Chapter 4

Infrastructure for Development in LDCs

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4.1 Introduction

The objective of this chapter is to set out the main challenges that infrastructure (transport, telecommunication, energy, and water and sanitation) poses to foster equitable and sustainable development in least developed countries (LDCs). It attempts to monitor infrastructure commitments of the Istanbul Declaration and the Istanbul Programme of Action (IPoA) by proposing quantitative and qualitative indicators for the IPoA. It also compares infrastructure performance in LDCs with those in developed and other developing economies. Finally, this paper highlights the need to improve the policy-making process in these economies in order to tap unexploited opportunities for development.

The chapter first reviews the channels through which infrastructure shapes economic growth in LDCs. It also reviews the list of goals, targets and actions for both LDCs and development partners in the IPoA on infrastructure: transport, information and communication technologies (ICT), energy, and water and sanitation. Second, it presents key shortcomings of the IPoA commitments on infrastructure and proposes some indicators to compare infrastructure in LDCs with respect to other economies and their evolution over time. Third, it analyses the main sources of infrastructure investment in LDCs and presents the role of private investment and official development assistance (ODA) for infrastructure development. Fourth, it highlights the need to improve the policy-making process to invest effectively private and public funds in infrastructure. This section proposes qualitative indicators from the analysis of the policy-making process to monitor the IPoA. Finally, the chapter concludes by providing recommendations for a successful improvement of infrastructure in LDCs.

4.1.1 The rationale for infrastructure investment in LDCs

Infrastructure shapes growth through a variety of channels.[2] Infrastructure investment affects aggregate output directly by altering the composition of input factors in the production function: it increases the aggregate capital stock, lowers the cost of intermediate inputs and can have a complementary impact on the aggregate hours worked by the labour force.[3] It can also have indirect impacts by affecting total factor productivity (TFP) through economies of scale and scope, lowering the logistic costs of investments and freeing up resources for private investment, thus improving the durability of private capital and altering labour productivity by shaping industrial organisation and work practices.[4] Moreover, infrastructure not only is a public good in itself, but also enters the production function through the

services it provides: transport needs are connected to trade; energy and water to health concerns and to cost-effectiveness of firms; and information technologies to knowledge and business opportunities.

Empirical evidence shows that infrastructure investment boosts economic growth in LDCs. Gross domestic product (GDP) growth's elasticity to infrastructure stocks can vary from 0.15 to 0.35 (Estache and Garsous 2010). Furthermore, evidence has been found that increasing the population's access to mobile phones in Africa by 1 per cent would have a positive impact of 0.5 per cent in real GDP per capita (Djiofack-Zebaze and Keck 2006). The quality of infrastructure (measured by the quality in the provision of a set of services) can impact firms' TFP. For instance, in Africa the lack of infrastructure can constrain a firm's TFP by up to 40 per cent (Escribano et al. 2009).

An improvement in infrastructure in LDCs would have an immediate impact on these countries. For instance, a shrink in the travelling time in these countries could be translated into significant productivity gains as well as an increase in their exports (Freund and Rocha 2010). It would initially benefit the sectors of activity already implemented, but in the long run it would unleash structural change, leading to a movement towards sectors with higher productivities. On the other hand, better infrastructure would also help LDCs to reduce their vulnerability to climate change, namely the occurrence of extreme events such as droughts or floods.

The expansion of infrastructure in LDCs contributes to structural transformation towards a better diversification of the economy. Structural specificities are mainly related to the scarcity of infrastructure and high predominance of low-productivity sectors in the total share of GDP. Moving into sectors with higher productivity can enable LDCs to overcome their inclusive growth and poverty challenges. However, this is impossible in the absence of improvements in infrastructure and developments in this group of countries (UNCTAD 2009). LDCs' economies are mainly based on the export of products with low value added, such as agricultural products and extraction of natural resources. Moreover, by tackling the infrastructure gap, LDCs can enhance their productivity capacity and facilitate the development of sectors with higher value added. Therefore, evolving towards sectors with higher productivity would make these countries less dependent on raw materials exports and expand their market access. A more diversified economic structure (in particular by boosting the manufacturing sector) would strengthen the resilience to external shocks in LDCs.

Better infrastructure can promote higher foreign direct investment (FDI) in LDCs and be a catalyst for FDI in other sectors. Implementing credible macroeconomic policies is a key challenge for growth in most of the LDCs. In addition, LDCs need to address their infrastructure gap in order to attract more FDI that is oriented towards productive sectors (UNCTAD 2010). This would also spur the development and enlargement of local markets, leading to the implementation of new small and medium enterprises in LDCs (Wresch 2003). Emerging economies can play a key role in providing further FDI.

Although LDCs have already adopted national legislation that opens most of their services sectors to FDI, these economies represent less than 1 per cent of world

infrastructure FDI stock and less than 5 per cent of the world's FDI inflows (Honeck 2011). This can in part be attributed to persistent difficulties in market access: in several LDCs, some restrictions on foreign participation have been retained in certain strategic sectors despite the trend towards greater openness – most frequently in electricity, telecommunications and rail infrastructure. Many of these countries are also geographically constrained by their narrow domestic market size, which works as a disincentive for investment (Asiedu 2005). Therefore, the overall performance of investment in these countries (not only from foreign origin but also from domestic investors) remains poor. This is particularly evident for Africa: according to OECD (2013), during the 1990–2010 period, infrastructure investment with private participation represented less than USD 170,000 billion, well below other developing regions, such as Latin America (more than USD 600,000 billion). However, small domestic market size highlights the potential and need for regional infrastructure projects. Regional initiatives represent a crucial opportunity and could be further supported by development aid.

4.1.2 The IPoA commitment on infrastructure, energy, and water and sanitation

The IPoA sets a list of general goals and targets in the area of infrastructure, energy and water (Table 4.1).

The IPoA also sets a list of actions for both LDCs and development partners (Table 4.2). Actions related to infrastructure are classified in three distinct sections in the IPoA: infrastructure (transport and communications are covered), energy, and water and sanitation. While actions on infrastructure and energy are integrated in the area of productive capacity, water and sanitation are included in the area of human and social development.

Table 4.1 IpoA. Goals and targets on infrastructure, energy, and water and sanitation

Productive capacity
(c) Significantly increase access to telecommunication services and strive to provide 100 per cent access to the internet by 2020;
(d) Strive to increase total primary energy supply per capita to the same level as other developing countries;
(e) Significantly increase the share of electricity generation through renewable energy sources by 2020;
(f) Enhance capacities in energy production, trade and distribution with the aim of ensuring access to energy for all by 2030;
(g) Ensure that the least developed countries have significant increase in combined rail and paved road mileage and sea and air networks by 2020
Water and sanitation
• Halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation and strive to provide sustainable access to safe drinking water and basic sanitation to all by 2020

Table 4.2 IPoA. Actions on infrastructure, energy, and water and sanitation

Infrastructure
1. Action by least developed countries: a) Allocate and disburse annually an adequate percentage of the budget for the development and maintenance of infrastructure; b) Develop and implement comprehensive national policies and plans for infrastructure development and maintenance encompassing all modes of transportation and ports, communications and energy; c) Develop modern ICT infrastructure and internet access, including expansion into rural and remote areas, including through mobile broadband and satellite connections; d) Build and expand broadband connectivity, e-networking and e-connectivity in relevant areas, including education, banking, health and governance; e) Promote public–private partnerships for the development and maintenance of transport and ICT infrastructure and their sustainability; f) Promote bilateral, sub-regional and regional approaches to improve connectivity by removing infrastructure bottlenecks
2. Action by development partners: a) Provide enhanced financial and technical support for infrastructure development in line with least developed countries' sectoral and development needs and priorities, and use concessional funds, where appropriate, to catalyse and leverage other sources of funding for infrastructure development and management; b) Support least developed countries' efforts to facilitate the transfer of relevant skills, knowledge and technology for the development of infrastructure under mutually agreed terms; c) Actively support private sector investment, including through public–private partnerships and grant/loans blending, for infrastructure development and maintenance in communication and multimodal transport such as railways, roads, waterways, warehouses and port facilities; d) Provide assistance to landlocked and small-island least developed countries aimed at addressing the challenges of their remoteness from international markets and lack of infrastructure connectivity.
Energy
1. Action by least developed countries: a) Ensure that the energy sector receives priority in budget allocation; b) Adopt integrated energy security development policies, strategies and plans to build a strong energy sector that ensures access to affordable, sustainable and reliable energy for all and promotes sustained, inclusive and equitable economic growth and sustainable development; c) Improve efficiency in the generation, transmission and distribution of energy and sustainable use of energy resources; d) Expand power infrastructure and increase capacity for energy generation, especially renewable energy which includes, inter alia, hydro power, geothermal, tidal, solar, wind and biomass energy.

(continued)

Table 4.2 IPoA. Actions on infrastructure, energy and water and sanitation (continued)

Energy
2. Action by development partners: a) Provide enhanced financial and technical support to the least developed countries to improve efficiency in the generation, transmission and distribution, and the sustainable use of energy resources with the aim of ensuring access to energy for all; b) Support least developed countries' efforts to develop the energy sector in generation, distribution and energy efficiency, including in renewable energy, other clean energy sources and natural gas, inter alia, through financial and technical assistance and by facilitating private sector investment, in accordance with national priorities and needs; c) Facilitate the transfer of appropriate and affordable technology under mutually agreed terms and conditions for the development of clean and renewable energy technologies in accordance with relevant international agreements.
Water and sanitation
1. Action by least developed countries: a) Develop mainstream or strengthen as appropriate integrated strategies and programmes to strive to ensure sustainable access by all to safe drinking water and basic sanitation by 2020; b) Prioritise provision of water and basic sanitation in the country's national development plans; c) Enhance water efficiency and water productivity and ensure more equitable and safe provision of basic water and sanitation services to rural areas and disadvantaged populations. including persons with disabilities; d) Improve the institutional regulatory and policy environment in least developed countries to promote private investment in the water and sanitation sector including in small-scale projects in rural and remote communities; e) Strengthen integrated waste management systems as well as improve wastewater collection and treatment systems. *2. Action by development partners:* a) Provide financial and technical support to least developed countries to improve and expand water and sanitation provision, including water pipelines and sewage networks, as well as support to strengthen the capacity of local institutions for service delivery, quality monitoring, financing, operations and maintenance; b) Support least developed countries' efforts to provide services to the unserved, utilising appropriate technologies and levels of service, and strengthen the capacity of national and local institutions for service delivery, quality monitoring, financing, operations and maintenance; c) Help least developed countries preserve and develop water sources, manage water sheds and enhance water productivity, including through sub-regional and regional collaborations; d) Support transfer of technology under mutually agreed terms for water treatment and waste management; e) Support, as appropriate, partnerships and least developed countries' initiatives to improve hygiene and increase the coverage of basic sanitation, especially for the poor, including the Sanitation and Water for All partnership and 'sustainable sanitation drive: the five-year drive to 2015'

4.2 Monitoring infrastructure, energy and water actions

4.2.1 Shortcomings of the IPoA

The IPoA does not address quantitative commitments on infrastructure. Although all pledges refer to a formal commitment from both LDCs and development partners to improve the overall infrastructure on LDCs, they could be more explicit and precise. For instance, the implementation of a quantitative target for the commitments would constitute a significant improvement. Otherwise, the lack of target specification can make the monitoring process difficult, since the IPoA omits the magnitude of the improvements required both to LDCs and to development partners. Further information and concrete commitments would enable a more successful monitoring process.

The absence of individualised targets for given LDCs and development partners can make the monitoring process misleading. A given improvement in an LDC can represent a great effort for the development partners or for the LDC involved. In contrast, the same improvement in the context of another LDC can be the result of a much smaller effort. Considering all LDCs and development partners in a homogeneous framework (that is not making differentiation when it is suitable) can result in an imprecise measurement of the established commitments.

All steps of the infrastructure projects should be monitored. The development of infrastructures involves many different steps from the first decision to carry out a given infrastructure up to the conclusion of the project. It often takes even more time for the local populations to be able to fully benefit from the recent implemented infrastructures. Thus, when collecting data on indicators, all these aspects should be given equal attention. Infrastructure stocks usually move very slowly. Specifying a precise schedule for the accomplishment of the proposed targets would make the monitoring process more effective and accurate. Ensuring the public availability of data to monitor all the steps of the infrastructure project would also improve the feasibility of the monitoring process.

Sometimes the accomplishment of the commitments by one actor (LDC or development partner) will hinge on the behaviour of the other. In some cases the commitments from both actors are interconnected, being completely dependent. For instance, without further private investment (which development partners pledged to promote in LDCs) LDCs will not be able to fulfil their commitments regarding the improvement and development of infrastructure in a diversity of sectors. The monitoring process should also take these considerations into account, because the violation of one commitment can lead to the non-feasibility of another one.

There is no institution that provides data on total investment in infrastructure in LDCs and on the share of public investment. In contrast to data on private investment commitments in infrastructure and ODA allocated to infrastructure, information on public investment in infrastructure is lacking for some LDCs and, when it exists, it is not comparable between economies.

It would be crucial to have data about the LDCs and development partners' performance regarding the above-mentioned pledges. First in the next steps of monitoring infrastructure developments, data should refer to the year before the IV United Nations Conference on LDCs (for instance 2010). This dataset would work as a control variable to

assess the initial conditions. Then, from 2010 on, and with a given frequency (three years for instance), it would be essential to update the same dataset. Monitoring and assessing the progress requires one to compare initial conditions of chosen variables with updated values of these variables. It is likely that it will be necessary to select a sample of LDCs and development partners representative of the population. The most relevant institution to identify and manage this dataset needs to be identified.

Qualitative indicators related to the regulatory and institutional framework of infrastructure are crucial to capture the effectiveness of infrastructure policies. The design and process of infrastructure and investment policies matter as much as finance in enhancing economic growth. In that context, basic safeguards of the legal framework for procurement and investment in infrastructure, as well as key elements of the policy-making process, could be monitored in order to assess the capabilities of LDCs to achieve infrastructure commitments. For instance, the regulatory and institutional framework as well as the interactions of the main actors in the infrastructure process can be studied at each of the main phases of the infrastructure policy-making process (i.e. prioritisation and planning, execution, operation and maintenance, and monitoring and evaluation phases).

4.2.2 Proposed infrastructure, energy and water indicators for LDCs

Although infrastructure stocks usually move very slowly, this section compares the progress on infrastructure stocks among different groups of countries. In order to compare stocks in infrastructure between different groups of LDCs and with other economies, this chapter uses the latest standard data provided by international organisations or forums, such as the World Bank, the United Nations Conference on Trade and Development (UNCTAD) or the World Economic Forum.[5] Annex 4.1 provides a description of the methodology employed and a classification of the studied countries. In addition, Annex 4.2 provides data on these indicators for each LDC. In particular, this section shows the improvements for each country since the reference period (2005–08), or a closer period when not available.

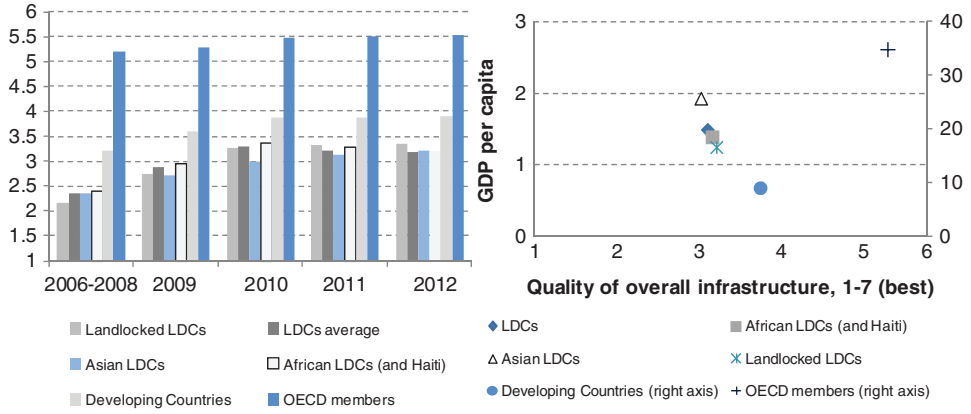
The quality of overall infrastructure strongly increased from 2006 to 2010 and then stagnated between 2010 and 2012. This major increase in the quality of overall infrastructure was particularly important in the group of landlocked LDCs, which were the lowest group of countries in 2006–08 and became the highest one in 2012.

Standard indicators highlight the need for more infrastructure stock, in terms of both quantity and quality. They show that LDCs' stock in infrastructure is well below developing and the Organisation for Economic Co-operation and Development (OECD) countries for all infrastructure sectors. In general, the quality of overall infrastructure in LDCs remains well below developing and OECD economies, and this is correlated with low GDP per capita (Figure 4.1).

Transport

To monitor goals and targets of the IPoA on transport infrastructure we propose a set of indicators provided by the UNCTAD, the World Bank and the World Economic Forum (Table 4.3).

Figure 4.1 Quality of overall infrastructure and GDP per capita



Note: From 1 to 7 (7 being the best ranking). GDP per capita is in USD thousands, adjusted for purchasing power parity (PPP) (2011).
Source: World Economic Forum, World Bank

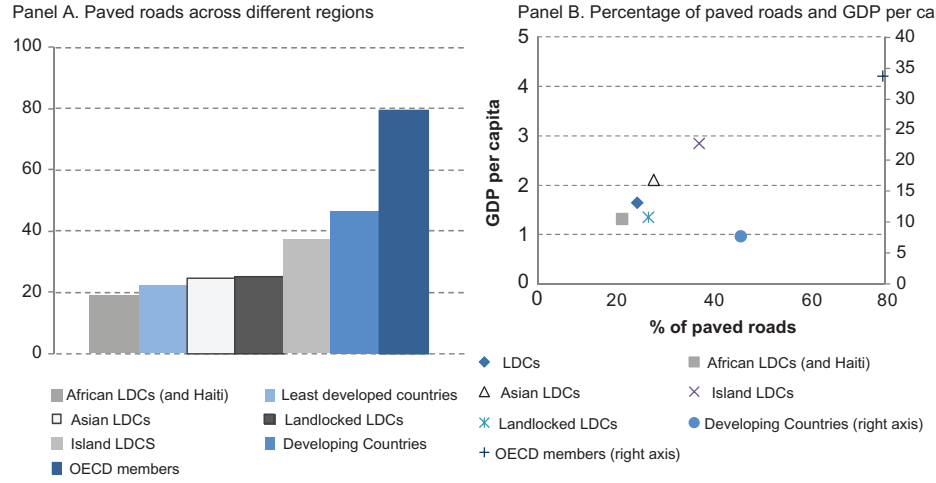
Table 4.3 IPoA. Goals and targets on transport infrastructure and proposed indicators

Goals and targets	Proposed indicators	Source
Productive capacity: (g) Ensure that the least developed countries have significant increase in combined rail and paved road mileage and sea and air networks by 2020	Paved roads across different regions (% of total roads)	UNCTAD; World Development Indicators. World Bank
	Quality of roads (ranking)	World Economic Forum
	Quality of port infrastructure (ranking)	World Economic Forum
	Quality of air transport infrastructure (ranking)	World Economic Forum
	Available airline seat km/week. millions	World Economic Forum
	Quality of railroad infrastructure	World Economic Forum

Between 2006 and 2012 the quality of roads and port infrastructure strongly increased, especially in landlocked LDCs, whereas air and rail transport did not really improve. Despite the scarcity of information on transport infrastructure, comparative analysis shows that LDCs are well behind developing and OECD countries in quantity and quality of transport infrastructure.

Most of the information available to analyse LDCs' stock on infrastructure comes from road networks. Data include the extension of road networks (in kilometres), as well as the percentage of paved roads in the total stock of roads for each LDC. As of 2008 (the latest available data), LDCs only have 20 per cent of their road total paved, while for developing and OECD countries the same indicator is close to 55 per cent and 80 per cent respectively (Figure 4.2). Among LDCs and given

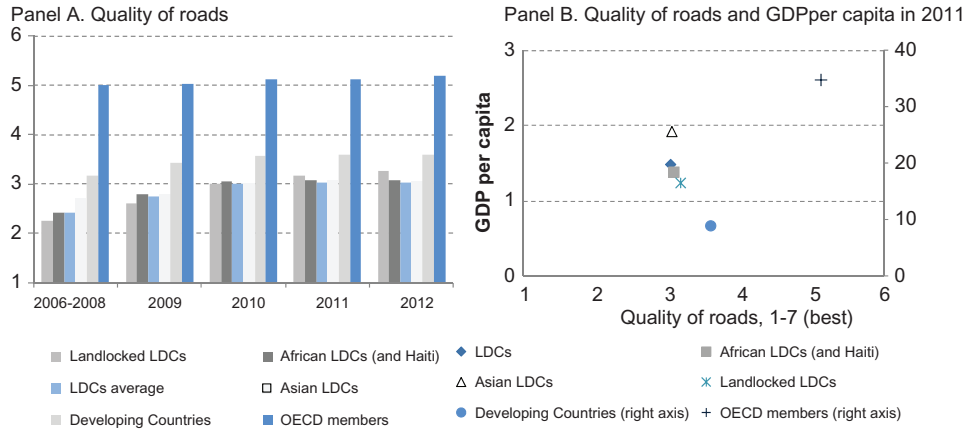
Figure 4.2 Indicators on percentage of paved roads and GDP per capita



Note: 2008 data (latest data available). Percentage of total roads. GDP per capita is in USD thousands, adjusted for PPP.
Source: UNCTAD 2011; World Development Indicators, World Bank

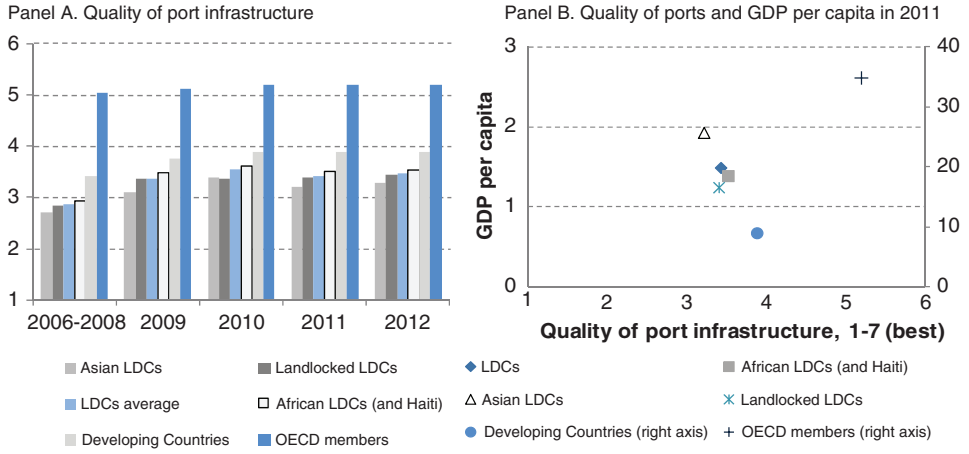
data available, Comoros is the country that holds the highest share of paved roads (more than 76 per cent of total roads). In contrast, the Democratic Republic of the Congo and Solomon Islands are ranked at the bottom of this classification, with a percentage of paved roads close to 2 per cent of the total roads. African LDCs have the main gap in the quality of roads among LDCs after controlling for the level of development (Figure 4.3).

Figure 4.3 Indicators on quality of roads and GDP per capita



Note: From 1 to 7 (7 being the best ranking). GDP per capita is in USD thousands, adjusted for PPP.
Source: World Economic Forum, World Bank

Figure 4.4 Indicators on quality of port infrastructure and GDP per capita



Note: From 1 to 7 (7 being the best ranking). GDP per capita is in USD thousands, adjusted for PPP.
Source: World Economic Forum, World Bank

Regarding port infrastructure in LDCs, although some improvement in its quality is observed in 2009 with respect to previous years, since 2010 no progress has been observed and the quality of port infrastructure remains below that of developing and OECD economies. In particular, after controlling for the level of GDP per capita, the quality of port infrastructure remains low in Asian LDCs in comparison with other LDCs (Figure 4.4).

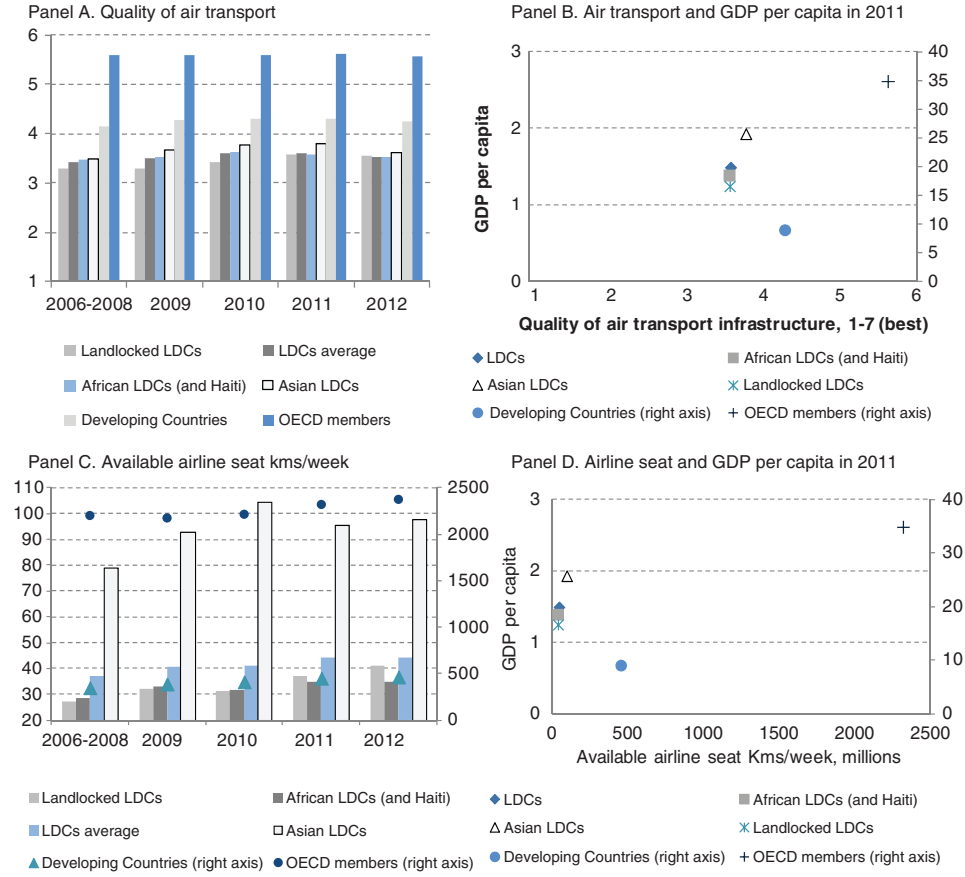
The quality of air transport infrastructure in landlocked LDCs has significantly improved since 2010. In contrast, African LDCs have not progressed as far as LDCs in general and the quality level remains below that of other LDCs after controlling for GDP per capita (Figure 4.5, panels A and B). Available airline seats per kilometre flown remain well below in LDCs in comparison with developing and OECD economies (Figure 4.5, panels C and D).

Although information on railways is scarce for LDCs, the quality of rail transport remains similar among groups of LDCs. However, the quality of railway infrastructure in LDCs remains well below that of other countries and no recent progress has been observed (Figure 4.6). Data available on railway supply shows that the highest density of railways is in Tanzania, with almost 175 km of railways per 1,000 km^2 of land. Uganda is at the bottom of this distribution, with only 0.3 km of railways per 1,000 km^2.

Telecommunications

To monitor goals and targets on telecommunications in the IPoA we propose a set of indicators provided by the OECD, the World Bank and the World Economic Forum (Table 4.4).

Figure 4.5 Indicators on air transport infrastructure and GDP per capita

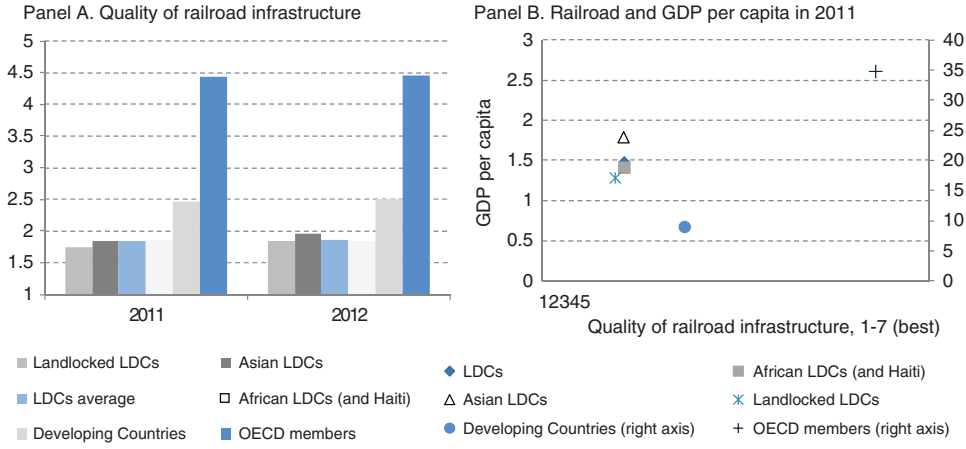


Notes: From 1 to 7 (7 being the best ranking). GDP per capita is in USD thousands, adjusted for PPP; airline seat km/week in millions. GDP per capita is in USD thousands, adjusted for PPP.
Sources: World Economic Forum, World Bank

The percentage of internet users and fixed broadband internet subscribers soared between 2005 and 2011, showing a catching-up effect with OECD countries. This phenomenon was particularly strong in Africa, where the share of internet users increased four-fold over the period, from 2 per cent of the population in 2005 to 8 per cent in 2011.

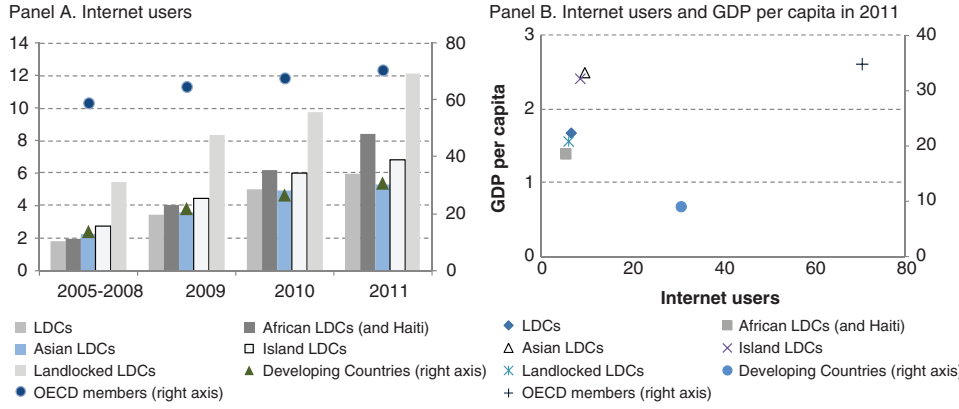
LDCs are constrained by poor communication infrastructure. In order to assess the infrastructure in telecommunications, standard indicators such as the number of users or subscribers of different technologies can be used. As of 2011, LDCs exhibit few internet users both in absolute and relative terms (Figure 4.7). According to the most recent data, there are less than 6 internet users per 100 people in LDCs. This value contrasts with more than 30 and 70 internet users per 100 inhabitants for developing and OECD countries respectively. Regarding fixed broadband internet subscribers per 100 inhabitants, this value is close to zero in LDCs, whilst it is more

Figure 4.6 Quality of railway and GDP per capita



Note: From 1 to 7 (7 being the best ranking). GDP per capita is in USD thousands, adjusted for PPP.
Source: World Economic Forum, World Bank

Figure 4.7 Internet users and GDP per capita (2005–11)



Note: Users per 100 people. 2011 data (latest data available). GDP per capita is in USD thousands, adjusted for PPP.
Source: World Bank, World Development Indicators

than 5 and 25 for developing and OECD countries respectively (Figure 4.8). On average, there are more than 40 mobile phone subscribers per 100 people in LDCs (Figure 4.9). Yet, these numbers are consistent with the level of GDP per capita when compared with developing and OECD countries. We observe similar results for fixed telephone lines (Figure 4.10). However, improvements in mobile subscriptions can substitute the access to fixed telephone lines, the latter being less effective and efficient for development.[6]

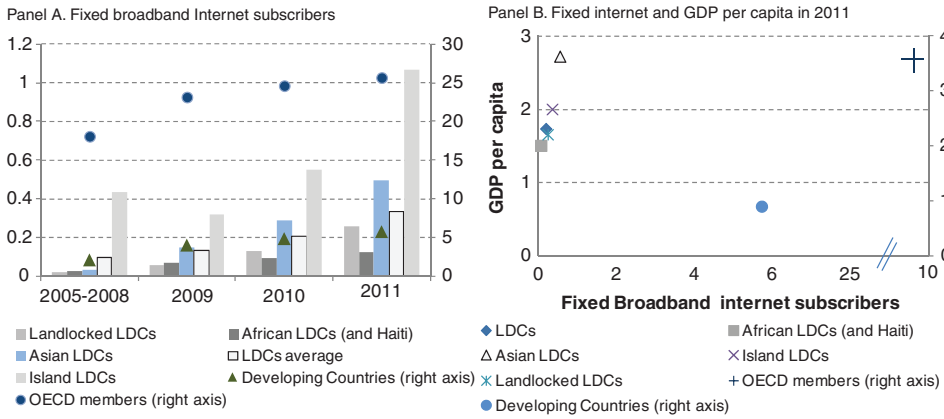
Nevertheless, LDCs have made progress in the telecommunications sector over the last years. The number of users and/or subscribers of the above-mentioned services have risen in LDCs following a similar trend observed in other regions.

Table 4.4 IPoA. Goals, targets and actions on telecommunication and proposed indicators

Goals and targets/actions	Proposed indicators	Source
Productive capacity (c) Significantly increase access to telecommunication services and strive to provide 100 per cent access to the internet by 2020 **Action by least developed countries** (c) Develop modern ICT infrastructure and internet access. including expansion into rural and remote areas. including through mobile broadband and satellite connections **Action by development partners** (a) Provide enhanced financial and technical support for infrastructure development in line with least developed countries' sectoral and development needs and priorities. and use concessional funds. where appropriate. to catalyse and leverage other sources of funding for infrastructure development and management; (c) Actively support private sector investment. including through public private partnerships and grant/loans blending. for infrastructure development and maintenance in communication and multimodal transport such as railways. roads. waterways. warehouses and port facilities	• Internet users per 100 people • Fixed broadband internet subscribers per 100 people • Fixed telephone lines per 100 people • Mobile cellular subscriptions per 100 people • Disbursements of ODA allocated to infrastructure in LDCs • Private investment commitments in infrastructure in LDCs by type of project in USD billions • Involvement of other public institutions (questions 2B; 4B*) • Average size of financing renegotiation (question 10D*) • Frequency of renegotiation of the execution contracts (question 10C*) • Frequency of turnover practices in assigning contracts to the same contractors (question 10E*) • Frequency of renegotiation of the maintenance contracts (question 11J*) • Frequency of turnover practices in assigning contracts in maintenance projects (question 11K*)	World Bank, World Development Indicators World Bank, World Development Indicators World Economic Forum World Bank, World Development Indicators OECD Creditor Reporting System (CRS) database World Bank Private Participation in Infrastructure database OECD Development Centre Survey

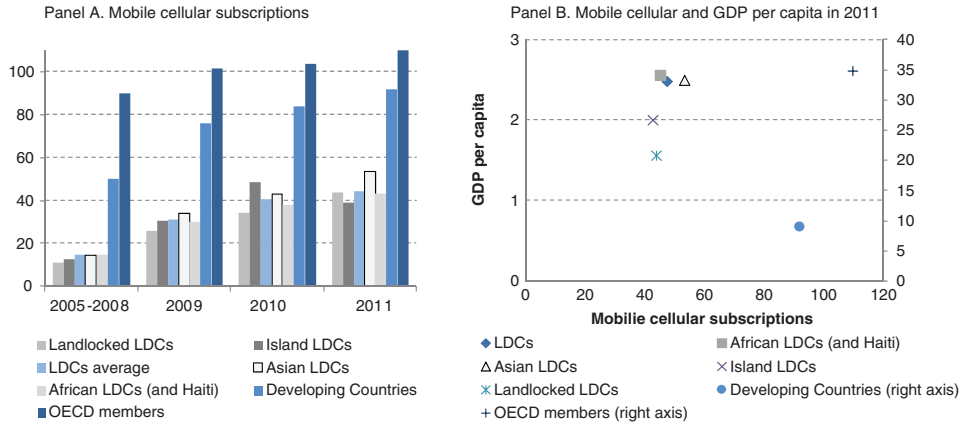
Note: * see www.oecd.org/dev/partnerships-networks/QUESTIONNAIRE_OECD_Survey_on_Infrastructure_2011.pdf (accessed 1 April 2014).

Figure 4.8 Fixed broadband internet subscribers and GDP per capita (2005–11)



Note: Subscriptions per 100 people. 2011 data (latest data available). GDP per capita is in USD thousands, adjusted for PPP.
Source: World Bank, World Development Indicators

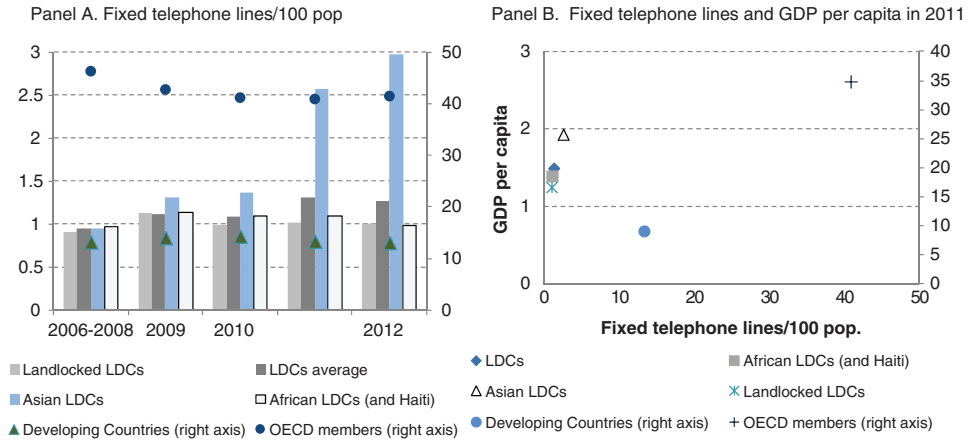
Figure 4.9 Mobile cellular subscriptions and GDP per capita (2005–11)



Note: Subscriptions per 100 people. 2011 data (latest data available). GDP per capita is in USD thousands, adjusted for PPP.
Source: World Bank, World Development Indicators

The most remarkable increase is in the number of mobile phone subscriptions per 100 people (from less than 10 in 2001 to more than 40 in 2011). Among the different groups of LDCs considered, Asian countries are those that present the highest number of mobile phone subscriptions per 100 inhabitants. Regarding internet users, landlocked LDCs rank at the top of the distribution, presenting more than 12 users per 100 people.

Figure 4.10 Fixed telephone lines and GDP per capita (2006–12)



Note: GDP per capita is in USD thousands, adjusted for PPP.
Source: World Economic Forum, World Bank

Energy

To monitor goals and targets in the IPoA on energy we propose a set of indicators provided by the OECD, the World Bank, the World Economic Forum and the UNCTAD (Table 4.5).

LDCs stand well below other groups of countries in generation capacity and efficiency on energy. The percentage of the population in LDCs having access to electricity as of 2009 is less than 25 per cent. These values are well below those observed for developing countries, where 72 per cent of the population has access to electricity. Among LDCs, Laos has the highest share of the population having access to electricity (55 per cent). Conversely, among the LDCs for which there is available data, Malawi and Uganda are the countries with the lowest share of their population having access to electricity (less than 10 per cent).

Furthermore, renewable sources of energy in most of the LDCs have worsened in previous decades. Renewable net installed electricity capacity provides information on the net percentage of electricity that is produced from renewable sources of energy, such as natural resources. This indicator helps to measure the sustainability and dependence of electricity production. The volume of renewable net installed electricity capacity also has important implications in terms of energy import dependence, as reducing the share of renewables in total energy supply can significantly increase dependence on oil imports to fill electricity production gaps. This has recently been the case in some developing countries such as Mauritius and Tanzania.

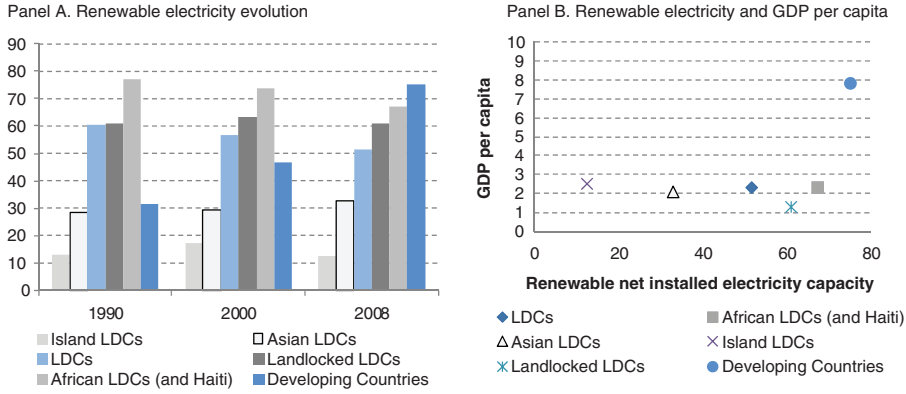
Access to renewable sources of energy has accordingly decreased in the past decades (Figure 4.11, panel A). Between 1990 and 2008 (latest year available), the electricity produced in LDCs from renewable sources decreased by close to 10 per cent. In contrast, developing countries improved considerably in this period: 75 per cent of

Table 4.5 IPoA. Goals, targets and actions on energy and proposed indicators

Goals and targets/actions	Proposed indicators	Source
Goals and targets, energy (d) Expand power infrastructure and increase capacity for energy generation, especially renewable energy which includes, inter alia, hydro power, geothermal, tidal, solar, wind and biomass energy; (f) Enhance capacities in energy production, trade and distribution with the aim of ensuring access to energy for all by 2030 **Action by least developed countries** Improve efficiency in the generation, transmission and distribution of energy and sustainable use of energy resources **Action by development partners** (b) Support least developed countries' efforts to develop the energy sector in generation, distribution and energy efficiency, including renewable energy, other clean energy sources and natural gas, inter alia, through financial and technical assistance and by facilitating private sector investment, in accordance with national priorities and needs	• Renewable net installed electricity capacity (% of total net installed electricity capacity) • Quality of electricity supply • Getting electricity (ranking) • Getting electricity (number of days) • Getting electricity – cost (% of income per capita)	UNCTAD World Economic Forum World Bank, Doing Business World Bank, Doing Business World Bank, Doing Business
Action by least developed countries (b) Adopt integrated energy security development policies, strategies and plans to build a strong energy sector that ensures access to affordable, sustainable and reliable energy for all and promotes sustained, inclusive and equitable economic growth and sustainable development	• Institutional framework (question 1) • Roles and responsibilities in the infrastructure stages (question 2)	OECD Development Centre Survey

Note: See www.oecd.org/dev/partnerships-networks/QUESTIONNAIRE_OECD_Survey_on_Infrastructure_2011.pdf (accessed 1 April 2014).

Figure 4.11 Renewable electricity and GDP per capita (1990–2008)



Note: 2008 data (latest data available). Renewable net installed electricity capacity (% of total net installed electricity capacity). GDP per capita is in USD thousands, adjusted for PPP.
Source: UNCTAD 2011

the electricity capacity was from renewable sources in 2008 against 31.5 per cent in 1990. The heterogeneity among LDCs is significant. In Bhutan, Burundi, Democratic Republic of the Congo and Zambia almost 100 per cent of electricity production comes from renewable sources, mainly hydropower, and needs to be more diversified. In contrast, in countries such as Bangladesh, Benin, Cambodia, Equatorial Guinea and Senegal, access to renewable sources of energy represents less than 5 per cent of the electricity capacity. In terms of the level of development of the economy, island LDCs have a low percentage of renewable sources of energy in their total electricity capacity (Figure 4.11, panel B).

Since 2009, the perception of the quality of electricity has not improved in LDCs and has even decreased in the case of African LDCs. When it is controlled for the level of development, Asian LDCs have a low level of quality of electricity supply in comparison with other groups of LDCs (Figure 4.12).

However, impressive improvements are observed in the number of days an electricity connection can be obtained in LDCs. In particular, the number of days on which electricity was unavailable in African LDCs went from 180 days in 2010 to less than 140 days in 2013. Similarly, island and landlocked LDCs have improved in this indicator. In contrast, Asian LDCs have deteriorated (Figure 4.13).

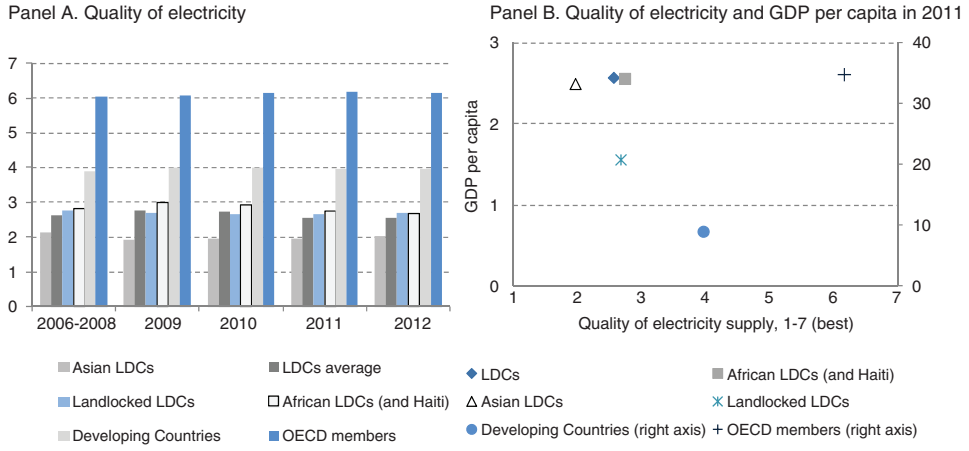
Water and sanitation

To monitor goals and targets in the IPoA on water and sanitation we propose a set of indicators provided by the World Bank (Table 4.6).

In order to measure progress in sanitation and water supply, this chapter considers three key indicators: improved sanitation facilities, improved water sources in rural areas and improved water sources in urban areas.[7]

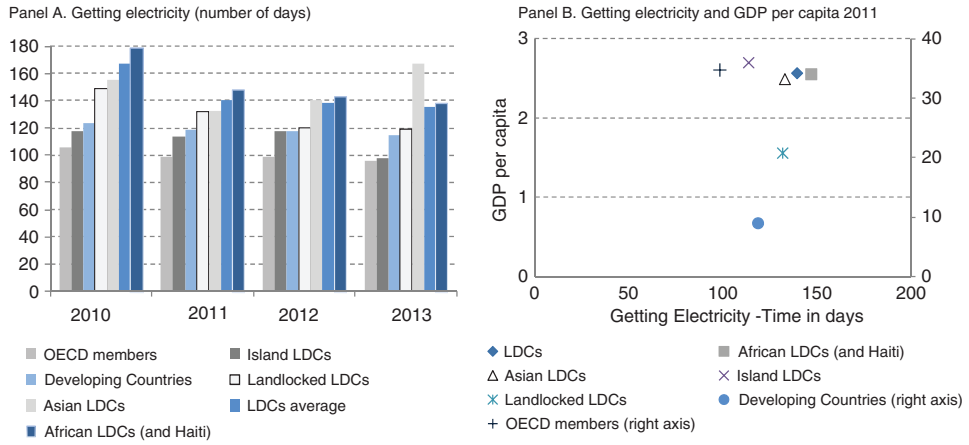
The percentage of the population having access to improved sanitation facilities and improved water sources in both rural and urban areas remained flat between 2005

Figure 4.12 Quality of electricity supply and GDP per capita (2006–12)



Note: From 1 to 7 (7 being the best ranking), GDP per capita is in USD thousands, adjusted for PPP.
Source: World Economic Forum

Figure 4.13 Getting electricity and GDP per capita (2010–13) (number of days)



Note: The number of days to obtain a permanent electricity connection. The measure captures the median duration that the electricity utility and experts indicate is necessary in practice, rather than required by law, to complete a procedure. GDP per capita is in USD thousands, adjusted for PPP.
Source: World Bank, Doing Business

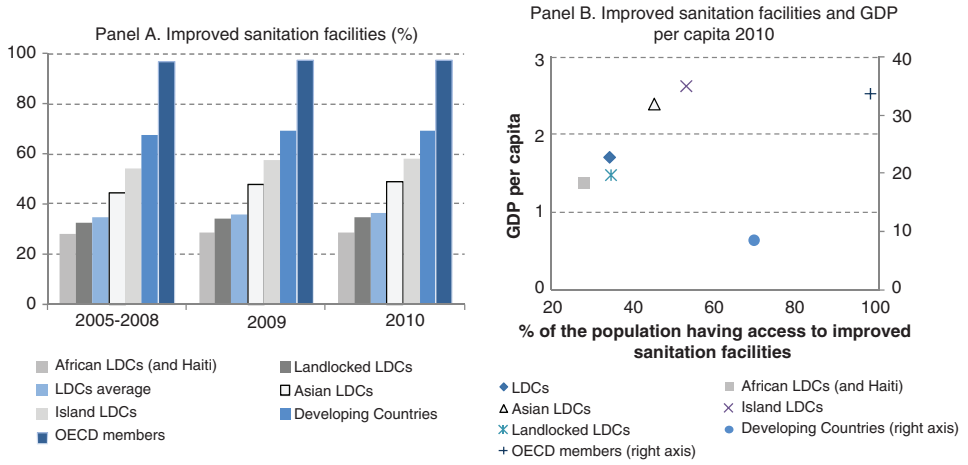
and 2010 (Figure 4.14). Comparing the different groups of LDCs, island LDCs are the group that performs better for all the water supply and sanitation indicators considered. In contrast, after controlling for the level of GDP per capita, African LDCs have the main gap in these types of infrastructure (Figure 4.14, panel B). However, the Millennium Development Goal of halving the proportion of people without access to an improved water source (Target 7.C) was met and a longer series shows an increase in the proportion of the population with access to water and sanitation.

Table 4.6 IPoA. Goals, targets and actions on water and sanitation and proposed indicators

Goals and targets/actions	Proposed indicators
Halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation. and strive to provide sustainable access to safe drinking water and basic sanitation to all by 2020	Percentage of the population having access to improved sanitation facilities Percentage of the population having access to improved water source in rural areas Percentage of the population having access to an improved water source in urban areas

Source: World Bank, World Development Indicators

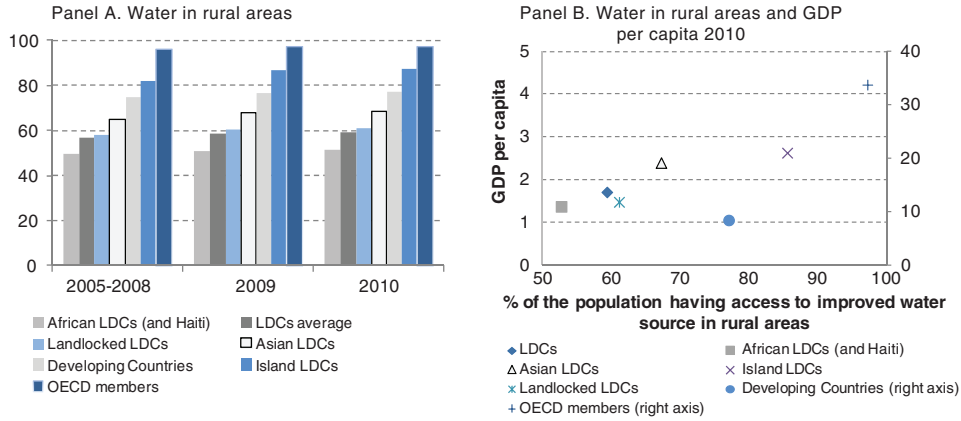
Figure 4.14 Improved sanitation facilities (%) and GDP per capita (2005–10)



Note: GDP per capita is in USD thousands, adjusted for PPP.
Source: World Bank, World Development Indicators

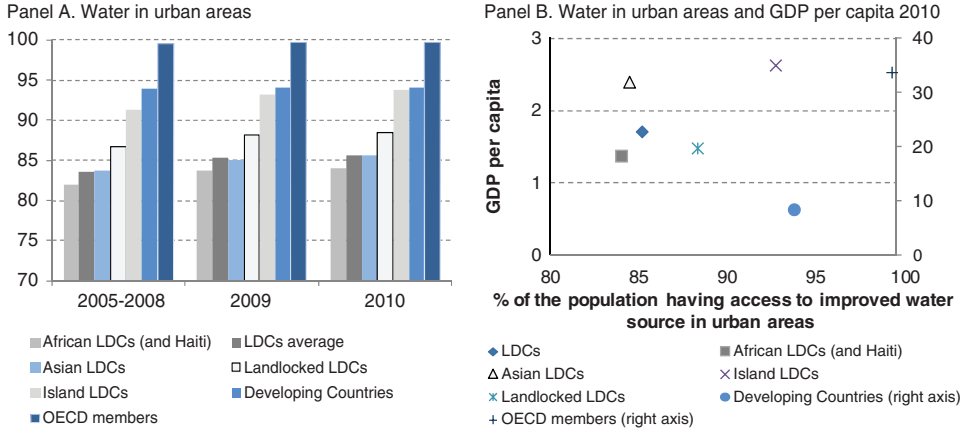
LDCs are endowed with very scarce water supply and sanitation infrastructure in both absolute and relative terms. Only 36 per cent of the population in LDCs in 2010 (latest available data) had access to improved sanitation facilities, in contrast to 70 per cent and 100 per cent in developing and OECD economies respectively. Among LDCs, the population's lack of access to improved sanitation facilities is particularly evident in Niger, where less than 10 per cent of the population has access to improved sanitation facilities. Only 56 per cent and 82 per cent of the population had access to an improved water source in rural and urban areas in 2010 respectively (Figures 4.15 and 4.16). In the rural areas of Somalia, the lack of access to an improved water source is also particularly acute, with less than 10 per cent of the population being able to access one. In contrast, in Bhutan, Samoa and Tuvalu almost 100 per cent of the population in rural areas have access to an improved water source (Figure 4.16).

Figure 4.15 Improved water source in rural areas (%) and GDP per capita (2005–10)



Note: GDP per capita is in USD thousands, adjusted for PPP.
Source: World Bank, World Development Indicators

Figure 4.16 Improved water source in urban areas (%) and GDP per capita (2005–10)



Note: GDP per capita is in USD thousands, adjusted for PPP.
Source: World Bank, World Development Indicators

4.3 The sources of investment

The current levels of investment in infrastructure in LDCs are insufficient. Sub-Saharan African countries (which represent 33 out of the 48 LDCs) would need an annual increase of around USD 19 billion to close their infrastructure gap in the next ten years (Honeck 2011). The largest share of this funding shortfall corresponds to water supply and sanitation (USD 9 billion) and electricity (USD 7.5 billion). The average level of annual investment in infrastructure in developing countries varies between 3 and

4.5 per cent of the GDP (Estache 2010). As is shown above, in telecommunications, transport, energy and water, LDCs present the lowest infrastructure stock in the world. These numbers fall short of the annual infrastructure expenditures that LDCs should make, which should be around 7 per cent of their annual GDP (UNCTAD-UNDP 2007; Briceño-Garmendia et al. 2004). Although there are no data for these needs by sector specifically for LDCs, in the low-income African countries water supply and sanitation as well as electricity will be the infrastructure sectors with the largest financing needs during the next decade. They would be absorbing 47 per cent and 39 per cent of the total increase in expenditure respectively (Honeck 2011). Therefore, more investment in infrastructure is required to fulfil LDCs' needs. In order to analyse carefully the investment needs per infrastructure sector, it is of key importance to follow a standard methodology and data. In that context, OECD publications on 'Infrastructure to 2030' could provide ideas and methodologies for a more in-depth analysis of long-term investment in infrastructure in LDCs (OECD 2006, 2007).

More than 35 per cent of the investment in infrastructure comes from LDC governments' budgets. The methodology used in Estache (2010) to compute a range of values for the total public investment in infrastructure in developing countries can be applied to LDCs. First, it is assumed that 3 per cent to 4.5 per cent of GDP corresponds to an upper bound for the total investment in infrastructure in LDCs. Second, the numbers of commitments of private participation in infrastructures in LDCs as well as the flows for ODA attributed to LDCs for the purpose of infrastructure development can be used to estimate the participation of these sources of financing in the total investment in infrastructure.[8] Third, it is assumed that the residual part of the investment in infrastructure in LDCs comes from the public sector. According to this methodology, and using the latest year for which there are available data (i.e. 2009), private sector commitments were roughly equivalent to between 27 per cent and 40 per cent of the total investment in infrastructure, depending on whether the total investment level was close to 3 per cent or 4.5 per cent of GDP respectively. For the same year, ODA accounted for between 16 per cent and 24 per cent of the participation in the total investment in infrastructure in LDCs. Consequently, the share of national public investment for the total investment in infrastructure in LDCs can vary between 36 per cent and 58 per cent of GDP.

The structure of ownership and the sources of financing in infrastructure investment can affect LDCs' economic growth and welfare distribution. The approach through which infrastructure projects are financed is, for instance, a key determinant of economic growth. Empirical evidence suggests that a decrease in the external indebtedness in LDCs or Heavily Indebted Poor Countries (HIPC) could have a positive impact on their income growth per capita (see Wamboye 2012; Bhattacharya et al. 2003). In addition, although there is relatively little empirical evidence on the impact of public versus private infrastructure on aggregate output, the type of ownership in infrastructure projects has an impact on the welfare distribution among the stakeholders and on the incentives for service provision (see Estache and Grifell-Tatjé 2010). In the absence of ability to pay for the services on the demand side (unless these are subsidised), profitability may be jeopardised and private entities may lack the incentives to provide these services. For this reason, basic utility services in LDCs

are often provided by the public sector, mostly through state-owned monopolies which rely on production subsidies so as to offer the services at tariffs that are fixed below the cost-recovery rate.

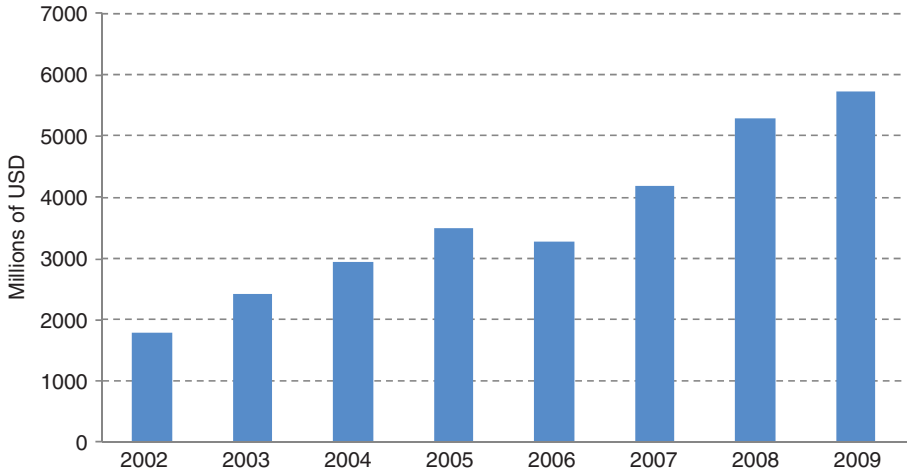
Tariff-setting of infrastructure services in the interest of end-user affordability can however raise important risks in terms of fiscal sustainability and efficiency. Infrastructure pricing policies that rely on production subsidies often impose a fiscal burden on LDC governments. While broadening the access of poorer citizens to electricity is a crucial objective to uphold, this does not have to be the most efficient way to address the power access gap. In fact, production subsidies do not automatically generate the expected socially desirable effects. In several LDCs, electricity access remains geographically constrained to areas inhabited by the richer segments of the population – as a result, the artificially low tariffs, backed with extensive public funding, act mostly as a regressive subsidy for the upper class rather than facilitating access for the poor. Replacing production subsidies by consumption subsidies can help strike the balance between investment efficiency and end-user affordability while mitigating fiscal risks and allowing state-owned enterprises to operate on a more commercial basis. Moreover, infrastructure sector regulators can play an important role in keeping utility markets competitive (when they have been liberalised), as well as in tariff setting. Unless services are subsidised by the government, the majority of the population would not be able to access them. The prices charged in Africa for services related to their infrastructure networks stand well above global standards. While in some sectors this is the result of high operational costs, in other cases, such as the telecommunications sector as well as the transport sector, in particular roads, it simply reflects high profits (Foster 2008).

4.3.1 The role of ODA

Official development assistance (ODA) allocated to infrastructure as a share of the country's GDP is much higher in LDCs than in developing countries. This evidence is observed in all the infrastructure sectors. From 2002 to 2009, the value of total ODA allocated to infrastructure as a percentage of GDP remained relatively constant for both LDCs and developing countries. For LDCs this value has always been stable at around 1 per cent of GDP. For developing countries this value is well below, being always smaller than 0.2 per cent of GDP (Figure 4.17). Telecommunications is the sector that has benefited the least from ODA (Figure 4.18). For LDCs the value of ODA allocated to telecommunications' infrastructures did not exceed 0.05 per cent of GDP for the period 2002–09. Finally, over the last couple of years (with few exceptions), the group of island LDCs has received the highest ODA investment in infrastructure as a percentage of GDP.

From 2002 to 2009 the ODA allocated to infrastructure projects in LDCs has consistently increased (except in 2006). The value of the gross disbursements allocated to infrastructure in LDCs more than tripled in less than one decade. It was the result of a consistent and continuous surge in the ODA allocated to infrastructure in LDCs (Figure 4.17). This increase was pronounced in sectors such as energy, transport, water supply and sanitation. ODA gross disbursements allocated to the development

Figure 4.17 Disbursements of ODA allocated to infrastructure in LDCs



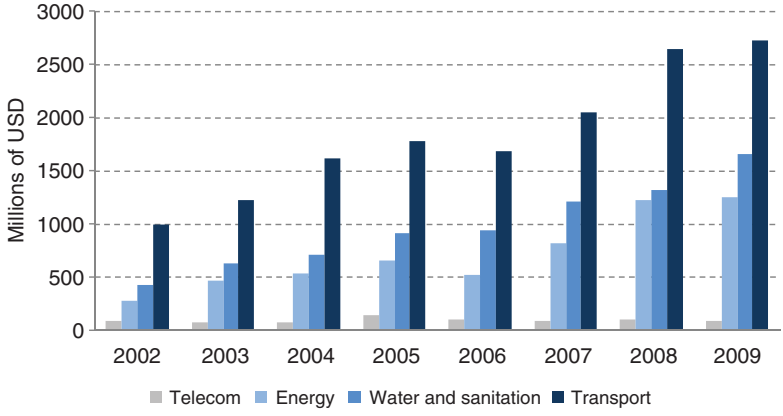
Source: OECD database

of infrastructure in the ICT sector kept constant over the period. The transport sector is the one that benefited the most from higher flows of ODA (Figure 4.18).

4.3.2 The role of private investment

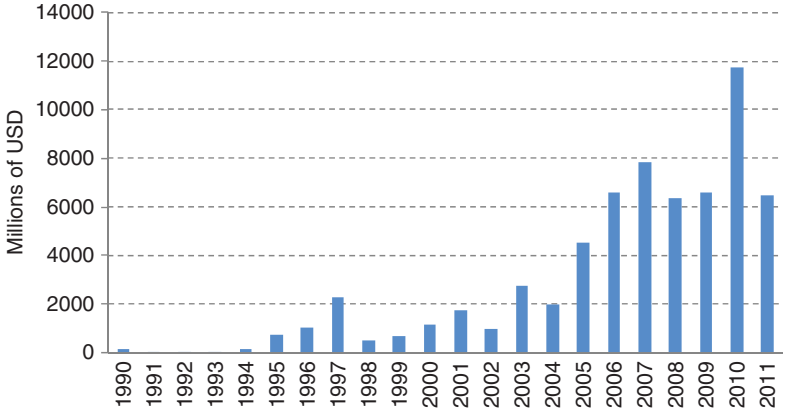
As of 2011, private investment in infrastructure in LDCs corresponds to less than 1 per cent of GDP, well below the same type of investment in developing countries.[9] However, since 1990 private investment commitments have been sharply increasing. For LDCs, this value was almost zero at the beginning of the 1990s, reaching a peak in 2010 at almost 2 per cent of GDP. Among the different sectors considered, water and sanitation is clearly that for which private investment commitments are lower. When these

Figure 4.18 Gross disbursements of ODA allocated to infrastructure in LDCs



Source: OECD database

Figure 4.19 Private investment commitments in infrastructure in LDCs



Source: World Bank, Private Participation in Infrastructure database

commitments exist, they never exceed 0.1 per cent of GDP. Despite the relatively good performance in this particular field for developing countries, these values are modest, never surpassing 0.2 per cent of GDP. The overall private investment commitments in infrastructure on landlocked LDCs for 2011 is close to 7 per cent of GDP, which is well above the average values of all other groups of countries considered.

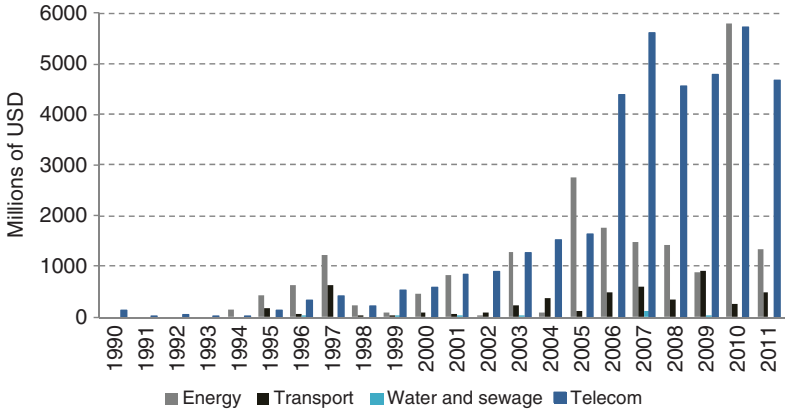
Private investment commitments in LDCs tend to be volatile and to present a significant heterogeneity among the sectors of activity. The peak for the private investment commitments in infrastructure in LDCs was reached in 2010, when private investors committed to invest more than USD 11.5 billion. In spite of high volatility in the last two decades, the commitments have shown an increasing path. During the first years of the 1990s these values were almost negligible. Conversely, in the following years these values have consistently increased (Figure 4.19). Water supply and sanitation is the sector in which private investment commitments are low, and it is followed by the transport sector. In contrast, energy and telecommunications are the sectors that attract more private investment commitments (Figure 4.20).

4.3.3 The role of international capital markets

LDCs present specificities that make their infrastructure financing different from that of developed countries. Industrialised countries rely mainly on private sector resources to finance their infrastructure needs. On the other hand, LDCs must rely essentially on the public sector to play such a role. This difference lies in the fact that LDCs have very limited access to international capital markets. This limited access is explained by investors' concerns about serious risks in these countries.

Further investment from capital markets in developed countries is a key challenge for LDCs. LDCs have to continue to rely essentially on the public sector in order to finance their infrastructure needs. In Africa, where 33 out of the 48 LDCs are located, public finance remains the dominant source to finance water, energy and transport (Foster 2008). New initiatives such as the issuance of foreign currency-denominated

Figure 4.20 Private investment commitments in infrastructure by sector of activity in LDCs



Source: World Bank, Private Participation in Infrastructure database

debt represent an opportunity for the infrastructure development of LDCs. For example, in 2012 Zambia successfully raised a USD 750 million 10-Year Eurobond to upgrade its infrastructure, particularly in the transport and energy sectors.

Leading emerging-market actors also need to cover more countries. International multilateral banks, as well as OECD country financial institutions such as the German development finance agency KfW, have been playing an important role in facilitating the creation of financial bonds in developing countries. These countries remain, however, largely ignored by brokers' analysts and therefore by the private sector. Increasing the scope of analysis to include information on such countries might help to attract more attention from investors and therefore potentially more capital flows. Country coverage by leading investment banks and leading emerging-market benchmarks like the EMBI produced by JP Morgan for the bond markets, or leading global banks such as Citigroup, Deutsche Bank, HSBC, JP Morgan or Morgan Stanley, rarely cover or sample more than 35 economies. The other 120 developing countries (all LDCs are included in that list) simply do not exist for global financial-market investors (Nieto-Parra and Santiso 2007).

Partnership agreements could be reached between leading international organisations, supported by donor agencies, and 'market makers' in emerging markets, in order to boost country coverage. This is particularly evident for LDCs where coverage is lacking. Examples of public–private partnerships have already been implemented in order to improve country coverage. In 2005, Standard & Poor's, one of the two leading rating agencies, initiated the rating coverage of some African sovereigns with the support of the UN Development Programme. In mid-2013, 21 sovereigns were rated. Five years earlier, and with the help of the European Commission, the OECD Development Centre and the African Development Bank launched the first edition of the African Economic Outlook. (Nieto-Parra and Santiso 2007). All these initiatives boosted the economic and rating coverage of a continent

lacking attention from investment banks. These initiatives could be complemented by similar agreements between international organisations and investment banks in order to boost the coverage by leading brokers and help to catch the attention of international investors.

In addition, a wide variety of financing instruments are being made available for infrastructure projects in developing countries on behalf of development partners and Development Finance Institutions. These increasingly stretch beyond traditional grants and loans. In 2012 the OECD Investment and Development Assistance Committees released a report entitled 'Mapping Support for Africa's Infrastructure Investment', which presents an overview of support by development partners as well as these financial instruments that serve as levers to private infrastructure investment. Such instruments include investment funds; blended grants (which combine concessionary financing with debt finance from international financial institutions or market-based sources); risk mitigation instruments (including credit guarantees and partial risk guarantees); and export credit agency instruments (which can provide export credits for their home companies overseas, and can also provide insurance and risk guarantees for investments abroad). All of these instruments enhance the volume of resources available for infrastructure projects and can thereby help to mobilise private investment, especially in countries with limited access to international capital markets.

4.3.4 The role of public–private partnerships

The IPoA considered raising the private investment in LDCs as a priority. The lack of quality in the provision of infrastructures by the public sector in LDCs highlights the limitations underlying public sector financing. Overall, these considerations are pushing LDCs to seek other forms of financing infrastructure, including further engagement from private partners. For this reason the IPoA calls on the development partners to actively promote private participation of investors in the LDCs' infrastructure projects. However, as highlighted below, a good regulatory and institutional framework is a key factor for a successful involvement of the private sector. Otherwise, the welfare cost of private sector participation could be extremely high and public–private infrastructure projects are likely to fall short of delivering the expected cost benefits.

In order to attract more private financial investment in LDCs' infrastructure, new financing schemes should arise. The insufficiency of the public sector in providing the necessary funding to close the LDCs' infrastructure gap, together with a volatile and also insufficient private investment, make desirable a considerable growth in both forms of financing. Therefore, instead of concentrating exclusively on models focused only on private or public investment, LDCs should explore forms of financing that mix both private and public participation and also boost the efficiency of infrastructure.

LDCs should avoid overcharging situations when establishing new financing schemes for infrastructure financing, namely public–private partnerships (PPPs).

Although spurring PPPs constitutes a good strategy to address the problem of both public and private infrastructure financing shortfall, LDCs should ensure the necessary conditions for the good implementation of such contracts. Infrastructure sectors present specific risks to private investors: projects tend to be large-scale, capital intensive and with long development timelines. Owing to the novelty and complexity of PPP projects for most LDCs and to the heavy contingent liabilities that such projects may entail for public finances, the shift from public to private provision of infrastructure services involves many risks and must be carefully prepared and managed.[10]

PPPs and other kinds of contracts that are established in order to attract more private investment participation in infrastructures therefore require a good institutional capacity and a clear and sound legal framework for investment activities. Otherwise, there is a risk of setting up inappropriate contracts, which could protect the private partner more than the public interest. In such a situation, these contracts can be extremely costly for governments, jeopardising their fiscal sustainability, requiring expensive and lengthy renegotiation, or resulting in high prices of the services provided.

Donors constitute an important vehicle for the promotion of private–public collaboration. Although ODA is the source of financing for infrastructure that presents the lowest participation in the total investment, it can constitute a key vehicle. The infrastructure sector continues to be an important field of business for the development agencies (Estache 2010). Furthermore, donors can support and promote public–private collaboration on LDCs (UN Global Compact 2011). In this sense, donors are not only expected to provide hard ODA (financing) to LDCs but also to enhance the conditions for further public–private collaboration. This can be done through diversity channels that can range from providing technical assistance to LDCs' governments to the creation of improved business conditions in order to attract and foster private investment participation.

4.4 The role of public policies in infrastructure

To ensure that infrastructure impacts economic growth, policies matter as much as finance. Economic growth is shaped not only by the level of infrastructure investment but also by the quality of policies. In that context, the design and implementation of infrastructure policies are key elements to increase the effectiveness of infrastructure investment in LDCs. The regulatory and institutional framework as well as the interactions between actors during the design process of infrastructure polices considerably affect the outcomes. More investment in infrastructure does not necessarily affect economic growth beyond the simple physical capital accumulation effect. A policy-making framework is needed to promote such investment in ways that are conducive to increasing economic growth through gains in total factor productivity (i.e. efficiency-enhancing externalities). Essential aspects of the decision-making process, such as assessing the costs and benefits of new investments and creating independent regulatory institutions, are key to efficiency (Égert et al. 2009).

4.4.1 The policy-making process in infrastructure in LDCs

The policy-making process can affect the nature and quality of public policies in infrastructure. Public policies are the translation of the political priorities and principles of governments into programmes and courses of action to deliver the desired outcomes (Goodin et al. 2006). They emerge from a policy-making process, which is a decision-making process involving a multiplicity of actors who interact in a variety of arenas. In view of the complexity of this process, it is fundamental to understand how it operates before designing public policies. In that context, country and sector specific analyses and the consideration of biased decision making should be integrated in the reform process of infrastructure (Benitez et al. 2010). This section analyses the policy-making process in infrastructure based on a survey of policy makers in developing countries (Box 4.1). This survey identifies four key phases to analyse the policy-making process in infrastructure, which are aligned with the pillars of the OECD's relevant investment policy tools (OECD 2007): (i) prioritisation and planning, (ii) execution, (iii) operation and maintenance and (iv) monitoring and evaluation. Although all four phases overlap to varying degrees in the real world, such a framework helps us understand better the prerequisites, elements and consequences of policy making. In each phase, governments have to consider assessments, accountability and oversight mechanisms to properly evaluate the progress of the project. Appropriate allocation of responsibilities at each phase, and adequate integration of policies throughout the whole project cycle help improve the effectiveness of public policies in infrastructure.

A sequence of activities – identification, screening and appraisal – is needed in the prioritisation and planning phase of an infrastructure project. Governments are usually called upon to undertake more projects than they can afford. A rigorous approach can help select those that provide the greatest net benefit to society and can be implemented efficiently (Fischer et al. 2007). This approach involves:

i. *Identification:* a sector review, linking planning at the macro and project levels, is crucial. The implications of infrastructure development on competitiveness of specific industries, the potential for tapping into regional infrastructure projects and the necessity of developing a multimodal infrastructure master plan which emphasises the links between infrastructure sub-sectors should be taken into account.

ii. *Screening:* before deciding whether to start the phase of project appraisal, a project profile should identify measurable objectives, specify the needed resources, identify the main constraints and put forward alternative means of attaining the project's objectives.

iii. *Project appraisal:* a complex and recurrent process is essential to provide a comprehensive assessment of the investment, *ex ante* and during the project's lifetime. This includes careful upstream project preparation, including a value-for-money assessment, so as to identify which mix of private and public provision is most suited to the infrastructure project at hand.

An infrastructure project appraisal should take into account financial, economic, technical, distributional, regulatory and environmental elements as well as risk

Box 4.1 OECD Development Centre survey on the infrastructure policy-making process

The OECD Development Centre conducted a survey that attempts to identify the main bottlenecks hindering effective infrastructure service delivery throughout the policy-making process. Derived from the OECD Survey on Water Governance (OECD 2011a), it is directed at policy makers in the infrastructure sectors at the national level; at the ministries of finance, planning or infrastructure or at the national development and planning agencies for general infrastructure questions; and at the ministry of transport for transport-specific questions. Respondents first completed the survey online and then complemented their answers through bilateral discussions. The survey was carried out in 2011–12 in Latin America (Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Mexico, Paraguay, Peru and Uruguay), Africa (Benin, Botswana, Burundi, Cameroon, Cape Verde, Chad, Djibouti, Gambia, Kenya, Madagascar, Mauritius, Niger, São Tomé and Príncipe, the Republic of the Sudan and Tunisia), Asian and Pacific LDCs (Afghanistan, Bhutan, Samoa, Timor-Leste and Vanuatu) and Southeast Asia (Malaysia, the Philippines, Thailand and Vietnam). Consequently, this survey covers 14 LDCs (Afghanistan, Benin, Bhutan, Burundi, Chad, Djibouti, Gambia, Madagascar, Niger, Samoa, São Tomé and Príncipe, Sudan, Timor-Leste and Vanuatu). In the future the coverage of this pilot initiative could be widened to most of the LDCs. This would allow a representative global database on public policies related to infrastructure development.

This survey can be considered as a key input into the analysis of the effectiveness of public policies in infrastructure that complements existing quantitative surveys. However, because it is based on stated, and not on revealed, preferences, it is subject to possible biases. In addition, cross-country comparability is subject to preferences that vary from country to country. Finally, survey answers may be affected by the dominance of certain types of infrastructure in policy-making processes.

Source: OECD (2013) and Nieto-Parra et al. (2013) for Latin American countries.

assessments. Cost–benefit analyses can help assess the project's potential impact on social welfare, but these analyses involve difficult choices over what to include under both costs and benefits, and there is little consensus on how to estimate the impact of risk (OECD/International Transport Forum 2011; Fischer et al. 2007). The OECD Principles for Private Sector Participation in Infrastructure (OECD 2007) provide some guidance to public officials in this regard, with the objective of enabling the public sector to negotiate infrastructure contracts on an equal footing with private counterparts.

The analysis of the policy-making process can help to monitor key IPoA commitments. Key actions presented in the IPoA on infrastructure are linked to the effectiveness of public policies in infrastructure (and not specified in a unique infrastructure

sector). In order to capture these commitments, qualitative analysis on the quality of the policy-making process is fundamental to provide recommendations on the implementation of policies. In that context, the survey on infrastructure developed at the Development Centre can constitute a pillar of this study. It highlights questions on the effectiveness of infrastructure policies. Table 4.7 presents key actions that can be

Table 4.7 IPoA. Goals, targets and actions on the effectiveness of infrastructure policies

Actions	Proposed indicators	Source
Allocate and disburse annually an adequate percentage of the budget for the development and maintenance of infrastructure;	• Roles and responsibilities of the central government in the execution phase (question 5C) • Main obstacles for the transport sector at different stages of the infrastructure cycle (question 8A) • Operating and maintenance costs in the prioritisation and planning stage (question 9G) and in the operation and maintenance stage (question 11) • Main features of public policies in the transport sector (question 13)	OECD Development Centre survey
Develop and implement comprehensive national policies and plans for infrastructure development and maintenance encompassing all modes of transportation and ports. communications and energy;	• Quality of the institutional framework in the main infrastructure sectors (question 1A) • Roles and responsibilities in the infrastructure stages (question 2) • Coordination between infrastructure agencies and ministries (question 3)	OECD Development Centre survey
Promote public–private partnerships for the development and maintenance of transport and ICT infrastructure and their sustainability	• Private investment commitments in infrastructure in LDCs	World Bank Private Participation in Infrastructure database
	• Private investment commitments in infrastructure by sector of activity in LDCs	World Bank Private Participation in Infrastructure database

Note: See www.oecd.org/dev/partnerships-networks/QUESTIONNAIRE_OECD_Survey_on_Infrastructure_2011.pdf (accessed 1 April 2014).

monitored by proposed questions included in that survey and by data on private investment provided by the World Bank.

According to the OECD survey on the policy-making process in infrastructure, the execution phase is the most challenging for LDCs. In the sample, 10 out of 14 LDCs identified the execution phase as the most complex one in the policy-making process, whether alone or together with other phases. Large projects often encounter costs and time overruns during the construction. Few projects procured internationally are actually completed within the budget and time-frame originally estimated by the project's sponsor. These systemic failures often arise from inability to manage risks adequately and to anticipate them *ex ante* during contract negotiation (CABRI 2010; Fischer et al. 2007). In terms of broad risks, inflation and exchange rate fluctuations can have a significant impact on project financing. Political interference, community participation and environmental compliance are also factors that affect the implementation process. At the project level, some of the bottlenecks at the execution level are explained by the lack of an appropriate design of the project. Poor project management, changes in design, lack of finance or delays in payment for services, unexpected ground conditions and unsettled land acquisition claims are among the most important implementation risks. Shortfalls in the legal framework for investment (in particular weak safeguards for compensation in the event of an expropriation, and ineffective mechanisms for commercial dispute resolution and investor–State dispute settlement) can also significantly shake investor confidence and complicate contract renegotiations. Shortages of construction materials and equipment are also common, as well as an inability to find experienced contractors and technical staff in the public administration.

In order to ease the implementation phase, policy makers must assess broad- and project-level risks as part of the prioritisation and planning phase. The aim of risk management is to identify and manage those risks that could derail implementation, notably *ex ante*, by assigning risks to the public or private partner that is best capable to shoulder them. The line ministry or sponsoring agency has primary responsibility for this process, but when risks relate to financing, the ministry of finance should step in (CABRI 2010). PPP units can also be set up, most frequently within the Ministry of Finance, to guide the project preparation process and to ensure that value-for-money and fiscal feasibility concerns are well addressed. Furthermore, policy makers must take risk management into account throughout all phases of the project, which are all interdependent. Implementation is a political process in the course of which policies are often reshaped, redefined or even completely overturned (Égert et al. 2009). During selection of the project developer, the transparency of infrastructure procurement and bidding processes is also paramount; this applies not only to PPPs but also to more traditional forms of infrastructure procurement by the public sector.

The operation and maintenance phase also presents deficiencies across LDCs. Governments often prefer to finance new investment during their political cycle and postpone the less visible maintenance activities to later cycles (OECD/ECLAC 2011). Indeed, there is often a bias towards the realisation of new investments to the detriment of the maintenance of the existing stock. This bias usually generates higher operational costs for the infrastructure and for the private goods and services that

rely on it. In the context of African countries, enhancements in the quality of existing infrastructure stock seem to be less essential for LDCs' economic growth than enlargement of the stock (Calderón 2009). However, in order to boost sustainable economic growth, it is essential to plan the maintenance costs of the existing and new infrastructure and to implement adequate maintenance operations when needed. Otherwise, other sectors that rely on this infrastructure would increase their operational costs, affecting negatively the attraction of private sector investment. Authorities could set specific rules to quantify the yearly operation and maintenance costs of existing and planned infrastructure, and incorporate them into multi-year budgets (Mourougane and Pisu 2011). For example, road fund boards can play an important role (for instance in Zambia, but also in many other African countries) in ring-fencing and managing funds that are dedicated to maintaining the road network. Furthermore, aid-recipient countries should adequately account for maintenance costs in infrastructure projects when their construction is funded by donors.

In the absence of good policies, tapping private investment does not deliver effective economic outcomes. A set of reforms should be undertaken prior to attracting private participation in infrastructure. Past experiences in developing economies, and in particular Latin American economies, are useful for capturing the risks of private investment in infrastructure when the institutional and regulatory framework is not designed appropriately to deliver effective private investment. For instance, PPP projects have been extremely expensive for these economies given the high frequency of renegotiations in concession contracts (Straub 2008; Bitran et al. 2013). Consequently, reforms are needed that include a less dependent institutional and regulatory framework in infrastructure from the political cycle and an increase of competition among private actors. Empirical evidence also highlights positive outcomes of private investment after the implementation of good policies. For instance, the telecommunications sector in Africa has experienced successful examples of private involvement. After some regulatory changes in that sector, the liberalisation of this market improved its performance (Djiofack-Zebaze and Keck 2006). In that context, external players in the arenas of infrastructure investment are often influenced by the design of public policies in infrastructure.

To better leverage the impact of infrastructure investment policy reforms, LDCs stand to gain from greater regional co-operation and policy harmonisation. It is also fast becoming essential for countries to develop their institutional capacity for managing cross-border infrastructure projects. Regional projects (as recently identified in the Southern African Development Community's Regional Infrastructure Development Master Plan, for instance) can help overcome a binding constraint to private participation in infrastructure: the shallowness of utility markets. The emergence of platforms such as the SADC PPP Network (which brings together heads of PPP units from across the SADC) demonstrates the increasing importance that regional dialogue and experience-sharing for infrastructure investment is taking on government agendas in Africa. To ensure successful preparation and facilitation of the growing pipeline of regional infrastructure projects, neighbouring LDCs will need to closely co-ordinate regulatory and institutional reforms aimed at enhancing infrastructure investment. In this light the NEPAD-OECD Africa Investment Initiative has, for

instance, been collaborating with the SADC PPP Network since 2013 on promoting harmonisation in PPP policy and regulatory frameworks across Southern Africa, drawing on infrastructure OECD investment policy tools. Especially in the case of PPPs, co-operation on project financing (including consolidating national capital markets) will also become increasingly necessary.

4.4.2 Good environmental policies can promote sustainable infrastructure investment

The development of infrastructure in LDCs should preserve the environment. LDCs face serious environmental concerns, leading to a biodiversity loss. Biodiversity is a key asset in development in LDCs and it can constitute a comparative advantage with respect to other economies (Freytag and Vietze 2006). Nevertheless, biodiversity has not been exploited appropriately (UNDP 2011). A policy recommendation that emerges is that the development of infrastructure in LDCs should evolve hand in hand with respect for biodiversity.

Further green investments in infrastructure could achieve a sustainable development path in LDCs. The overall assessment of a country's environmental performance could be measured through the Environmental Performance Indicator (EPI). This index takes into account environmental public health as well as the vitality of the ecosystem. The lowest EPIs are shown by developing states, with LDCs ranking among the worst performers (e.g. Ethiopia, Chad and Niger). Economies with a high population density combined with stressed ecosystems (e.g. Bangladesh), economies experiencing dramatic urban growth unleashed by natural resources exports (such as Angola), or even arid states with limited natural resources (e.g. Mauritania, Mali) are exposed to environmental damage. Under-investment in environmental infrastructure and ineffective environmental governance are some of the key factors behind the low EPI scores of LDCs (UNDP 2011). In that context, policies emphasising the promotion of green investments as well as investments committed to low carbon emissions can also be useful (OECD 2012, Corfee-Morlot et al. 2012). For instance, transport infrastructure policies can promote multimodal strategies in order to reduce environmental costs and better exploit the geography of some LDCs.

Beyond green investments in infrastructure at large, in the energy sub-sector more specifically the choice between clean energy and conventional energy is crucial and requires strategic thinking for LDC governments. The very lengthy operational lifetimes of energy infrastructure and long time lags between planning and implementation make investment in a given form of energy infrastructure hard to reverse, with highly significant long-term implications for energy management and future resilience to climate change.

The development of green infrastructure projects requires innovative financing options. Finance is one of the main constraints on implementing green infrastructure projects. A considerable pool of capital under management by institutional investors (USD 71 trillion in 2010) could be attracted by green bonds in infrastructure. However, green investment remains low compared with what is necessary. The market size for all green bond issuances to 2011 was approximately USD 11 billion, and environmentally

focused ODA amounted to USD 25.4 billion in 2009/2010 (see OECD 2011b, 2012 for discussions on the financing of green infrastructure projects in developing economies and OECD economies).

4.5 Conclusions and policy recommendations

Through a variety of channels, infrastructure is a crucial element to boost economic growth and to reinforce economic diversification and FDI in LDCs. The IPoA sets a list of commitments for both LDCs and development partners in the area of infrastructure, but lacks important elements such as qualitative commitments, individualised targets and indicators of performance on investment and regulatory frameworks. This chapter has proposed a set of indicators to monitor IPoA commitments in infrastructure (transport and communication), energy, and water and sanitation. These indicators capture the stock of these infrastructures as well as the quality of the policy-making process in the infrastructure sectors.

Available indicators show that in all sectors (transport, telecommunication, energy and water) infrastructure efforts need to be reinforced in terms of both quality and quantity. After controlling for the level of development of these economies, this gap is particularly evident for African LDCs. These efforts could focus on two dimensions: investment and public policies. The two are inter-related as sound public policies can themselves help attract more investment into infrastructure.

On the investment side, reinforcing investment, both from the donor community and from the private sector, is particularly important, especially coming from emerging economies. The investment needs are estimated at 7 per cent of GDP, which is much higher than current levels of investment in infrastructure (around 3 per cent of GDP). This will require making the investment climate of LDCs more attractive on the public policy side. Country coverage by leading emerging-market actors could be improved in order to attract more international investors. New financing schemes such as PPP could be strengthened.

On the public policies side, all stages of the policy-making process require improvement, particularly at the execution level. Better infrastructure policies will improve the effectiveness of investment. More broadly, investment policy would need to be enhanced, so as to create a more attractive investment climate and make the most of infrastructure investment opportunities. Through innovative financing options green infrastructure projects could also be developed. Stronger regulatory and institutional frameworks are necessary before new sources of financing can be found. Past experiences in emerging and OECD economies recommend following a vigilant approach before increasing private participation in activities such as PPPs. Enhanced regional co-operation is needed on all of the above, which can help mitigate the constraints posed by narrow domestic market size. In particular, enhancing legal and regulatory frameworks for investment in infrastructure on a regional level can help facilitate cross-border infrastructure projects.

Finally, it is crucial to assess LDCs' institutional capacity to provide statistical data, in particular on the quantity and quality of infrastructure. Evidence suggests that

a country's statistical capacity depends on its institutional capacity, and vice versa. For instance, for Sub-Saharan Africa (where most LDCs are located) the countries' statistical capacity positively impacts the quality of their institutions (Kodila-Tedika 2012). In this sense, there is a need to endow LDCs with means that allow them to have further and more accurate statistical information. As a first step, this could be achieved through information provided by international, intergovernmental or regional organisations. Complementary to this, the technical assistance provided by the donors could also enhance these countries' statistical capacity.

Notes

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2 See Straub (2008) for an analysis of infrastructure through the lens of economic geography.
3 See Bennathan et al. (2006) on how infrastructure enters the production function through the services provided by this capital.
4 See Straub (2008) and Agénor and Moreno-Dodson (2006). For instance, in the nineteenth century railways and the telegraph made it possible to improve the speed, volume and regularity of the distribution of goods and information. Markets grew and new organisational practices emerged with better inventory management, more efficient market clearing, enhanced competition, faster diffusion of technology and changes in the pattern of specialisation. Overall, there is a reorganisation of production thanks to lower transaction and co-ordination costs.
5 The World Economic Forum's survey covers only 23 of the 48 LDCs.
6 See AfDB and OECD (2009) for the impact of mobile banking on development in Africa.
7 According to World Development Indicators (WDIs), access to improved sanitation facilities refers to the percentage of the population with at least adequate access to excreta disposal facilities (i.e. facilities that prevent human, animal and insect contact with excreta). Improved water sources refers to the percentage of the population (from either rural or urban areas) with access to adequate water (i.e. at least 20 litres per person per day from a source within one kilometre of the dwelling) from an improved source (i.e. a household connection, public standpipe, borehole, protected well or spring, or rainwater collection).
8 These data are available at http://ppi.worldbank.org/ and http://stats.oecd.org/Index.aspx?DatasetCode=CRSNEW respectively.
9 These values are overstated since they refer to private investment commitments and not to actual flows.
10 See the OECD PSPI – Principles for Private Sector Participation in Infrastructure – (OECD/Investment Committee 2007) for an elaborated guidance to policy-makers on addressing these potential pitfalls, notably through careful risk-sharing arrangements and upstream contract preparation. In addition, instruments derived from the PSPI Principles (such as the OECD Policy Guidance for Investment in Clean Energy Infrastructure) provide non-prescriptive guidance for tackling the policy bottlenecks specific to different infrastructure sub-sectors.

Annex 4.1 Methodology used to define infrastructure indicators and LDCs

4.1.1 Infrastructure indicators

Key infrastructure indicators shed light on the current stocks of infrastructures in LDCs. The choice of each indicator has been made by taking into account both its suitability and its availability for the specific context for which it is being considered.

The data on infrastructure were collected from different sources, mainly from international organisations such as the OECD, UNCTAD and the World Bank. The main sectors considered are energy, water supply and sanitation, telecommunications and transports. For each one of these sectors, key different indicators have been included. A comparative analysis of the data has been conducted, covering the following comparisons (always subject to data availability): time-trend and cross-group of countries with a comparison of the main indicators. Each group of LDCs has been compared, as well as developing and OECD countries. In addition, a cross-country comparison of the main indicators among different LDCs has been studied. Finally, in order to control for the level of development of each LDC, this analysis has compared the stock of infrastructure of all indicators by taking into account the GDP per capita.

4.1.2 Country classification

LDCs were split into different groups according to the classification adopted by UNCTAD, which includes African LDCs (and Haiti), Asian LDCs and island LDCs. There is no overlapping in the classification of these groups of economies. In addition, landlocked LDCs have been included. This last group is composed of LDCs that have no access to the sea.

African LDCs (and Haiti): Angola, Benin, Burkina Faso, Burundi, Central African Republic, Chad, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, Senegal, Sierra Leone, Somalia, Sudan, Togo, Uganda, United Republic of Tanzania and Zambia.

Asian LDCs: Afghanistan, Bangladesh, Bhutan, Cambodia, Lao People's Democratic Republic, Myanmar, Nepal and Yemen.

Island LDCs: Comoros, Kiribati, Maldives, Samoa, São Tomé and Príncipe, Solomon Islands, Timor-Leste, Tuvalu and Vanuatu.

Landlocked LDCs: Afghanistan, Bhutan, Burkina Faso, Burundi, Central African Republic, Chad, Ethiopia, Laos, Lesotho, Malawi, Mali, Nepal, Niger, Rwanda, Uganda and Zambia.

Developing economies: The definition adopted in order to classify developing countries is that proposed by the World Bank. According to this classification. all low- and middle-income countries of the world are considered as developing countries.

OECD countries: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zeeland, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom and United States.

Annex 4.2 Proposed indicators by country

A4.1 Quality of overall infrastructure. From 1 to 7 (7 being the best ranking)

Country Name	2006–08	2009	2010	2011	2012
Afghanistan					
Angola					
Bangladesh	2.31	2.52	2.74	2.82	2.84
Benin	2.55	2.84	2.95	3.13	3.20
Bhutan					
Burkina Faso	2.36	2.79	2.79	2.73	2.73
Burundi	1.92	2.56	2.84	2.61	2.33
Cambodia	2.88	3.42	3.82	4.05	4.23
Central African Republic					
Chad	1.56	2.03	2.51	2.79	2.80
Comoros					
Congo. Democratic Republic of the (Dem. Rep.)					
Djibouti					
Equatorial Guinea					
Eritrea					
Ethiopia	2.39	3.18	3.76	3.62	3.58
Gambia, The	3.58	4.51	4.71	4.57	4.46
Guinea					2.13
Guinea-Bissau					
Haiti				1.82	1.89
Kiribati					
Lao People's Democratic Republic (PDR)					
Lesotho	2.10	2.95	3.43	3.22	3.40
Liberia					
Madagascar	2.45	2.92	3.23	3.00	3.00
Malawi	2.32	2.91	3.43	3.45	3.23
Mali	2.62	3.01	3.41	3.59	3.77
Mauritania	1.97	2.76	2.82	2.58	2.81
Mozambique	2.20	2.74	3.27	3.11	3.00
Myanmar					
Nepal	1.89	2.16	2.45	2.67	2.90
Niger					
Rwanda			4.31	4.65	4.90
Samoa					
São Tomé and Príncipe					
Senegal	3.06	3.72	3.86	3.63	3.38
Sierra Leone					2.92
Solomon Islands					
Somalia					
Sudan					
Tanzania	2.71	2.66	3.01	3.12	3.10
Timor-Leste	1.79	2.27	2.74	2.46	2.68
Togo					
Tuvalu					
Uganda	2.65	2.87	3.43	3.57	3.38
Vanuatu					
Yemen, Republic of (Rep.)				2.96	2.85
Zambia	2.06	2.89	3.44	3.65	3.87

(continued)

A4.1 Quality of overall infrastructure (continued)

Country Name	2006–08	2009	2010	2011	2012
Least developed countries	2.35	2.88	3.28	3.21	3.18
African LD Cs (and Haiti)	2.39	2.96	3.36	3.27	3.19
Asian LDCs	2.36	2.70	3.00	3.13	3.20
Island LDCs					
Landlocked LDCs	2.17	2.73	3.26	3.32	3.35
Developing Countries	3.20	3.59	3.88	3.88	3.89
OECD members	5.20	5.29	5.48	5.50	5.53

Source: UNCTAD 2011

A4.2 Percentage of paved roads across different regions

Country	2008
Afghanistan	29.30
Angola	10.40
Bangladesh	9.50
Benin	9.50
Bhutan	62.00
Burkina Faso	4.20
Burundi	10.40
Cambodia	6.30
Central African Republic	
Chad	
Comoros	76.50
Congo, Dem. Rep.	1.80
Djibouti	45.00
Equatorial Guinea	
Eritrea	21.80
Ethiopia	12.80
Gambia, The	19.30
Guinea	9.80
Guinea-Bissau	27.90
Haiti	24.30
Kiribati	
Lao PDR	13.40
Lesotho	18.30
Liberia	6.20
Madagascar	11.60
Malawi	45.00
Mali	18.00
Mauritania	26.80
Mozambique	18.70
Myanmar	11.90
Nepal	56.90
Niger	20.70
Rwanda	19.00
Samoa	14.20

(continued)

A4.2 Percentage of paved roads across different regions (continued)

Country	2008
São Tomé and Príncipe	68.10
Senegal	29.30
Sierra Leone	8.00
Solomon Islands	2.40
Somalia	11.80
Sudan	36.30
Tanzania	8.60
Timor-Leste	
Togo	31.60
Tuvalu	
Uganda	23.00
Vanuatu	23.90
Yemen, Rep.	8.70
Zambia	22.00
Least developed countries	22.27
African LDCs (and Haiti)	19.04
Asian LDCs	24.75
Island LDCS	37.02
Landlocked LDCs	25.36
Developing Countries	46.59
OECD members	79.25

Source: World Economic Forum, Global Competitiveness Index

A4.3 Quality of roads. From 1 to 7 (7 being the best ranking)

Country Name	2006–08	2009	2010	2011	2012
Afghanistan					
Angola					
Bangladesh	3.00	2.91	3.00	2.92	2.80
Benin	2.62	2.85	2.91	2.93	3.07
Bhutan					
Burkina Faso	2.41	2.77	2.59	2.50	2.61
Burundi	2.07	2.33	2.66	2.83	2.70
Cambodia	3.04	3.34	3.75	3.99	4.03
Central African Republic					
Chad	1.48	2.03	2.42	3.00	3.08
Comoros					
Congo, Dem. Rep.					
Djibouti					
Equatorial Guinea					
Eritrea					
Ethiopia	2.54	3.29	4.06	4.05	4.09
Gambia, The	3.45	4.03	4.32	4.45	4.50
Guinea					2.02
Guinea-Bissau					
Haiti				1.74	1.75
Kiribati					
Lao PDR					

(continued)

A4.3 Quality of roads. From 1 to 7 (7 being the best ranking) (continued)

Country Name	2006–08	2009	2010	2011	2012
Lesotho	2.09	2.55	2.86	2.72	2.90
Liberia					
Madagascar	2.67	2.95	2.93	2.71	2.53
Malawi		3.08	3.64	3.65	3.42
Mali	2.65	2.81	2.94	3.26	3.59
Mauritania	2.00	2.54	2.40	2.33	2.73
Mozambique	1.94	2.33	2.38	2.34	2.38
Myanmar					
Nepal	2.10	2.11	2.31	2.46	2.57
Niger					
Rwanda			4.15	4.61	4.96
Samoa					
São Tomé and Príncipe					
Senegal	2.90	3.34	3.31	3.33	3.19
Sierra Leone					2.75
Solomon Islands					
Somalia					
Sudan					
Tanzania	2.80	2.66	2.93	3.18	3.22
Timor-Leste	1.64	1.89	2.22	2.14	2.22
Togo					
Tuvalu					
Uganda	2.54	2.50	2.72	2.95	2.91
Vanuatu					
Yemen, Rep.				2.85	2.74
Zambia	2.33	2.62	2.85	2.92	3.19
Least developed countries	2.43	2.75	3.02	3.04	3.04
African LDCs (and Haiti)	2.42	2.79	3.06	3.08	3.08
Asian LDCs	2.71	2.79	3.02	3.06	3.03
Island LDCs					
Landlocked LDCs	2.25	2.61	3.02	3.18	3.27
Developing Countries	3.18	3.42	3.57	3.60	3.60
OECD members	5.00	5.02	5.12	5.13	5.19

Source: World Economic Forum, Global Competitiveness Index

A4.4 Quality of port infrastructure. From 1 to 7 (7 being the best ranking)

Country Name	2006–08	2009	2010	2011	2012
Afghanistan					
Angola					
Bangladesh	2.50	2.98	3.39	3.36	3.27
Benin	2.88	3.31	4.02	3.93	3.73
Bhutan					
Burkina Faso	3.24	4.00	3.93	3.66	3.60
Burundi	2.73	3.09	2.98	2.97	2.64
Cambodia	3.27	3.50	3.90	4.02	4.21

(continued)

A4.4 Quality of port infrastructure. From 1 to 7 (7 being the best ranking) (continued)

Country Name	2006–08	2009	2010	2011	2012
Central African Republic					
Chad	2.33	2.66	2.63	2.74	2.78
Comoros					
Congo, Dem. Rep.					
Djibouti					
Equatorial Guinea					
Eritrea					
Ethiopia	3.06	3.77	4.43	3.85	3.49
Gambia, The	4.03	4.67	5.09	4.88	4.83
Guinea					3.54
Guinea-Bissau					
Haiti				1.84	1.89
Kiribati					
Lao PDR					
Lesotho	2.40	2.98	3.06	3.35	3.43
Liberia					
Madagascar	2.48	3.03	3.38	3.29	3.23
Malawi	3.52	3.53	3.56	3.62	3.74
Mali	2.95	3.77	3.71	3.69	4.06
Mauritania	2.59	3.47	3.57	3.31	3.67
Mozambique	2.73	3.20	3.49	3.38	3.37
Myanmar					
Nepal	2.39	2.83	2.90	2.61	2.71
Niger					
Rwanda			2.81	3.22	3.52
Sa moa					
São Tomé and Príncipe					
Senegal	3.70	4.43	4.74	4.54	4.53
Sierra Leone					3.32
Solomon Islands					
Somalia					
Sudan					
Tanzania	3.11	2.82	3.04	3.33	3.33
Timor-Leste	2.09	2.26	2.50	2.61	2.72
Togo					
Tuvalu					
Uganda	3.22	3.44	3.53	3.68	3.77
Vanuatu					
Yemen, Rep.				2.86	2.99
Zambia	3.13	3.70	3.63	4.00	4.13
Least developed countries	2.87	3.37	3.54	3.42	3.46
African LDCs (and Haiti)	2.94	3.49	3.62	3.52	3.53
Asian LDCs	2.72	3.10	3.40	3.21	3.29
Island LDCs					
Landlocked LDCs	2.83	3.38	3.38	3.40	3.44
Developing Countries	3.41	3.76	3.90	3.88	3.89
OECD members	5.04	5.12	5.20	5.20	5.21

Source: World Economic Forum, Global Competitiveness Index

A4.5 Quality of air transport infrastructure. From 1 to 7 (7 being the best ranking)

Country Name	2006–08	2009	2010	2011	2012
Afghanistan					
Angola					
Bangladesh	3.04	3.39	3.50	3.55	3.46
Benin	3.34	3.30	3.94	3.78	3.38
Bhutan					
Burkina Faso	3.26	3.04	2.97	3.09	3.31
Burundi	2.93	3.47	3.29	3.19	2.80
Cambodia	4.01	4.08	4.28	4.29	4.40
Central African Republic					
Chad	2.58	2.54	2.75	3.16	2.92
Comoros					
Congo, Dem. Rep.					
Djibouti					
Equatorial Guinea					
Eritrea					
Ethiopia	4.71	4.71	5.38	5.26	5.13
Gambia, The	4.34	4.80	4.80	4.78	4.88
Guinea					3.65
Guinea -Bissau					
Haiti				2.08	2.20
Kiribati					
Lao PDR					
Lesotho	2.22	2.39	2.26	2.38	2.49
Liberia					
Madagascar	3.88	3.97	3.78	3.44	3.56
Malawi	2.87	3.08	3.35	3.27	3.06
Mali	3.41	3.36	3.21	3.65	4.17
Mauritania	2.84	2.95	2.88	2.53	2.82
Mozambique	3.46	3.74	4.05	4.11	3.89
Myanmar					
Nepal	3.40	3.52	3.55	3.38	3.15
Niger					
Rwanda				4.12	4.26
Samoa					
São Tomé and Príncipe					
Senegal	4.87	4.72	4.50	4.11	4.35
Sierra Leone					2.75
Solomon Islands					
Somalia					
Sudan					
Tanzania	3.62	3.40	3.43	3.51	3.49
Timor-Leste	2.44	2.66	2.89	3.15	2.92
Togo					
Tuvalu					
Uganda	3.25	3.50	3.88	3.89	3.78
Vanuatu					
Yemen, Rep.				3.96	3.46
Zambia	4.16	3.38	3.62	4.04	3.91
Least developed countries	3.42	3.50	3.62	3.60	3.53
African LDCs (and Haiti)	3.47	3.52	3.63	3.58	3.54

(continued)

A4.5 Quality of air transport infrastructure. From 1 to 7 (7 being the best ranking) (continued)

Country Name	2006–08	2009	2010	2011	2012
Asian LDCs	3.48	3.66	3.77	3.79	3.62
Island LDCs					
Landlocked LDCs	3.30	3.30	3.43	3.58	3.54
Developing Countries	4.16	4.27	4.31	4.29	4.24
OECD members	5.58	5.59	5.60	5.62	5.58

Source: World Economic Forum, Global Competitivences Index

A4.6 Available airline seat km/week, millions

Country Name	2006–08	2009	2010	2011	2012
Afghanistan					
Angola					
Bangladesh	147.56	173.41	197.17	202.37	205.64
Benin	11.82	13.81	18.73	19.08	20.87
Bhutan					
Burkina Faso	8.28	11.22	13.35	12.44	14.01
Burundi	1.42	2.33	2.14	2.22	2.31
Cambodia	44.56	44.90	49.63	57.75	63.06
Central African Republic					
Chad	7.01	7.34	7.66	9.30	9.12
Comoros					
Congo, Dem. Rep.					
Djibouti					
Equatorial Guinea					
Eritrea					
Ethiopia	107.32	142.76	152.30	186.83	223.78
Gambia, The	4.27	3.45	7.95	10.80	12.61
Guinea					9.47
Guinea-Bissau					
Haiti				24.12	24.43
Kiribati					
Lao PDR					
Lesotho	0.23	0.25	0.32	0.29	0.22
Liberia					
Madagascar	37.91	37.71	37.60	41.72	50.07
Malawi	8.18	8.82	7.30	7.14	5.75
Mali	22.29	23.07	26.56	28.80	23.63
Mauritania	8.00	7.15	7.19	7.84	9.85
Mozambique	28.55	22.82	23.23	29.46	31.05
Myanmar					
Nepal	44.69	59.32	66.00	80.28	86.20
Niger					
Rwanda			4.08	6.22	13.22
Sa moa					
São Tomé and Príncipe					
Senegal	124.41	125.94	107.02	91.62	86.94
Sierra Leone					6.70

(continued)

A4.6 Available airline seat km/week, millions

Country Name	2006–08	2009	2010	2011	2012
Solomon Islands					
Somalia					
Sudan					
Tanzania	49.82	54.15	56.95	69.58	80.23
Timor-Leste		7.43	9.76	11.52	11.15
Togo					
Tuvalu					
Uganda	35.15	41.54	40.84	35.06	43.30
Vanuatu					
Yemen, Rep.				40.75	35.52
Zambia	25.66	25.75	25.53	40.75	30.98
Least developed countries	37.01	40.66	41.01	44.17	44.00
African LDCs (and Haiti)	28.63	33.01	31.69	34.63	34.93
Asian LDCs	78.93	92.54	104.27	95.29	97.60
Island LDCs					
Landlocked LDCs	27.18	32.24	31.46	37.21	41.14
Developing Countries	349.82	389.39	413.29	452.56	464.80
OECD members	2,200.88	2,174.01	2,213.73	2,320.24	2,373.87

Source: World Economic Forum, Global Competitiveness Index

A4.7 Quality of railway infrastructure. From 1 to 7 (7 being the best ranking)

Country Name	2011	2012
Afghanistan		
Angola		
Bangladesh	2.50	2.48
Benin	1.93	1.63
Bhutan		
Burkina Faso	1.84	2.00
Burundi		
Cambodia	1.84	2.27
Central African Republic		
Chad		
Comoros		
Congo, Dem. Rep.		
Djibouti		
Equatorial Guinea		
Eritrea		
Ethiopia	1.30	1.43
Gambia, The		
Guinea		1.62
Guinea-Bissau		
Haiti	1.23	1.29
Kiribati		
Lao PDR		
Lesotho	1.30	1.56
Liberia		
Madagascar	1.55	1.87

(continued)

A4.7 Quality of railway infrastructure. From 1 to 7 (7 being the best ranking) (continued)

Country Name	2011	2012
Malawi	2.39	2.19
Mali	2.35	2.70
Mauritania	1.78	2.00
Mozambique	2.18	2.03
Myanmar		
Nepal	1.15	1.10
Niger		
Rwanda		
Samoa		
São Tomé and Príncipe		
Senegal	1.86	1.70
Sierra Leone		1.30
Solomon Islands		
Somalia		
Sudan		
Tanzania	2.42	2.26
Timor-Leste		
Togo		
Tuvalu		
Uganda	1.41	1.44
Vanuatu		
Yemen, Rep.		
Zambia	2.22	2.28
Least developed countries	1.84	1.85
African LDCs (and Haiti)	1.84	1.83
Asian LDCs	1.83	1.95
Island LDCs		
Landlocked LDCs	1.75	1.84
Developing Countries	2.46	2.50
OECD members	4.44	4.47

Source: World Bank, World Development Indicators, 2012

A4.8 Internet users per 100 people

Country Name	2005–08	2009	2010	2011
Afghanistan	1.63	3.25	3.65	4.58
Angola	2.71	6.00	10.00	14.78
Bangladesh	1.39	3.10	3.70	5.00
Benin	1.61	2.24	3.13	3.50
Bhutan	5.21	7.17	13.60	21.00
Burkina Faso	0.69	1.13	2.40	3.00
Burundi	0.68	0.90	1.00	1.11
Cambodia	0.45	0.53	1.26	3.10
Central African Republic	0.49	1.80	2.00	2.20
Chad	0.75	1.50	1.70	1.90
Comoros	2.43	3.50	5.10	5.50
Congo, Dem. Rep.	0.34	0.56	0.72	1.20

(continued)

A4.8 Internet users per 100 people (continued)

Country Name	2005–08	2009	2010	2011
Djibouti	1.53	4.00	6.50	7.00
Equatorial Guinea	1.45	2.13	6.00	
Eritrea	2.63	4.93	5.40	6.20
Ethiopia	0.34	0.54	0.75	1.10
Gambia, The	5.53	7.63	9.20	10.87
Guinea	0.72	0.94	1.00	1.30
Guinea-Bissau	2.13	2.30	2.45	2.67
Haiti	6.99	8.10	8.37	
Kiribati	5.38	8.97	9.07	10.00
Lao PDR	1.80	6.00	7.00	9.00
Lesotho	3.15	3.72	3.86	4.22
Liberia	0.54	0.51	2.30	3.00
Madagascar	0.87	1.63	1.70	1.90
Malawi	0.62	1.07	2.26	3.33
Mali	0.90	1.80	1.90	2.00
Mauritania	1.24	2.28	4.00	4.50
Mozambique	1.04	2.68	4.17	4.30
Myanmar	0.17	0.22	0.25	0.98
Nepal	1.28	1.97	7.93	9.00
Niger	0.40	0.76	0.83	1.30
Rwanda	2.39	7.70	8.00	7.00
Samoa	4.40	6.00	7.00	
São Tomé and Príncipe	14.50	16.41	18.75	20.16
Senegal	7.17	14.50	16.00	17.50
Sierra Leone	0.23	0.26		
Solomon Islands	1.87	4.00	5.00	6.00
Somalia	1.11	1.16		1.25
Sudan	7.05			
Tanzania	6.58	10.00	11.00	12.00
Timor-Leste	0.13	0.18	0.21	0.88
Togo	2.10	2.60	3.00	3.50
Tuvalu	12.50	20.00	25.00	30.00
Uganda	3.96	9.78	12.50	13.01
Vanuatu	6.25	7.50	8.00	
Yemen, Rep.	3.55	9.96	12.35	14.91
Zambia	4.36	6.31	10.13	11.50
LDCs	2.72	4.47	6.00	6.84
African LDCs (and Haiti)	2.28	3.60	4.91	5.26
Asian LDCs	1.93	4.02	6.22	8.45
Island LDCs	5.43	8.32	9.77	12.09
Landlocked LDCs	1.78	3.46	4.97	5.95
Developing Countries	13.72	21.79	26.56	30.73
OECD members	59.02	64.75	67.77	70.59

Source: World Economic Forum, Global Competitiveness Index

A4.9 Fixed broadband internet subscribers per 100 people

Country Name	2005–08	2009	2010	2011
Afghanistan	0.00	0.00	0.00	
Angola	0.05	0.11	0.10	0.13
Bangladesh	0.02	0.04	0.04	0.04
Benin	0.01	0.02	0.04	0.04
Bhutan	0.07	0.43	1.20	1.78
Burkina Faso	0.03	0.07	0.08	0.08
Burundi	0.00	0.00	0.00	
Cambodia	0.05	0.21	0.25	0.15
Central African Republic	0.00	0.00	0.00	0.00
Chad	0.00	0.00	0.00	0.00
Comoros	0.01	0.01	0.01	0.02
Congo, Dem. Rep.	0.00	0.01	0.01	0.02
Djibouti	0.11	0.61	0.91	1.25
Equatorial Guinea	0.03	0.03	0.17	
Eritrea	0.00	0.00	0.00	0.00
Ethiopia	0.00	0.00	0.00	0.03
Gambia, The	0.01	0.02	0.02	0.02
Guinea	0.00		0.01	0.01
Guinea-Bissau	0.00			
Haiti	0.00	0.00	0.00	0.00
Kiribati	0.50	0.78	0.85	0.91
Lao PDR	0.05	0.14	0.19	0.66
Lesotho	0.00	0.02	0.02	
Liberia	0.00	0.00	0.00	0.00
Madagascar	0.01	0.02	0.03	0.03
Malawi	0.01	0.03	0.05	0.06
Mali	0.02	0.02	0.02	0.01
Mauritania	0.08	0.17	0.16	0.17
Mozambique	0.02	0.05	0.06	0.07
Myanmar	0.01	0.04	0.05	0.06
Nepal	0.02	0.05	0.20	0.31
Niger	0.00	0.01	0.01	0.01
Rwanda	0.02	0.02	0.02	0.03
Samoa	0.06	0.11	0.11	
São Tomé and Príncipe	0.09		0.34	0.42
Senegal	0.29	0.49	0.63	0.73
Sierra Leone	0.00			
Solomon Islands	0.18	0.38	0.37	0.44
Somalia	0.00			
Sudan	0.06		0.03	0.04
Tanzania	0.00	0.01	0.01	0.01
Timor-Leste	0.00	0.04	0.04	0.05
Togo	0.01	0.05	0.06	0.08
Tuvalu	2.46	1.02	2.44	4.57
Uganda	0.01	0.02	0.16	0.26
Vanuatu	0.05	0.21	0.21	
Yemen, Rep.	0.05	0.23	0.35	0.44

(continued)

A4.9 Fixed broadband internet subscribers per 100 people (continued)

Country Name	2005–08	2009	2010	2011
Zambia	0.03	0.08	0.08	0.06
LDCs	0.10	0.13	0.21	0.33
African LDCs (and Haiti)	0.03	0.07	0.09	0.12
Asian LDCs	0.03	0.14	0.28	0.49
Island LDCs	0.44	0.32	0.55	1.07
Landlocked LDCs	0.02	0.06	0.13	0.25
Developing Countries	2.07	3.99	4.84	5.73
OECD members	18.09	23.17	24.65	25.70

Source: World Economic Forum, Global Competitiveness Index

A4.10 Fixed telephone lines per 100 people

Country Name	2006–08	2009	2010	2011	2012
Afghanistan					
Angola					
Bangladesh	0.72	0.83	0.94	0.61	1.06
Benin	0.97	1.23	1.42	1.51	1.68
Bhutan					
Burkina Faso	0.66	0.82	1.06	0.87	0.83
Burundi	0.39	0.34	0.38	0.39	0.39
Cambodia	0.25	0.31	0.37	2.54	3.70
Central African Republic					
Chad	0.14	0.13	0.12	0.46	0.27
Comoros					
Congo, Dem. Rep.					
Djibouti					
Equatorial Guinea					
Eritrea					
Ethiopia	0.78	1.07	1.10	1.10	0.98
Gambia, The	2.92	2.79	2.87	2.82	2.76
Guinea					0.18
Guinea-Bissau					
Haiti				0.50	0.50
Kiribati					
Lao PDR					
Lesotho	2.57	2.97	1.94	1.79	1.63
Liberia					
Madagascar	0.46	0.82	0.92	0.83	0.65
Malawi	0.99	1.26	1.15	1.07	1.13
Mali	0.64	0.65	0.62	0.74	0.66
Mauritania	1.25	2.38	2.26	2.07	2.04
Mozambique	0.35	0.36	0.36	0.38	0.37
Myanmar					
Nepal	1.90	2.80	2.80	2.81	2.77
Niger					
Rwanda			0.33	0.37	0.36
Samoa					
São Tomé and Príncipe					

(continued)

A4.10 Fixed telephone lines per 100 people (continued)

Country Name	2006–08	2009	2010	2011	2012
Senegal	2.33	1.87	2.22	2.75	2.71
Sierra Leone					0.24
Solomon Islands					
Somalia					
Sudan					
Tanzania	0.41	0.30	0.40	0.39	0.35
Timor-Leste	0.23	0.21	0.21	0.21	0.26
Togo					
Tuvalu					
Uganda	0.31	0.53	0.71	0.98	1.35
Vanuatu					
Yemen, Rep.				4.35	4.33
Zambia	0.81	0.75	0.70	0.69	0.64
Least developed countries	0.95	1.12	1.09	1.31	1.27
African LDCs (and Haiti)	0.97	1.14	1.09	1.09	0.99
Asian LDCs	0.95	1.31	1.37	2.58	2.97
Island LDCs					
Landlocked LDCs	0.91	1.13	0.99	1.02	1.00
Developing Countries	13.20	14.03	14.33	13.35	13.10
OECD members	46.28	42.75	41.16	40.90	41.46

Source: World Bank, World Development Indicators, 2012

A4.11 Mobile cellular subscriptions per 100 people

Country Name	2005–08	2009	2010	2011
Afghanistan	13.93	34.34	41.39	54.26
Angola	23.40	43.70	46.69	48.38
Bangladesh	18.60	35.66	46.17	56.48
Benin	22.48	58.52	79.94	85.33
Bhutan	18.87	47.49	54.32	65.58
Burkina Faso	10.81	23.92	34.66	45.27
Burundi	3.58	10.26	13.72	14.46
Cambodia	17.56	44.84	57.65	69.90
Central African Republic	3.97	15.74	22.25	25.04
Chad	7.66	20.86	25.61	31.80
Comoros	7.58	17.13	22.49	28.71
Congo, Dem. Rep.	9.75	14.73	17.92	23.13
Djibouti	8.09	14.77	18.64	21.32
Equatorial Guinea	21.40	29.36	57.01	59.15
Eritrea	1.55	2.77	3.53	4.47
Ethiopia	1.43	4.99	8.26	16.67
Gambia, The	41.04	78.07	85.53	89.02
Guinea	17.40	35.74	40.07	44.02
Guinea-Bissau	18.43	37.76		25.98
Haiti	19.22	36.98	40.03	41.49
Kiribati	0.82	10.11	10.64	13.64
Lao PDR	21.80	52.92	64.56	87.16
Lesotho	19.70	30.76	45.48	47.91

(continued)

A4.11 Mobile cellular subscriptions per 100 people (continued)

Country Name	2005-08	2009	2010	2011
Liberia	13.26	28.29	39.34	49.17
Madagascar	11.24	31.23	37.23	38.28
Malawi	6.62	17.21	20.92	25.07
Mali	14.69	29.92	48.41	68.32
Mauritania	41.46	64.61	79.34	92.71
Mozambique	13.02	26.12	30.88	32.83
Myanmar	0.51	1.05	1.24	2.57
Nepal	7.76	19.02	30.69	43.81
Niger	6.42	17.36	24.53	27.01
Rwanda	6.38	23.56	33.40	40.63
Samoa	38.53	82.78	91.43	
São Tomé and Príncipe	17.60	39.38	62.11	68.26
Senegal	29.99	57.00	67.11	73.25
Sierra Leone	16.07	20.21	34.09	35.63
Solomon Islands	2.70	9.54	27.87	49.77
Somalia	6.58	7.03	6.95	6.85
Sudan	16.49	36.11	41.54	56.25
Tanzania	18.14	40.14	46.80	55.53
Timor-Leste	6.74	31.90	53.42	53.23
Togo	17.18	37.06	40.69	50.45
Tuvalu	16.10	10.20	16.28	21.63
Uganda	13.15	28.99	38.38	48.38
Vanuatu	10.10	54.09	119.05	
Yemen, Rep.	18.33	35.63	46.09	47.05
Zambia	18.23	34.63	41.62	60.59
LDCs	14.43	30.93	40.77	44.49
African LDCs (and Haiti)	14.80	29.95	37.76	43.26
Asian LDCs	14.67	33.87	42.76	53.35
Island LDCs	12.68	30.62	48.38	39.21
Landlocked LDCs	10.94	25.75	34.26	43.87
Developing Countries	49.92	75.86	83.78	92.02
OECD members	89.92	101.06	103.28	109.83

Source: UNCTAD 2011

A4.12 Renewable net installed electricity capacity (% of total net installed electricity capacity)

Country	1990	2000	2008
Afghanistan	59.10	71.70	76.50
Angola	66.80	49.50	43.10
Bangladesh	9.10	6.40	4.20
Benin	0.00	1.90	1.70
Bhutan	96.90	97.20	98.90
Burkina Faso	14.30	26.40	12.70
Burundi	74.40	78.20	98.10
Cambodia	22.20	7.70	4.70

(continued)

A4.12 Renewable net installed electricity capacity (% of total net installed electricity capacity) (continued)

Country	1990	2000	2008
Central African Republic	51.20	47.20	54.30
Chad	0.00	0.00	0.00
Comoros	20.00	20.00	16.70
Congo, Dem. Rep.	97.90	98.70	98.70
Djibouti	0.00	0.00	0.00
Equatorial Guinea	20.00	16.70	3.20
Eritrea	0.00	0.00	0.00
Ethiopia	92.10	90.40	85.20
Gambia, The	0.00	0.00	0.00
Guinea	23.10	40.10	37.20
Guinea-Bissau	0.00	0.00	0.00
Haiti	39.40	25.80	25.80
Kiribati	0.00	0.00	0.00
Lao PDR	89.80	97.30	93.10
Lesotho	0.00	0.00	0.00
Liberia	0.00	0.00	0.00
Madagascar	48.20	46.30	50.40
Malawi	78.90	91.30	92.10
Mali	51.70	47.40	55.40
Mauritania	58.10	56.60	38.30
Mozambique	88.10	91.50	89.70
Myanmar	23.50	29.30	32.60
Nepal	84.70	85.90	92.10
Niger	0.00	0.00	0.00
Rwanda	88.20	83.30	55.20
Samoa	31.60	42.20	29.30
São Tomé and Príncipe	33.30	43.90	42.90
Senegal	0.00	0.40	0.40
Sierra Leone	1.60	7.30	7.70
Solomon Islands	0.00	0.00	0.00
Somalia	0.00	0.00	7.70
Sudan	45.00	39.90	43.40
Tanzania	65.00	65.00	60.50
Timor-Leste	0.00	0.00	0.00
Togo	69.10	72.80	78.80
Tuvalu	0.00	0.00	0.00
Uganda	95.70	98.60	61.20
Vanuatu	0.00	0.00	0.00
Yemen, Rep.	0.00	0.00	0.00
Zambia	98.20	99.10	99.50
Least developed countries	60.60	56.70	51.50
African LDCs (and Haiti)	77.20	73.80	67.20
Asian LDCs	28.20	29.40	32.80
Island LDCs	13.00	17.10	12.30
Landlocked LDCs	60.95	63.38	60.89
Developing Countries	31.50	46.80	75.00
OECD members			

Source: World Bank, World Development Indicators, 2012

A4.13 Quality of electricity supply. From 1 to 7 (7 being the best ranking)

Country Name	2006–08	2009	2010	2011	2012
Afghanistan					
Angola					
Bangladesh	1.83	1.82	1.55	1.56	1.79
Benin	2.46	2.91	3.26	2.72	2.54
Bhutan					
Burkina Faso	3.11	3.04	2.19	1.90	2.27
Burundi	2.11	2.68	2.54	2.37	1.88
Cambodia	2.55	2.57	3.06	3.45	3.57
Central African Republic					
Chad	1.30	1.41	1.45	1.50	1.53
Comoros					
Congo, Dem. Rep.					
Djibouti					
Equatorial Guinea					
Eritrea					
Ethiopia	3.79	3.18	2.72	2.84	3.16
Gambia, The	3.37	4.65	4.84	4.40	4.12
Guinea					1.46
Guinea-Bissau					
Haiti				1.49	1.56
Kiribati					
Lao PDR					
Lesotho	3.29	3.62	3.64	3.88	3.67
Liberia					
Madagascar	2.10	2.32	2.56	2.25	2.25
Malawi	2.69	2.57	2.04	1.88	2.23
Mali	3.35	3.29	3.34	3.39	3.45
Mauritania	3.16	3.48	2.99	2.98	3.70
Mozambique	3.48	3.66	3.33	3.33	3.17
Myanmar					
Nepal	1.98	1.32	1.22	1.30	1.39
Niger					
Rwanda			4.14	4.18	4.20
Samoa					
São Tomé and Príncipe					
Senegal	2.12	2.85	2.31	1.74	1.85
Sierra Leone					2.58
Solomon Islands					
Somalia					
Sudan					
Tanzania	2.28	2.47	2.54	2.24	1.93
Timor-Leste	1.78	2.03	1.61	1.81	2.91
Togo					
Tuvalu					
Uganda	1.71	2.63	2.83	2.70	2.18
Vanuatu					
Yemen, Rep.				1.54	1.40
Zambia	4.26	3.05	3.27	3.48	3.52
Least developed countries	2.64	2.78	2.73	2.56	2.57

(continued)

A4.13 Quality of electricity supply. From 1 to 7 (7 being the best ranking) (continued)

Country	2006–08	2009	2010	2011	2012
African LDCs (and Haiti)	2.80	2.99	2.94	2.74	2.66
Asian LDCs	2.12	1.91	1.94	1.96	2.04
Island LDCs					
Landlocked LDCs	2.76	2.68	2.67	2.67	2.68
Developing Countries	3.91	4.00	4.00	3.96	3.98
OECD members	6.04	6.08	6.13	6.16	6.13

Source: World Bank, Doing Business

A4.14 Getting electricity (worldwide ranking)

Country Name	2012	2013
Afghanistan	107	110
Angola	145	113
Bangladesh	185	185
Benin	135	136
Bhutan	133	141
Burkina Faso	132	139
Burundi	163	164
Cambodia	128	132
Central African Republic	171	173
Chad	147	149
Comoros	100	104
Congo, Dem. Rep.	134	140
Djibouti	138	142
Equatorial Guinea	87	86
Eritrea	93	93
Ethiopia	94	94
Gambia, The	121	119
Guinea	114	88
Guinea-Bissau	183	182
Haiti	73	71
Kiribati	156	159
Lao PDR	131	138
Lesotho	136	133
Liberia	146	145
Madagascar	181	183
Malawi	178	179
Mali	111	115
Mauritania	119	121
Mozambique	174	174
Myanmar		
Nepal	96	96
Niger	115	118
Rwanda	50	49
Samoa	34	33
São Tomé and Príncipe	71	72
Senegal	179	180

(continued)

A4.14 Getting electricity (worldwide ranking) (continued)

Country Name	2012	2013
Sierra Leone	176	176
Solomon Islands	118	125
Somalia		
Sudan	108	108
Tanzania	95	96
Timor-Leste	45	40
Togo	91	89
Tuvalu		
Uganda	124	127
Vanuatu	144	124
Yemen, Rep.	52	112
Zambia	148	151
Least developed countries	123.58	124.53
African LDCs (and Haiti)	131.00	130.10
Asian LDCs	118.86	130.57
Island LDCs	95.43	93.86
Landlocked LDCs	127.25	129.75
Developing Countries	109.10	108.92
OECD members	57.06	57.21

Source: World Bank, Doing Business

A4.15 Getting electricity (number of days)

Country Name	2010	2011	2012	2013
Afghanistan	424	191	109	109
Angola	69	69	69	55
Bangladesh	137	142	295	404
Benin	172	101	101	90
Bhutan	101	172	158	158
Burkina Faso	158	158	158	158
Burundi	188	188	188	188
Cambodia	183	183	183	183
Central African Republic	210	210	102	102
Chad	67	67	67	67
Comoros		120	120	120
Congo, Dem. Rep.	58	58	58	58
Djibouti	180	180	180	180
Equatorial Guinea		106	106	106
Eritrea	59	59	59	59
Ethiopia	75	75	95	95
Gambia, The	178	178	78	78
Guinea	69	69	69	69
Guinea-Bissau	455	455	455	455
Haiti	66	66	66	60
Kiribati	97	97	97	97
Lao PDR	134	134	134	134
Lesotho	140	140	140	125

(continued)

A4.15 Getting electricity (number of days) (continued)

Country Name	2010	2011	2011	2010
Liberia	585	585	585	465
Madagascar	450	450	450	450
Malawi	222	222	222	222
Mali	120	120	120	120
Mauritania	75	75	75	75
Mozambique	87	87	117	117
Myanmar				
Nepa l	74	74	70	70
Niger	165	120	120	115
Rwanda	30	30	30	30
Sa moa	34	34	34	34
São Tomé and Príncipe		89	89	89
Senegal	125	125	125	125
Sierra Leone	454	137	137	137
Solomon Islands	160	160	160	160
Somalia				
Sudan		70	70	70
Tanzania	382	109	109	109
Timor-Leste	39	39	63	63
Togo	74	74	74	74
Tuvalu				
Uganda	151	91	91	91
Vanuatu	257	257	257	122
Yemen, Rep.	35	35	35	110
Zambia	117	117	117	117
Least developed countries	167.22	140.40	138.60	135.89
African LDCs (and Haiti)	178.66	148.10	143.00	137.48
Asian LDCs	155.43	133.00	140.57	166.86
Island LDCs	117.40	113.71	117.14	97.86
Landlocked LDCs	148.50	131.81	120.06	118.81
Developing Countries	123.38	118.71	117.18	114.55
OECD members	105.85	98.35	98.35	95.47

Source: World Bank, Doing Business

A4.16 Cost of getting electricity (% of income per capita)

Country Name	2010	2011	2012	2013
Afghanistan	618.2	3,711.1	3,956.8	3,494.3
Angola	1,099.1	1,278.5	890.5	754.9
Bangladesh	6,462.6	5,576.1	5,122.7	5,193.8
Benin	15,016.7	1,261.1	1,265.4	1,149.6
Bhutan	1,416.4	1,5452	15,205.3	14,343.1
Burkina Faso	15,290.8	14,901.3	13,356.8	12,662.1
Burundi	43,020.5	36,696.7	34,477.1	21,481.7
Cambodia	3,854.2	3,581.5	3,062.5	2802
Central African Republic	14,390.3	13,298.3	12,852.1	12,603.6

(continued)

A4.16 Cost of getting electricity (% of income per capita) (continued)

Country Name	2010	2011	2012	2013
Chad	1,4057	14,719.8	13,123.8	11,017.6
Comoros		2,353.6	2,383.8	2,477.2
Congo, Dem. Rep.	33,520.3	32,434.1	28,801.5	27,211.6
Djibouti	10,165.8	8,816.7	8,799.1	7,776.5
Equatorial Guinea		833.3	571.1	456.5
Eritrea	5,051.6	4,156.7	4,436.6	3508
Ethiopia	4,897.9	3,661.7	3,320.8	2,544.3
Gambia, The	6,973.2	6,526.3	6,070.8	3,976.9
Guinea	12,592.9	13,275.4	10,421.7	8,377.7
Guinea-Bissau	4009	2,133.5	2,049.6	1,737.2
Haiti	3,887.9	3,345.3	4,032.8	4599
Kiribati	5,029.4	5320	5,162.7	5,199.7
Lao PDR	3,245.2	2,734.3	2,381.6	2,130.5
Lesotho	2,672.7	2,664.1	2,456.7	2,275.9
Liberia	5066	5,294.1	4,455.2	3,528.6
Madagascar	8,087.8	9,236.4	8,390.9	9,056.7
Malawi	11,655.6	11,703.9	9,665.8	8,854.9
Mali	4,229.2	3,877.9	4,397.7	4,187.8
Mauritania	9,906.2	8997	7,310.9	7,516.9
Mozambique	2979	2,523.9	2558	2,394.7
Myanmar				
Nepal	2,730.9	2,370.7	1,995.8	1,762.8
Niger	7982	7,886.7	6662	6,562.4
Rwanda	6,233.6	5,513.6	4,696.8	3,948.1
Sa moa	901.6	881.9	857.1	790.8
São Tomé and Príncipe		1,437.2	1,252.8	1,066.6
Senegal	6,051.1	5,997.9	5,938.9	5,624.9
Sierra Leone	2,014.5	2,914.1	2,466.3	2,124.4
Solomon Islands	1,950.8	2575	2,272.4	2,044.5
Somalia				
Sudan		4091	3,949.3	2,527.3
Tanzania	2,849.6	2,402.9	2,223.5	1,944.1
Timor-Leste	950.3	1,159.2	1,064.4	593
Togo	6,492.1	6,020.7	6,023.2	4,732.5
Tuvalu				
Uganda	6,761.7	5,765.4	5,130.1	4623
Vanuatu	1,398.7	1,266.1	1,238.8	1,248.1
Yemen, Rep.	5,024.5	4,973.4	4,569.8	3,921.2
Zambia	1,198.3	1,250.5	1,317.9	1,109.5
Least developed countries	7,359.4	6,597.1	6,058.7	5,287.5
African LDCs (and Haiti)	9,246.6	7,854.2	7,164.9	6,157.1
Asian LDCs	3,336.0	5,485.6	5,184.9	4,806.8
Island LDCs	2,046.2	2,141.9	2,033.1	1,917.1
Landlocked LDCs	8,775.0	9,138.0	8,437.3	7,100.1
Developing Countries	3,393.8	2,885.0	2,625.4	2,296.1
OECD members	124.3	120.7	118.7	113.3

Source: World Bank, Doing Business

A4.17 Percentage of the population having access to improved sanitation facilities

Country	2005–08	2009	2010
Afghanistan	36.00	37.00	37.00
Angola	53.00	57.00	58.00
Bangladesh	52.25	54.00	56.00
Benin	11.75	13.00	13.00
Bhutan	42.25	44.00	44.00
Burkina Faso	15.00	17.00	17.00
Burundi	46.00	46.00	46.00
Cambodia	25.75	29.00	31.00
Central African Republic	31.50	34.00	34.00
Chad	12.00	13.00	13.00
Comoros	35.75	36.00	36.00
Congo, Dem. Rep.	22.00	24.00	24.00
Djibouti	52.00	50.00	50.00
Equatorial Guinea	89.00		
Eritrea	13.75		
Ethiopia	16.25	20.00	21.00
Gambia, The	67.00	68.00	68.00
Guinea	17.00	18.00	18.00
Guinea-Bissau	18.00	19.00	20.00
Haiti	18.00	17.00	17.00
Kiribati	34.00		
Lao PDR	50.25	60.00	63.00
Lesotho	26.00	26.00	26.00
Liberia	15.50	17.00	18.00
Madagascar	14.00	15.00	15.00
Malawi	49.00	51.00	51.00
Mali	20.50	21.00	22.00
Mauritania	24.75	26.00	26.00
Mozambique	16.75	17.00	18.00
Myanmar	71.75	76.00	76.00
Nepal	27.50	30.00	31.00
Niger	9.00	9.00	9.00
Rwanda	52.75	55.00	55.00
Samoa	98.00	98.00	98.00
São Tomé and Príncipe	24.75	26.00	26.00
Senegal	49.50	51.00	52.00
Sierra Leone	12.00	12.00	13.00
Solomon Islands	32.00		
Somalia	22.75	23.00	23.00
Sudan	26.00	26.00	26.00
Tanzania	10.00	10.00	10.00
Timor-Leste	44.00	46.00	47.00
Togo	13.00	13.00	13.00
Tuvalu	83.50	84.00	85.00
Uganda	33.00	34.00	34.00
Vanuatu	51.50	55.00	57.00

(continued)

A4.17 Percentage of the population having access to improved sanitation facilities (continued)

Country Name	2005–08	2009	2010
Yemen, Rep.	49.50	52.00	53.00
Zambia	47.50	48.00	48.00
Least developed countries	34.54	35.84	36.32
African LDCs (and Haiti)	27.92	28.33	28.60
Asian LDCs	44.41	47.75	48.88
Island LDCs	54.07	57.50	58.17
Landlocked LDCs	32.16	34.06	34.44
Developing Countries	67.77	69.16	69.50
OECD members	97.19	97.66	97.75

Source: World Bank, World Development Indicators, 2012

A4.18 Percentage of the population having access to improved water sources in rural areas

Country	2005–08	2009	2010
Afghanistan	39.50	42.00	42.00
Angola	38.75	38.00	38.00
Bangladesh	79.00	80.00	80.00
Benin	64.50	67.00	68.00
Bhutan	89.50	93.00	94.00
Burkina Faso	66.25	71.00	73.00
Burundi	71.00	71.00	71.00
Cambodia	52.00	56.00	58.00
Central African Republic	50.75	51.00	51.00
Chad	42.75	44.00	44.00
Comoros	96.75	97.00	97.00
Congo, Dem. Rep.	27.00	27.00	27.00
Djibouti	55.50	54.00	54.00
Equatorial Guinea	42.00		
Eritrea	57.00		
Ethiopia	29.50	34.00	34.00
Gambia, The	83.50	85.00	85.00
Guinea	61.00	65.00	65.00
Guinea-Bissau	49.50	52.00	53.00
Haiti	51.00	51.00	51.00
Kiribati	53.00		
Lao PDR	53.25	59.00	62.00
Lesotho	74.00	73.00	73.00
Liberia	56.50	59.00	60.00
Madagascar	30.50	33.00	34.00
Malawi	71.75	77.00	80.00
Mali	45.75	50.00	51.00
Mauritania	44.75	48.00	48.00
Mozambique	28.25	29.00	29.00
Myanmar	71.50	76.00	78.00
Nepal	85.75	88.00	88.00
Niger	38.00	39.00	39.00

(continued)

A4.18 Percentage of the population having access to improved water sources in rural areas (continued)

Country Name	2005–08	2009	2010
Rwanda	63.00	63.00	63.00
Samoa	94.00	95.00	96.00
São Tomé and Príncipe	84.25	88.00	88.00
Senegal	53.25	55.00	56.00
Sierra Leone	33.25	34.00	35.00
Solomon Islands	65.00		
Somalia	7.75	7.00	7.00
Sudan	52.75	52.00	52.00
Tanzania	44.50	44.00	44.00
Timor-Leste	56.50	59.00	60.00
Togo	39.25	40.00	40.00
Tuvalu	96.00	97.00	97.00
Uganda	63.00	67.00	68.00
Vanuatu	81.00	85.00	87.00
Yemen, Rep.	47.75	47.00	47.00
Zambia	43.75	46.00	46.00
Least developed countries	56.86	58.82	59.39
African LDCs (and Haiti)	49.50	50.87	51.30
Asian LDCs	64.78	67.63	68.63
Island LDCs	82.12	86.83	87.50
Landlocked LDCs	57.97	60.50	61.19
Developing Countries	74.57	76.49	77.10
OECD members	96.32	97.06	97.24

Source: World Bank, World Development Indicators, 2012

A4.19 Percentage of the population having access to improved water sources in urban areas

Country	2005–08	2009	2010
Afghanistan	73.50	78.00	78.00
Angola	57.50	60.00	60.00
Bangladesh	85.00	85.00	85.00
Benin	82.00	83.00	84.00
Bhutan	99.00	100.00	100.00
Burkina Faso	91.50	94.00	95.00
Burundi	83.75	83.00	83.00
Cambodia	78.50	84.00	87.00
Central African Republic	90.50	92.00	92.00
Chad	66.50	69.00	70.00
Comoros	91.00	91.00	91.00
Congo, Dem. Rep.	80.25	79.00	79.00
Djibouti	97.25	99.00	99.00
Equatorial Guinea	66.00		
Eritrea	74.00		
Ethiopia	94.00	97.00	97.00

(continued)

A4.19 Percentage of the population having access to improved water sources in urban areas (continued)

Country	2005–08	2009	2010
Gambia, The	91.75	92.00	92.00
Guinea	89.25	90.00	90.00
Guinea-Bissau	83.25	89.00	91.00
Haiti	85.00	85.00	85.00
Kiribati	77.00		
Lao PDR	76.00	76.00	77.00
Lesotho	92.00	91.00	91.00
Liberia	83.00	87.00	88.00
Madagascar	75.00	75.00	74.00
Malawi	94.00	95.00	95.00
Mali	81.50	86.00	87.00
Mauritania	50.50	52.00	52.00
Mozambique	76.50	77.00	77.00
Myanmar	90.50	92.00	93.00
Nepal	93.00	93.00	93.00
Niger	92.75	98.00	100.00
Rwanda	79.50	77.00	76.00
Samoa	96.00	96.00	96.00
São Tomé and Príncipe	88.50	89.00	89.00
Senegal	92.00	93.00	93.00
Sierra Leone	83.00	86.00	87.00
Solomon Islands	94.00		
Somalia	62.75	66.00	66.00
Sudan	69.75	68.00	67.00
Tanzania	81.50	80.00	79.00
Timor-Leste	83.00	88.00	91.00
Togo	87.50	89.00	89.00
Tuvalu	97.50	98.00	98.00
Uganda	92.25	94.00	95.00
Vanuatu	97.00	97.00	98.00
Yemen, Rep.	74.00	72.00	72.00
Zambia	87.00	87.00	87.00
Least developed countries	83.58	85.27	85.64
African LDCs (and Haiti)	81.92	83.77	84.00
Asian LDCs	83.69	85.00	85.63
Island LDCs	91.26	93.17	93.83
Landlocked LDCs	86.67	88.13	88.50
Developing Countries	93.91	94.01	94.06
OECD members	99.55	99.61	99.70

Source: World Bank, World Development Indicators, 2012

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