the health and productivity of the workforce (stress, sick leave, impacts on concentration etc.) and it can reinforce existing gender discrimination.

By improving transport and transport access, increasing the availability of information about economic opportunities (jobs or market conditions) and increasing productivity of existing activities, investments in infrastructure can facilitate greater market access.

DFID/UK Comparative Advantage

The transport sector is the largest sectoral lending programme in the World Bank, and is one of the leading sectors in both the Asian Development Bank and the African Development Bank. This makes a strong case for engaging strategically with the MDBs'

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[8] PricewaterhouseCoopers LLP, 'Total Appraisal: How to make decisions on major infrastructure', available at: https://www.pwc.co.uk/industries/government-public-sector/transport/insights/video-transcript-total-appraisal-how-make-decisions-major-infrastructure.html

[9] A BCR greater than 1 (preferably higher) is required for a project to be considered good value for money.

[10] Mohun R & Biswas, S (2016) Infrastructure: A Game-changer for Women's Economic Empowerment, a background paper for the UN Secretary-Generals' High-Level Panel on Women's Economic Empowerment, prepared by the DFID-funded Infrastructure and Cities for Economic Development (ICED) facility.

[11] Jacobson, J Mohun, R & Sajjad, F (2016) Infrastructure: A Game Changer for Women's Economic Empowerment, scoping report for the DFID-funded ICED facility

Boards and operations on transport.

Amongst the traditional bilateral agencies Japan has the strongest position in funding transportation infrastructure. However, China's strategic engagement, linking with its own value chains has eclipsed all other IFIs and bilateral donors. They dominate the sector in scale, ambition and diversity of engagement.

The costs of urban transportation infrastructure are high and unlikely to be a priority for UK grant funding. There is significant potential for private sector participation in urban mass transport. Railway infrastructure is a strong natural monopoly due to the very high sunk costs, so developing or maintaining and operating a railway network requires regulation and, in many cases, public finance[12]. CDC and the PIDG suite of instruments do support private investment in transportation (add details).

Beyond this the UK has world class urban/spatial and transport economics expertise that could be deployed to make a significant contribution to city, national and regional planning. There are significant opportunities for relatively low cost, high impact, short term interventions spatial and transportation planning, and modelling and demonstration projects (e.g. traffic management).

As a result, DFID has comparative advantage at the top end of the delivery chain – in conceptual and detailed planning and design, and structuring finance – for each of the areas identified. DFID is also well placed to support implementation of traffic management systems.

The ICED Offer

To add

Examples of Earlier Support:

Light Rail in Addis Ababa

Bus Rapid Transit in Dar el Salaam

[12] DFID Infrastructure Strategy Paper. 2015

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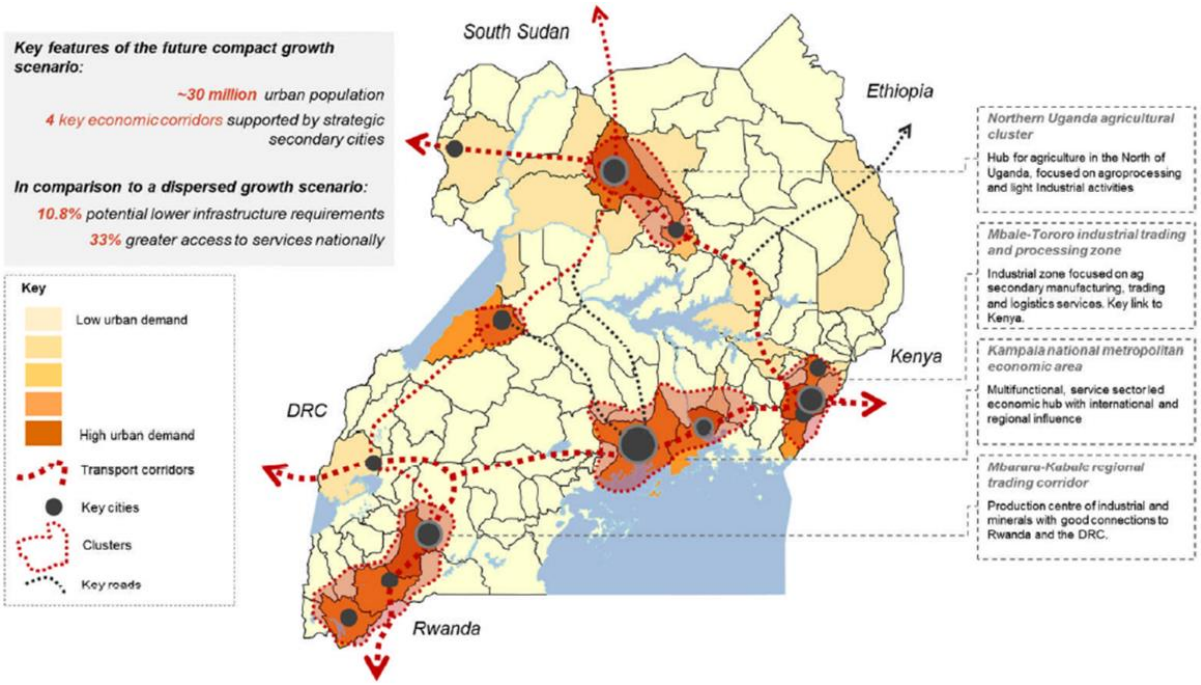
The Power of Spatial Approaches for Transportation Planning

Urban Cluster Scenario - Uganda[13]



Urban agglomerations are growing in Uganda on the transport / production corridors, where secondary cities/municipalities are increasingly connected within larger metropolitan areas. Agglomeration is a measure of urban concentration in a country or region index. An agglomeration index uses three indicators – population density, the population size of large urban centres, and travel time to the nearest such urban centre. According to this index, Uganda's level of urbanization increased from 22.4 percent in 2002 to 29.3 percent in 2010. Spatial approaches enable planning scenarios for future transport needs - linking urban, national population centres with potential national and international economic opportunities.

[13] The economic benefits of Uganda's Green Growth Transition, New Climate Economy, 2016

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The Importance of Transport Infrastructure to the Sustainable Development Goals[14].

The public and private sectors have important roles in delivering sustainable transport systems. The institutional framework and guidance of the sustainable development goals and the post 2015 agenda should help create an enabling environment for partnerships and collaborative working.

Inclusive Mobility	**Transport Infrastructure**
Expand affordable access to reliable mobility services for people and goods, thereby expanding market opportunities: • Provide affordable public transport with good intermodal connectivity, including rural areas and low income urban neighbourhoods. • Manufacture low cost, durable vehicles and bicycles. • Expand 'mobility on demand' business models. • Develop innovative transportation solutions including pooled freighting services. • Extend freight transport to underserved areas, which facilitate cost-effective movement of goods.	Inform government transport policies and help design, build and operate effective and efficient transportation infrastructure: • Support greater use of spatial planning, and build capacity for project preparation and execution. • Expand multimodal transport systems and intelligent route modelling to reduce congestion. • Improve links between urban, peri-urban and rural areas • Support the development of transport corridors • Improve the efficiency of transit borders, customs, port handling and airports • Strengthen inter- and multi-modal transport solutions for goods and people. • Promote infrastructure that maximises economic, social and environmental benefits – including the needs of vulnerable persons – while avoiding or mitigating any negative risks. • Support assessment of climate risks

SDG	**Goal**	**Contribution of Transportation**
1	End poverty in all its forms everywhere	Provide core expertise and funding for innovative rural transportation. Partner with local governments to offer affordable transport services and flat fares to rural areas and low income urban neighbourhoods.
2	End hunger, and promote sustainable agriculture	Accelerate technological innovation to increase efficiency, reduce the costs and reduce environmental footprint of transporting food products.

[14] Based on the UN Global Compact & KPMG, SDG Industry Matrix. 2016.

		Advise farmers in extended supply chains how to increase their productivity, storage, logistics and sustainability.
3	Ensure healthy lives and promote well-being	Collaborate with governments and other stakeholders to reduce deaths and injuries from road traffic accidents. Improve accessibility of medical services. Engage in partnerships to tackle HIV/AIDs for long distance drivers. Partner with local governments in support of safe walking and cycling infrastructure.
4	Quality, and Inclusive Education	Support governments to identify optimal locations for schools and other educational institutions, such as close to mass transit lines. Encourage inclusion of road safety into school curricula.
5	Gender Equality	Design safe passenger transport solutions and practices that reduce women's vulnerability to sexual violence and abuse while travelling. Engage in initiatives that help prevent human trafficking. Involve girls and women to integrate their needs into transportation and infrastructure policy making. Integrate women's empowerment issues into core business operations and value chain.
6	Clean Water and Sanitation	Support processes to improve cost, efficiency and sustainability of water conveyance.
7	Affordable and Clean Energy	Collaborate with industry and Governments to improve the intermodal and trans-model transfer systems in order to increase energy efficiency. Collaborate with industry, energy sector, academia and governments to make coordinated investments in research and development of next generation biofuels.
8	Decent Work and Economic Growth	Support training and strengthening of the income generating ability of suppliers in the value chain, and identifying ways to improve efficiency and reduce transportation costs.
9	Industry, Innovation and Infrastructure	Increase whole life infrastructure efficiency Integrate rigorous social and environmental impact assessments and mitigation strategies. Support a 'system of systems' approach on interconnected infrastructure networks – including transport, energy, telecommunications and water – to develop an integrated infrastructure system fit for the future.
10	Reduced Inequalities	Support and encourage investment in States where the need is greatest. Develop universal transport accessibility.
11	Sustainable Cities and Communities	Support government, city planners and the private sector in the planning and development of

		public and private transportation solutions to enhance the mobility and accessibility of vulnerable persons including low income families and those with disabilities. Help improve transportation links between urban, peri-urban and rural areas – to improve access to socio-economic activities and increased access to jobs and markets. Support development of systems and technology that facilitate integrated origin to destination transport solutions.
12	Responsible Consumption and Production	Support governments to increase the accessibility and affordability of public transport networks.
13	Climate Action	Integrate climate risks into investment analysis and decision making. Inform public policies on urban design and transport infrastructure to transition to more sustainable cities and transport networks.
14	Conserve marine resources	Develop and adopt policies and practice that reduce waste released into oceans.
15	Protect, restore and promote sustainable use of terrestrial ecosystems	Support policies, and practice when planning infrastructure and related transportation systems that protect biodiversity, enhance regeneration and facilitate natural resource management.
16	Peace, Justice and Strong Institutions.	Work with governments to develop robust strategies to mitigate the risk of transport related crimes. Support processes that address issues of corruption in infrastructure and transportation. Assist with development of systems and processes to tackle human trafficking.
17	Partnerships	Engage in collaborative approached with other funding agencies to address critical issues relating the transportation and the SDGs.