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What you spend years building, someone could destroy overnight; Build anyway.

(Mother Theresa)

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Cover picture: Chinyingi bridge over the Zambezi River, Zambia.

Difference Within Peers: The Infrastructure Stock in the Least Developed Countries

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Abstract:

The decrepit state of infrastructure in many least developed countries (LDCs) constitutes a major obstacle for these countries to grow and develop. Yet, the differences in the infrastructure stocks within the group of LDC countries are too often overlooked. Using a cluster analysis technique, this paper shows that LDCs with poor infrastructure tend to be large African LDCs with a low population density, while the group with the best infrastructure stocks is composed of small LDCs with high population and urbanization rates. The paper highlights the worrying trend that less than a handful of LDCs managed to improve their infrastructure over time. Most of them are still grappling with the same infrastructure stock they had 13 years earlier.

Keywords: infrastructure, cluster analysis, least developed countries

JEL: C69, L91, L98, O55

1. Introduction

Available data on transport, energy and telecommunications indicates that the least developed countries (LDCs) have the worst infrastructure stock in the world and the lowest quality of infrastructure services. In 1999, the length of roads per square kilometre and per capita were about half the level in other developing countries, and only 22% of LDC roads were paved, compared to 43% in other developing countries. In 2003, fixed and mobile phone densities were 11% of the level in other developing countries. In 2002, electricity consumption per capita in the LDCs was a mere 7% that of the other developing countries (UNCTAD, 2006). While it is well known that the LDCs have the lowest level of infrastructure in the world, the real and concrete differences in the stocks of infrastructure available to them are too often overlooked. This paper groups LDCs according to their state of infrastructure in order to highlight the existing gaps within and between them.

Rather than discussing single variables, this paper assesses the available infrastructure stocks at the country level using both an ad hoc infrastructure index and cluster analysis techniques. The infrastructure index is used (i) to show the extent of the gap between the infrastructure stocks of the LDCs and that of the other developing countries, and (ii) to assess the evolution of the infrastructure stock in the LDCs over time.

The goals of this paper are twofold. First, it attempts to highlight the differences that exist within the LDCs in terms of infrastructure stocks. Second, it investigates whether the infrastructure stocks of the individual LDCs have improved, worsened or stagnated over the past 13 years.

The data for the analysis was taken from the infrastructure database compiled by Estache and Goicoechea (2005). Notwithstanding this recent data gathering effort, data unavailability seriously limits the extent of the analysis, which is only based on 31 LDCs.

The paper is organized as follows: Section 2 shows the extent of the gap between the infrastructure stocks available to the LDCs and other developing countries. Section 3 highlights the differences in terms of infrastructure stocks within the LDCs and groups them according to whether they have good, average or poor infrastructure. Section 4 contains an analysis of whether the infrastructure stocks of the individual LDCs have improved, stagnated or worsened over time. Section 5 concludes.

2. Infrastructure stocks in the developing countries

Using the internationally-comparable database compiled by Estache and Goicoechea (2005), an infrastructure index was created for 114 developing countries (31 of which are LDCs) for which data is available. The unavailability of data seriously limits the extent of the analysis as the construction of the index requires full data for three out of the four variables used. The selection of the variables was therefore made on the basis of the widest country coverage. Four variables have been selected and used to construct the index, as they properly represent the existing stock of physical infrastructure as well as the quality of it.

The variables considered are: (i) the percentage of roads paved (PvRoads), (ii) the road density measured as the km of roads per 1000 people, (iii) the percentage of population with access to electricity, and (iv) the phone-density, which measures the total number of mobile and fixed phone subscribers per 1,000 people.

The above four variables have been normalized to zero mean and variance equal to one, *N(0,1)*, as in Limao and Venables (2001). The linear average over the four variables is taken to obtain a single indicator per country and over time. Only those countries that have data for a minimum three out of four variables are retained and the remaining missing observations are ignored.

The infrastructure index obtained from the normalization is visually represented in chart 1. High income developing countries are at the forefront with the best infrastructure indices, while all LDCs are located below average (μ) and below $\mu - s.d.$ (standard deviation). Some Asian LDCs (Bhutan, Laos and Yemen) stand out as having the best infrastructure indices of the LDCs and having better infrastructure than some other developing countries, such as Zimbabwe, Cote d'Ivoire, Gabon, to cite a few. The majority of the African LDCs (with the notable exceptions of Mauritania and Senegal) have the worst infrastructure indicators of the entire 114 countries sample. Out of the 30 developing countries with the worst infrastructure indicators, 24 are LDCs, mostly located in Africa. Furthermore, quite a few non-LDC African countries have an infrastructure index that is not too different from that of the African LDCs. This is rather unfortunate as it limits the regional benefits that can be gained by neighbouring a more developed country with better infrastructure. Mozambique, for example, should be benefiting greatly from the regional infrastructure projects that have been set up with South Africa.

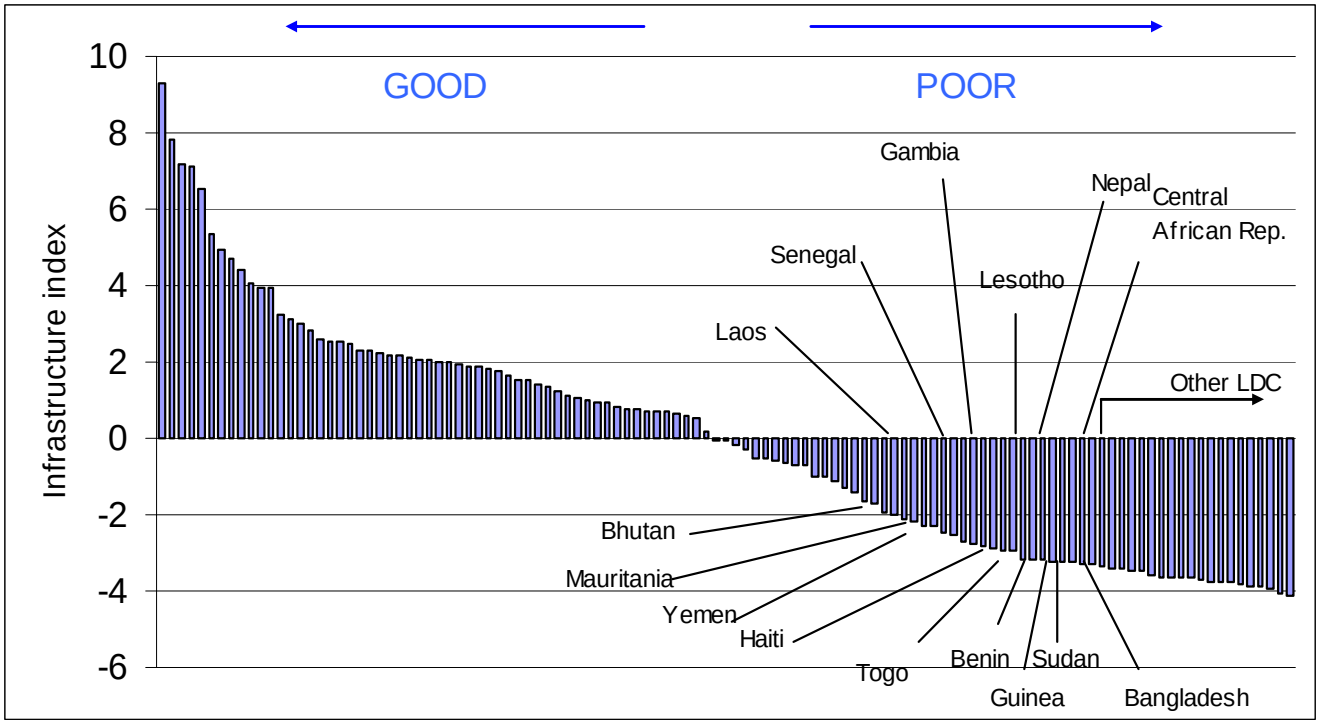
Such a result was somewhat expected, as the infrastructure stock tends to be highly correlated with countries' incomes. Chart 1 also shows that not all LDCs have the same infrastructure endowment: Some are better (worse) endowed than others. The next section attempts to group the LDCs according to the similarities in their infrastructure stocks using cluster analysis techniques.

3. Infrastructure stocks within the LDCs: differences and similarities

A non-hierarchical K-mean cluster analysis (see Annex 1 for details) is used to group the LDCs according to the similarity in their infrastructure stocks. This analysis relies on the same four variables discussed in section 2 and focuses on the 31 LDCs for which data is available. Table 1 summarises the results of the cluster analysis and groups the LDCs accordingly.

The interpretation of the results of this cluster analysis involves a certain degree of subjectivity. The cluster of LDCs with poor infrastructure, or Group III, contains 6 LDCs that have on average, the highest road density, while having the lowest phone-density, share of paved roads as well as the electrification rate. This cluster only has just a quarter of the electrification rate, the phone-density and the paved roads of the LDCs with the best infrastructure level, or Group I. The stock of infrastructure for those 14 LDCs with average infrastructure (or Group II) is slightly better than that of Group III, but still

Chart 1: Infrastructure indicator for 114 developing countries, 2003.



Source: Author's calculations.

Table 1. LDC Classification according to K-means cluster analysis, 2003

Clusters	Countries	Elec-tricity	Phone-density	Pv-Roads	Road-density	GDP pc at 2000 $	Populat density (per km)	Area (sq km)	Urbaniza-tion (% of total)
Group I: LDCs with best infra-structure (11 LDCs)	Benin Bhutan Gambia Haiti Laos Lesotho Mauritania Senegal Sudan Togo Yemen	21.5	64.8	29.4	2.4	443.6	73.4	421,129	35.0
Group II: LDCs with average infrastructure (14 LDCs)	Bangladesh Burkina Faso Cambodia Eritrea Ethiopia Malawi Mali Mozambique Nepal Niger Rwanda Sierra Leone Tanzania Uganda	8.6	18.7	13.7	1.5	235.9	157.7[a]	454,739	22.5
Group III: LDCs with poor infra-structure (6 LDCs)	Angola Central African Republic Chad Guinea Guinea-Bissau Madagascar	5.7	12.3	8.8	4.3	343.4	23.0	664,043	33.0

Source: Author's calculations based on Estache and Guinoechea (2005) and World Bank, World Development Indicators, 2005.

Note: The data reported in the table are not normalized and should be read with the usual reference unit measures.

[a] Excluding Bangladesh, the population density falls to 88.3.

far below that of Group I. The average electrification rate of Group II is less than half that of Group I. Furthermore, their phone-density and share of paved roads are a third of the average of the group with best infrastructure. Out of 31 LDCs, only 11 belong to Group I. Although the four variable averages for Group I are still below the averages for the other developing countries, the Gambia, Mauritania and Senegal seem to have better infrastructure than some other developing countries. Furthermore, there seems to be a clear geographical difference in the infrastructure stock available to the LDCs: Asian LDCs have better infrastructure than the African LDCs. Asian LDCs are included in Groups I and II, while the cluster with poor infrastructure, or Group III, is only composed of African LDCs.

As expected, the 11 LDCs of Group I have the highest real GDP per capita. Group III has a higher real per capita GDP than Group II, due to the presence of Angola and Chad, two oil-exporting countries. If they were excluded from the computation, the average real GDP per capita for the LDCs with poor infrastructure would have been 257.11, which is not drastically different from the mean of group II.

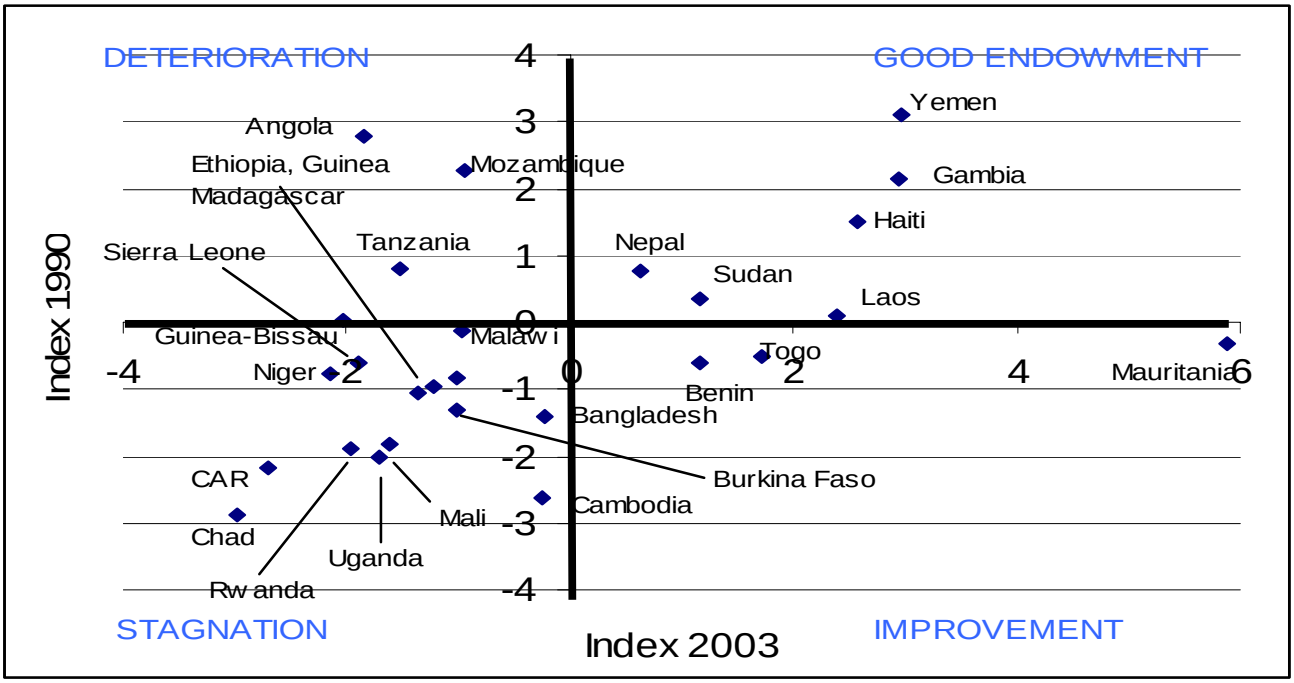
The group of LDCs with the best infrastructure is composed of relatively small countries, in terms of land area, with a high population density as well as the high shares of urbanization. Mauritania and Senegal, which are amongst the LDCs with the best infrastructure, have the two highest urbanization rates (above 49.6%) of the countries considered. The group of LDCs with the worst infrastructure is composed of large countries with a low population density. The size of the LDCs included in group III is a third bigger than that for the LDCs of Group I. Furthermore, the population density for the poor infrastructure cluster is only a third of that for the LDCs with the best infrastructure.

Angola, Central African Republic, Chad, Guinea, Guinea-Bissau and Madagascar have the poorest infrastructure stock of the LDCs considered. It is rather surprising to find two oil exporting countries with poor infrastructure. This finding raises some policy concerns over the future development-oriented strategies that could make for better use of the oil revenues. Investing in infrastructure-building and/or infrastructure-upgrading projects has large poverty-reducing effects (see for example, ADB et al., 2005), as well as high benefit/cost ratios (see Fan et al., 2004 and 2005 for country studies on the benefit/cost ratios for different types of public investments, one of which covers road building).

4. Have the infrastructure stocks of the LDCs improved over time?

Using the same methodology and variables employed in section 2, two infrastructure indices have been calculated to assess and compare the stock of infrastructure available in both 1990 and 2003. Chart 2 scatters the infrastructure indicators calculated for 28 LDCs for the years 1990 and 2003, and table 2 summarises the main results by listing the countries according to the evolution of their infrastructure stock.

Chart 2: Evolution of the infrastructure index for 28 LDCs, 1990 vs 2003



Source: Author's calculations

The I quadrant contains the countries that had good infrastructure in both 1990 and 2003 compared to the remaining LDCs. The II quadrant contains the countries that have experienced a worsening of their infrastructure levels from 1990 to 2003. The III quadrant contains those LDCs whose infrastructure stock has stagnated over time, while the IV quadrant contains the LDCs that have experienced an improvement in their infrastructure stock from 1990 to 2003.

Out of the 28 LDCs analysed, only three have improved their infrastructure stocks, while the infrastructure of 14 LDCs has stagnated, and that of the other four has deteriorated over time. Amongst the seven LDCs that have had a good infrastructure level in 1990 and 2003, only Nepal was clustered in Group II (see table 1 for reference). The remaining LDCs belong to the cluster with the best infrastructure (Group I).

The infrastructure stock of Angola, Guinea-Bissau, Mozambique and Tanzania had shown a marked deterioration in 2003 compared to 1990, due to conflicts, switch in external aid from physical to social infrastructure, and the failure of the private sector to replace the Government in the provision of these services (UNCTAD, 2006). The three countries that have improved their infrastructure stock over time, namely Benin, Mauritania and Togo, have been clustered in Group I.

This analysis has shed light on a worrying trend: The vast majority of the LDCs has not managed to upgrade their infrastructure stock over time. More attention should be devoted to this issue.

5. Conclusion

In spite of having the lowest level of infrastructure in the world, there are large differences amongst the levels of infrastructure within the LDCs.

This paper has used a non-hierarchical cluster method, the K-means, to cluster the LDCs according to whether their infrastructure stock was good, average or poor. The analysis has been carried out relying almost exclusively on the internationally-comparable infrastructure database compiled by Estache and Goicoechea (2005). Due to data unavailability, the cluster analysis was carried out for only 31 LDCs and relied on four main variables. The analysis reflects the infrastructure situation of 2003, the latest available year, as well as the change of infrastructure stock that occurred with respect to 1990. It showed that the vast majority of the LDCs considered have not successfully upgraded its infrastructure stock over time. This is an issue which clearly deserves further attention.

Gambia, Mauritania and Senegal have been found to have the best infrastructure level of the LDCs analysed, while Angola, Central African Republic, Chad, Guinea, Guinea-Bissau and Madagascar have the worst. The presence of two oil-exporting LDCs among those countries with the worst infrastructure calls for some targeted Government initiatives aimed at devoting a share of oil revenues into infrastructure-building or upgrading.

Table 2:. The evolution of infrastructure stocks in the LDCs between 1990 and 2003.

Quadrants	Description	Countries
I	Good infrastructure stock (7 LDCs)	Bhutan, Gambia, Haiti, Laos, Nepal, Sudan, Yemen
II	Deterioration of infrastructure stock (4 LDCs)	Angola, Guinea-Bissau, Mozambique, Tanzania
III	Stagnation of infrastructure stock (14 LDCs)	Bangladesh, Burkina Faso, Cambodia, Central African Republic, Chad, Ethiopia, Guinea, Madagascar, Mali, Malawi, Niger, Rwanda, Sierra Leone, Uganda
IV	Improvement of infrastructure stock (3 LDCs)	Benin, Mauritania, Togo

Source: Author's calculations based on chart 2

About the author:

Lisa Borgatti has a Ph.D in international economics from the Graduate institute of international Studies of Geneva, Switzerland. She has been working for the Division of Africa, LDCs and Special Programmes, UNCTAD, since 2002. She has contributed to the UNCTAD Least Developed Countries Reports 2004, 2006, and 2007.

Endnotes

i. The latest year available.

ii. Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Cambodia, Central African Republic, Chad, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Laos, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mozambique, Nepal, Niger, Rwanda, Senegal, Sierra Leone, Sudan, Tanzania, Togo, Uganda, and Yemen.

iii. This assumption implies that missing observations take the same average value as the non-missing observations.

iv. The number of clusters that best minimizes the distance between each observation and the cluster mean, and maximizes the distance between each cluster, is three. A sensitivity analysis, carried out using the Calinski and Harabasz Pseudo F-index, shows that the index is highest when the countries are grouped in 3 clusters (12.47), followed by 8 clusters (12.01).

v. For a stability check, a second cluster analysis was carried out to verify whether the country groupings were steady or not. Three other variables were added to the initial specification, the choice of which was made dependent only on the best data coverage, namely phone density outside the largest city, the cost of a local phone call (in US dollars), and the share of population with access to improved sanitation facilities. The results of this analysis show that out of 31 countries only 3 have changed groups. Benin moved to Group II, while Lesotho and Tanzania moved to Group III.

vi. Eritrea, Lesotho and Senegal have been excluded for lack of data in 1990.

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Annex 1: A Brief Review of the Methodology

A cluster analysis is a statistical technique that allows for the creation of homogenous groups of variables without prior information on the classification of the data. "The objective is to sort observations into groups called clusters so that the degree of statistical association is high among members of the same group and low between members of different groups" (Berlage and Terweduwe, 1988:1529). Each cluster is composed of elements that have a small distance from each other and a relatively large distance from the elements of another cluster. In other words, all available variables for *n* countries are classified in a given number of clusters *c* characterised by (i) a small variability within the cluster and (ii) a large variability across different clusters.

Although there are various ways to calculate the distance or proximity between two observations, this paper uses the most commonly used distance function, i.e. the Euclidean distance function, $d_{i,j}$, which is calculated as follows.

$$d_{i,j} = \left[\sum_{K=1}^{p} (X_{ik} - X_{jk})^2 \right]^{1/2}$$

where $d_{i,j}$ represents the distance between observations *i* and *j*, X_{ik} is the value of the *ith* observation of the variable *k*, and *i= 1,...,n.*

This paper uses the K-means clustering method, which is one of the most used non-hierarchical methods. A hierarchical procedure (i.e. average linkage method, not shown here) has however been used to calculate the initial number of clusters used as starting point for the K-means clustering analysis.

The K-means clustering method allocates the observations to a specified number of clusters in an iterative way in order to minimize the distance between each observation and the cluster means. The error component of the K-means can be defined as

$$E\left[P(n,c)\right] = \sum_{i=1}^{c} \sum_{j=1}^{n} \delta_{ji} d_{j,i}^{2}$$

where $P(n,c)$ stands for the partition of *n* observations into *c* clusters and δ_{ji} is an indicator function that takes the value 1 if the *jth* observation is in cluster *i* and 0 otherwise. The error component is calculated for each observation until no improvement in the within-cluster variance can be reached resulting in an optimal allocation of the *n* observations into the *c* clusters.

Furthermore, the Calinski & Harabasz pseudo-F index was used to identify the number of clusters that best maximise the distance function. This index measures the separation between clusters and is calculated as follows:

$$\frac{S_b/(k-1)}{S_w/(n-k)}$$

where S_b is the sum of squares between the clusters, S_w is the sum of squares within the clusters, *k* is the number of clusters and *n* is the number of observations. The higher the Calinski & Harabasz pseudo F-index, the greater the divergence between the clusters and, therefore, the best the country groupings that result from the analysis.

The Role of Engineering in Building Africa's Infrastructure

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Abstract:

Africa's ability to meet its human welfare needs and to ensure a sustainable use of its natural resources are currently not addressed by donor agencies that continue to focus on traditional relief and emergency activities., Instead, this would require considerable investment in science and innovation in general, and engineering in particular. This article argues that viable strategies for building competence in engineering should seek to link engineering training directly to infrastructure projects. The improvement of infrastructure, again, will result in more private sector investment and thus more opportunities for engineers.

Introduction

The international development community is facing increasing pressure from the bottom-up to change its focus from emergency and relief operations to long-term endogenous solutions based on the building of technical competence, stimulating local entrepreneurship, and investing in infrastructure. [1]

Development partners need to pay more attention to investing in people and promoting technological innovation rather than simply providing short-term palliatives aimed at reducing the visible symptoms of low levels of economic productivity. This shift will involve building capabilities in key areas related to production, project execution, and technological innovation.

Much of the work to build local competence entails training in engineering and related management fields. In other words, the challenge for Africa lies largely in its ability to harness the world's scientific and technical pool and using it to solve local problems. Current investments in infrastructure offer a strategic starting point for building capacity in engineering.

The term "infrastructure" is used here to mean the facilities, structures, associated equipment, services, and institutional arrangements that facilitate the flow of goods and services between individuals, firms, and governments.

Infrastructure represents a foundational base for applying technical knowledge in sustainable development and relies heavily on civil engineering. Moreover,, infrastructure reduces the transaction costs in market exchanges and thus attracts more economic activities and private sector investment.

The following article highlights some the challenges of infrastructure in Africa in transportation, electricity, water treatment, research equipment and ICTs. It further emphasizes the importance of regional integration and higher education to get the critical mass of financial and human capital that is necessary to create and maintain the different types

1. Engineering and international development

Engineering has been marginal to international development practice in the last two decades. Earlier designs of major infrastructure projects ignored critical socioeconomic and environmental factors and were quite frequently linked to macroeconomic distortions. Over time, development agencies shied away from such projects and underplayed the critical role of infrastructure in sustainable development. However, the failure of subsequent sustainable development strategies has forced the international community to rethink the role of infrastructure and the associated engineering fields in sustainable development.

Engineering can help reduce poverty by contributing to sustainable development and alleviate hunger by providing the physical infrastructure needed to advance agriculture as part of an integrated strategy aimed at improving overall human welfare. [2] A nation's ability to solve problems and to initiate and sustain economic growth depends in part on its capabilities in engineering, which in turn determines the ability to provide clean water, good health care, adequate infrastructure, and safe food.

Building domestic competence in fields like chemical and process engineering is critical to expanding the technological basis for improving healthcare. Engineering-

This article builds on excerpts from Calestous Juma, "Redesigning African Economies: The Role of Engineering in International Development," paper presented at The 2006 Hinton Lecture (London: The Royal Academy of Engineering, 3 October 2006) and Bob Wayne Bell Jr. and Calestous Juma. "Rejuvenating African Economies: The Role of Engineering." *Africa Policy Journal* 2 (Fall 2006).

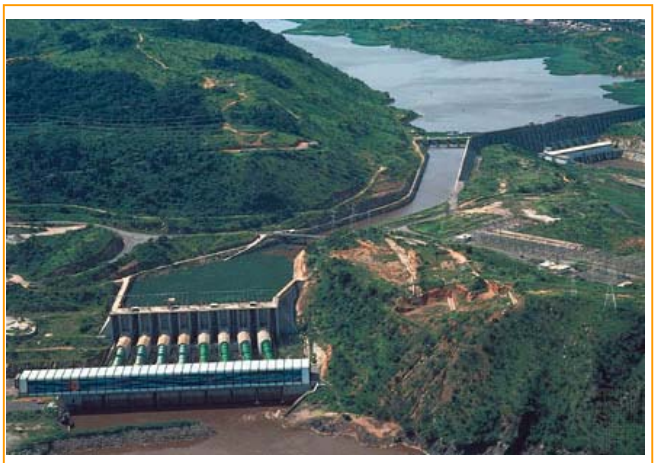
based approaches (e.g., redesigning houses and remodeling landscapes) can help mitigate mosquito breeding and malaria transmission, respectively, complementing efforts to develop new antimalarial drugs and vaccines. [3]

Local technological capacity is indispensable for managing complex ecosystems, such as watersheds, forests, and seas, and for helping to predict (and thereby manage) the impact of climate change and the loss of biodiversity. Emerging fields such as industrial ecology offer new opportunities for addressing ecological challenges. [4] The management of freshwater resources is increasingly dependent on technological interventions as well. Attention is also turning to the development of drought-tolerant crops using both conventional breeding methods and genetic engineering.

But technological innovation can only have the desired impact if placed in the context of long-term sustainable development strategies, especially those associated with greater regional diversity and experimentation. In this regard, regional integration efforts across Africa represent a major opportunity to apply technological innovation in sustainable development, which in turn requires significant investment in creating engineering capacity.

2. The importance of infrastructure

Poor infrastructure and inadequate infrastructure services are among the major factors that hinder Africa's sustainable development. [5] Without adequate infrastructure, African countries will not be able to harness the power of science and innovation to meet sustainable development objectives and be competitive in international markets. Roads, for example, are critical to supporting rural development. Emerging evidence suggests that in some cases low-quality roads have a more significant impact on economic development than high-quality roads. [6] In addition, all significant scientific and technical efforts require reliable electric power and efficient logistical networks. In the manufacturing and retail sectors, efficient transportation and logistical networks allow firms to adopt process and organisational innovations, such as the just-in-time approach to supply chain management.



The Inga falls on the Congo, falls 96 m in 14 km and flows at a rate of about 43,000 cubic m per second, has the potential of providing at least 50,000 megawatt (MW) compared to its current capacity of 700 MW . Good engineering could help.

Infrastructure promotes agricultural trade and helps integrate economies into world markets. It is also fundamental to human development, including the delivery of health and education services. Infrastructural investments further represent untapped potential for the creation of productive employment. For example, it has been suggested that increasing the stock of infrastructure by 1 percent in a developing country context could add 1 percent to the level of GDP. But in some cases the impact has been far greater: the Mozal aluminium smelter investment in Mozambique not only doubled the country's exports and added 7 percent to its GDP, but it also created new jobs and skills in local firms. [7]

2.1 ICT infrastructure

The advancement of information technology and its rapid diffusion in recent years could not have occurred without basic telecommunications infrastructure. In addition, electronic information systems, which rely on telecommunications infrastructure, account for a substantial proportion of production and distribution activities in the secondary and tertiary sectors of the economy. It should also be noted that the poor state of Africa's telecommunications infrastructure has hindered the capacity of the region to make use of advances in fields such as geographical information sciences in sustainable development. [8]

2.2. General infrastructure services

Globalization of trade and investment demands that countries upgrade their technological capabilities as a source of competitive advantage. [9] Infrastructure con-

tributes to technological development in almost all sectors of the economy, serving as its foundation and representing, in effect, technological and institutional investment. The infrastructure development process also provides an opportunity for technological learning. [10]

Because infrastructure services act as intermediate inputs into production, their costs directly affect firms' profitability and competitiveness. Infrastructure services also affect the productivity of other production factors. Electric power allows firms to shift from manual to electrical machinery, extensive transport networks reduce workers' commuting time, and telecommunications networks facilitate flows of information. As an "unpaid factor of production," infrastructure increases the returns to labor and other capital. The availability of infrastructure may also attract firms to certain locations, which creates agglomeration economies and reduces production and transactions costs. [11] Infrastructure is a critical determinant of the destination of foreign direct investment (FDI). [12] It is one of the key factors that all types of investors consider in deciding on the location, scope, and scale of their investments.
Infrastructure and technology development reinforce each other. Expanded use of technology in sustainable development depends on the existence of infrastructure while the introduction of new technologies contributes to improvements in infrastructure services.

Given their strategic importance to creating and sustaining knowledge, research facilities need to be defined as part of Africa's critical infrastructure and managed as such. Many countries have well established sections of the military that deal with civilian matters on a routine basis. This function does not undermine the military role of the armed forces, but instead gives them new tasks that are consistent with a wider sense of national security. The time has come to rethink the role of the military in sustainable development and find constructive ways in which the armed forces can contribute to long-term sustainable development in general and technological innovation in particular.

All stages of an infrastructure project (including planning, design, construction, and operation) involve the use of a wide range of engineering inputs and institutional as well as management arrangements. Given their physical, organizational, and institutional complexity, infrastructure facilities and services require adequate technical capabilities on the part of engineers, managers, government officials, and others involved in these projects.

2.3. Infrastructure and engineering skills

All stages of an infrastructure project (including planning, design, construction, and operation) involve the use of a wide range of engineering inputs and institutional as well as management arrangements. Given their physical, organizational, and institutional complexity, infrastructure facilities and services require adequate technical capabilities on the part of engineers, managers, government officials, and others involved in these projects.

3. Africa's poor infrastructure

Investing in infrastructure is emerging as a critical item on Africa's sustainable development agenda. This interest has been inspired by the growing recognition of the role of infrastructure in sustainable development. It has also been reinforced by the demand for adequate infrastructure in the rapidly expanding urban areas. In 1980, for example, only 28 percent of the African population lived in cities. Today the figure stands at about 37 percent. Africa's annual urban growth rate is 4.87 percent, twice that of Asia and Latin America and Asia. This makes Africa the fastest urbanising continent in the world. [13]

Africa's demand for infrastructure across sectors is hardly being met for the majority of people, with its worst sectoral performance being in access to electricity. [14] Even where such access exists, supply is unreliable and the quality of services remains poor. [15] Generally, access to infrastructure services favors the rich and is more unequal in Africa than in any other part of the world. [16]

3.1 Water treatment

There are major disparities in access to clean water in urban settings. Of Africa's 280 million urban residents, over 150 million lack access to clean water and nearly 180 million do not have adequate sanitation. In turn, some 48 percent of African urban households have a water connection, compared to only 19 percent of informal settlements. Similarly, 31 percent of urban households are connected to the sewage system, but the figure for informal settlements is 7 percent. [17]

3.2. Mobile phones

There is good news, however: the advent of ICTs is transforming the continent. [18] In 2001 Uganda became the

first African country where mobile phones exceeded land fixed lines. [19] The market has expanded from under 20,000 users in 1993 to an estimated 18.2 million in 2003. [20] But despite such phenomenal growth rates, much of Africa still remains disconnected from the rest of the world because of poor communications infrastructure. [21] Access to high bandwidth services remains beyond the reach of most individuals and institutions. Similarly, prospects for enhancing private sector participation through improved telecommunications are being undermined by poor infrastructure. [22]

3.3 Transportation costs

Transportation costs in Africa are the highest of any region in the world. With landlocked countries having to figure in transport costs of up to 75 percent of the value of their exports, the continent faces extreme challenges to compete in global markets. [23] In Uganda, for example, transport costs add the equivalent of an 80 percent tax on clothing exports. Freight charges for imports are 70 percent higher in West and East Africa than in Asia. Africa's landlocked countries pay more than double the rate of Asian countries for comparable transport services. [24] Most of Africa is isolated from major air and maritime routes, which allows access only to high-cost, peripheral routes. [25] More than 20 percent of African exports reach the United States by air. It is estimated that air transport costs account for up to 50 percent of the value of exports to the United States. [26] Internally, air transport costs across Africa are up to four times the cost of getting the same goods over the Atlantic. [27]

3.4. Low private sector participation

A loss of focus on the importance of economic growth in poverty reduction and a failure to appreciate the importance of infrastructure investment led to a drop in infrastructure spending in Africa. Development policy in the 1980s and 1990s asserted that infrastructure would now be financed by the private sector. [28] From 1990 to 2002 infrastructure investment in Africa stood at US$150 billion, of which only US$27.8 billion came from the private sector. Nearly two-thirds of this amount (US$18.5 billion) was for telecommunications. [29] Unfortunately, private sector participation in infrastructure investment has not taken off in Africa, contrary to policy opinion. [30] Over an almost twenty-year period, Africa has only managed to generate 230 projects in partnership with foreign operators, about half of which are located in South Africa. Irrespective of the South African bias of the data, the total number of projects is small and so is the average size of projects in Africa. The average project size is indeed less than half of that in other developing countries. Africa's share of total (mostly foreign) private investment attracted by infrastructure across all sectors in the developing world is roughly 1–2 percent (except in telecoms, 6 percent). [31]

3.5 Military expenditures at the expense of infrastructure

The war-torn economies in Africa are perhaps the hardest hit by the inadequate provision of infrastructure services, where physical infrastructure stocks (e.g., telecommunications, airports, ports, roads, and bridges) are often key targets during war. Although only a fraction of a country may be directly affected by war, infrastructure investment and maintenance is neglected in favor of military expenditures. [32]

3.6 Natural disasters and the need for engineers

Africa is highly vulnerable to external shocks arising from natural disasters such as cyclones, floods, droughts, and earthquakes. The economic fragility arising from natural disasters often deepens precarious economic and social situations. Natural disasters tend to divert a large portion of government and donor resources from otherwise essential infrastructure investment to emergency relief operations. [33] But natural disasters can also serve as a stimulus for investing in engineering for disaster preparedness. Disaster management could therefore serve as a foundation for building expertise in ecological engineering. [34]

3.7 Climate Change

An equally important dimension in Africa's future is the possible impact of climate change on infrastructure development. Africa's high rate of urbanization is partly reinforced by declines in rainfall in parts of Africa. [35] These trends suggest that African countries will need to invest in technologies needed for adapting climate change, most of which will involve the use of a wide range of engineering capabilities. [36]

4 Rejuvenating African economies

Investment in engineering can play a critical role in building Africa's infrastructure and rejuvenating African economies. However, such efforts need to be placed in the appropriate national and regional policy contexts. [37]

4.1. Regional integration

A common feature of African regional integration agreements is their recognition of the importance of engineering in sustainable development. Individual African economies are small and poorly endowed with the human, physical, and financial resources necessary to develop and harness engineering capabilities. The cost of building science and technology infrastructure often appears to be an overwhelming task for national economies, especially in smaller and poorer states.

Cooperation in engineering can take various forms, including joint projects, information sharing, conferences, building and sharing joint laboratories, setting common standards for research and development, and exchange of expertise. Furthermore, the sheer magnitude of the necessary infrastructure development actually requires regional cooperation in project design and implementation to not only reduce costs but also facilitate greater learning.

4.2 Identifying strategic opportunities

A key strategy in building up engineering capabilities in Africa is to link training programs to infrastructure projects in growing fields. For example, expanding geothermal energy production in Eastern Africa (covering Djibouti, Eritrea, Ethiopia, Kenya, Tanzania, Uganda, and Zambia) could be linked to engineering and environmental programs at various universities.

Transportation projects also provide similar opportunities. For example, the Maputo Corridor joint initiative of South Africa and Mozambique, was aimed at addressing the poor state of transport infrastructure while also creating linkages with other sectors. The corridor's plans included upgrading and constructing road links, improving rail facilities, updating port and harbor operations, setting up a new, integrated border post, and improving telecommunications and other non-transport-related facilities.

Innovation: finding answers to real everyday problems

Although foreign construction and engineering firms will continue to be the main sources for infrastructure development, African governments should devise policies both to encourage technology transfer and build local capabilities in infrastructure projects.

Research and development (R&D) activities for infrastructure should be established with research networks as part of Africa's critical infrastructure. Existing research facilities can be networked as part of regional research cooperation, reducing duplication in the availability of such facilities and enhancing mobility and cooperation among researchers.

4.3 Reinventing engineering education

African countries need to create indigenous capacity by training scientists, technologists, and engineers in relevant fields. The most damaging legacy of the African system of higher education is the separation between research, training and practical activities. [38] Training must suit current conditions and fulfill practical need, anticipate future trends and prepare the next generation of engineers accordingly. [39]

Broadening Africa's technical skill base will involve increasing the number of women who train in engineering. Providing incentives that encourage the participation of women in higher education would place Africa in a strategic position to become an important locus for research and technology development.

Addressing the sustainability challenge requires greater investment in the generation and utilization of scientific and technical knowledge. This goal can be achieved by aligning the missions of universities and other institutions of higher learning with their government's development goals, including those related to business incubation.

In addition to providing degree training, a new view is emerging that places universities and research institutions at the center of community development. [40] In facilitating the development of business and industrial firms, universities can contribute to economic revival and growth in their regions. This approach is based on

the strong interactions between academia, industry, government and relevant sections of civil society.

Conclusion

Africa's ability to meet its human welfare needs, participate in the global economy, and protect the environment will require considerable investment in science and innovation in general, and engineering in particular. Weak infrastructure, for example, imposes critical limitations on Africa's capacity to utilize its abundant natural resources. This situation is also closely associated with limited opportunities for engineering education in African universities. A number of international organizations are responding to this challenge by offering a variety of "capacity building" projects in engineering.

Most of these efforts focus on training individuals and are not directly related to regional sustainable development efforts in Africa. This article argues that viable strategies for building competence in engineering should seek to link engineering training directly to infrastructure projects. Africa's focus on regional integration provides a policy context in which such efforts should be embedded. Considerable innovation will be needed both in the design of infrastructure projects and the functioning of training institutions. Support from governments and other sources of funding for such activities represent an important step in these advancing efforts to implement the MDGs.

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Endnotes

1. "Competence" denotes the ability to perform specific tasks and is used in this paper to reflect the practical nature of Africa's sustainable development challenges. It is a subset of the larger concept of "capacity development." The word "capacity" is often defined by the United Nations to mean the "ability of individuals, organizations and societies to perform functions, solve problems, and set and achieve goals." Anne Whyte, *Landscape Analysis of Donor Trends in International Development*, Rockefeller Foundation Series, No. 2 (New York: Rockefeller Foundation, 2004), p. 24; Moses Oketch, "Determinants of Human Capital Formation and Economic Growth of African Countries," *Economics of Education Review,* Vol. 25, No. 5 (October 2006), pp. 554-564.

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3. Kai Matuschewski, "Vaccine Development Against Malaria," *Current Opinion in Immunology,* Vol. 18, No. 4 (June 2006), pp. 449–457.

4. Robert Frosch and Nicholas E. Gallopoulos, "Strategies for Manufacturing," *Scientific American*, Vol. 189, No. 3 (September 1989), p. 152. Industrial ecology involves efforts to "understand how the industrial system works, how it is regulated, and its interaction with the biosphere; then, on the basis of what we know about ecosystems, to determine how it could be restructured to make it compatible with the way natural ecosystems function." Suren Erkman, "Industrial Ecology: A Historical View," *Journal of Cleaner Production,* Vol. 5, Nos. 1–2 (1997), p. 1.

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tional GDP that are about four times greater than the benefit-cost ratios for high-quality roads. Even in terms of urban GDP, the benefit-cost ratios for low-quality roads are much greater than those for high-quality roads. As far as agricultural GDP is concerned, high-quality roads do not have a statistically significant impact while low-quality roads are not only significant but also generate 1.57 yuan of agricultural GDP for every yuan invested. Investment in low-quality roads also generates high returns in rural non-farm GDP. Every yuan invested in low-quality roads yields more than 5 yuan of rural non-farm GDP." Shenggen Fan and Connic Chan-Kan, *Road Development, Economic Growth, and Poverty Reduction in China*, Research Report No. 138 (Washington, D.C.: International Food Policy Research Institute), pp. vii–viii.

7. Commission for Africa, *Our Common Interest*, p. 225.

8. See, for example, National Research Council, *Down to Earth: Geographic Information for Sustainable Development in Africa* (Washington, D.C.: National Academies Press).

9. For a detailed discussion of this point, see Sanjaya Lall and Carlo Pietrobelli, *Failing to Compete: Technology Development and Technology Systems in Africa* (Cheltenham, U.K.: Edward Elgar, 2002).

10. Allan Macpherson, "Learning How to Grow: Resolving the Crisis of Knowing," *Technovation,* Vol. 25, No. 10 (October 2005), pp. 1129–1140.

11. See, for example, Garth Holloway et al., "Agroindustrialization through Institutional Innovation: Transaction Costs, Cooperatives and Milk-market Development in the East-African Highlands," *Agricultural Economics,* Vol. 23, No. 3 (September 2000), pp. 279–288.

12. Chantal Dupasquier and Patrick Osakwe, "Foreign Direct Investment in Africa: Performance, Challenges, and Responsibilities," *Journal of Asian Economics,* Vol. 17, No. 2 (April 2006), pp. 241–260.

13. Anna Tibaijuka, *Africa on the Move: An Urban Crisis in the Making,* submission to the Commission for Africa, London, 2004, p. 1.

14. Antonio Estache, *What Do We Know about Sub-Saharan Africa's Infrastructure and the Impact of its 1990s Reforms?* Draft Working Paper (Washington, D.C.: World Bank, June 2005), p. 35.

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19. Jacqueline Hamilton, "Are Main Lines and Mobile Phones Substitutes or Complements? Evidence from Africa," *Telecommunications Policy,* Vol. 27, Nos. 1–2 (February/March 2003), pp. 109–133.

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23. Commission for Africa, *Our Common Interest*, p. 53. "Our task now is to equip the poorest, through investment, with the capacity to compete, so companies can take advantage of trade in the rest of the world. But building capacity to trade is about more than investment in infrastructure; it must also be about investment in people and their education, skills and entrepreneurial potential." Gordon Brown, "Forward," in Calestous Juma, ed., *Going for Growth: Science, Technology and Innovation in Africa* (London: Smith Institute, 2005), p. 5.

24. Gelb et al., *Can Africa Claim the 21st Century?* p. 136.

25. Commission for Africa, *Our Common Interest*, p. 53.

26. Azita Amjadi and Alexander Yeats, *Have Transport Costs Contributed to the Relative Decline of Sub-Saharan African Exports?* World Bank Policy Research Working Paper No. 1559 (Washington, D.C.: World Bank, 1995); and Commission for Africa, *Our Common Interest*, p. 269.

27. Gelb et al., *Can Africa Claim the 21st Century?* p. 136.

28. José Gómez-Ibáñez, Dominique Lorrain, and Meg Osius, *The Future of Private Infrastructure*, Working Paper (Cambridge, Mass.: Kennedy School of Government, Taubman Center for State and Local Government, April 2004).

29. Benno Ndulu, *The Challenges for Improving Access to Infrastructure Services in Africa*, background paper prepared for the Commission for Africa, London; and Commission for Africa, *Our Common Interest*, p. 234.

30. "Slashing the state indiscriminately will not build effective development. We learned this in the 1980s and 1990s when–to take one example–many development agencies and bilateral donors withdrew, or cut back sharply on, financial support for public infrastructure. The mantra then was that infrastructure financing should be a private sector activity, when in fact not much more than 25 percent of infrastructure in developing countries–and probably even less in Africa–is likely to be privately financed for the foreseeable future." Commission for Africa, *Our Common Interest*, p. 80

31. Estache, *What Do We Know about Sub-Saharan Africa's Infrastructure and the Impact of its 1990s* Reforms?, p. 17.

32. Gelb, *Can Africa Claim the 21st Century?* p. 135.

33. Banji Oyelaran-Oyeyinka, *Learning to Compete in African Industry: Institutions and Technology in Development* (Burlington, Vt.: Ashgate, 2006), p. 117.

34. William Mitsch and Sven Jørgensen, "Ecological Engineering: A Field Whose Time Has Come," *Ecological Engineering,* Vol. 20, No. 5 (October 2003), pp. 363–377.

35. Salvador Barrios, Luisito Bertinelli and Eric Strobl, "Climatic Change and Rural–Urban Migration: The Case of Sub-Saharan Africa," *Journal of Urban Economics* (forthcoming). See also Andrew Simms, Africa—*Up in Smoke?* Second Report of the Working Group on Climate Change and Development (London: New Economics Foundation, June 2005).

36. The importance of technological innovation in mitigation strategies is illustrated in Harald Winkler et al., "What Factors Influence Mitigative Capacity?" *Energy Policy* (forthcoming). The following publication addresses climate change in developing countries, FAO. 2007. Coping with water scarcity in developing countries: What role for agricultural biotechnologies?. Summary Document to Conference 14 of the FAO Biotechnology Forum (5 March and 1 April 2007): http://www.fao.org/biotech/logs/C14/summary.htm

37. Industrialized countries have been called on to launch the equivalent of the Marshall Plan for Africa. This metaphor, however desirable, may be misplaced. The New Deal launched by U.S. President Franklin D. Roosevelt in the 1930s provides a more appropriate inspiration model for relief, recovery, and reform for the kinds of economic crises that Africa faces. For a pertinent and provocative study of rural electrification under the New Deal, see Ronald Tobey, *Technology as Freedom: The New Deal and the Electrical Modernization of the American Home* (Berkeley: University of California Press, 1996).

38. For additional information on this theme, see, Calestous Juma, *Reinventing African Economies: Technological Innovation and the Sustainability Transition*, The John Pesek Colloquium on Sustainable Agriculture (Ames, Iowa: Iowa State University, April 2006) and Calestous Juma, "Reinventing African Universities," *Falmer*, No. 44 (Summer 2006), pp. 8-10.

39. James Wei, "Engineering Education for a Post-industrial World," *Technology in Society,* Vol. 27, No. 2 (April 2005), pp. 123–132; National Academy of Engineering, *Engineer of 2020: Visions of Engineering in the New Century* (Washington, D.C.: National Academies Press, 2004).

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TECHNOLOGICAL CAPABILITIES AND LEARNING IN SMALL COUNTRIES: THE CASE OF CAPE VERDE ISLANDS

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Abstract

The aim of this paper is to discuss the problems that Cape Verde Islands' firms have been confronting in the process of building up technological capabilities. Based on the concept of National Innovation System as an analytical tool, this work investigates the opportunities and constraints Capeverdian firms face in their efforts to improve and upgrade their technological capability. Particular attention is paid to the analysis of the linkages between the private sector and the State. The cases analyzed are two Capeverdian firms located in the Software and Food processing (fish) sectors. The evidence suggests that the State has a very important role to play as a facilitator of technology-based, private-sector development. The creation of policies that foster and consolidate the building of linkages between private firms and public actors of the economy appears to be of crucial importance to improve the successful acquisition and use of new knowledge and technology by the Capeverdian firms.

Keywords: Technological capabilities, learning, national system of innovation, islands, Cape Verde

Introduction

In the last decade, the concept of National Innovation System (NIS) has been used as an analytical tool to understand development processes. According to this approach, the most important input is knowledge and its successful translation into improved and profitable goods and services through a continuous process of learning. Freeman (1987), defines a NIS as a network of institutions (in the public and private sectors) whose activities and interactions initiate, import, modify and diffuse new technologies. According to Lundvall (1992), a NIS comprises all parts and aspects of the economic structure and institutional set-up affecting learning as well as searching and exploring the different subsystems (production, marketing, finance) in which learning takes place. The NIS approach allows the inclusion not only of economic factors influencing innovation, but also looks at institutional, organizational, social, and political aspects. Despite their different interpretations, all versions of the NIS approach place firms at the very centre of focus with learning as a key issue within it (Nelson, 1993; Niosi et al, 1993; Patel and Pavitt, 1994; Edquist, 1997, 2000).

Based on the findings of studies conducted over the past three decades, a theoretical framework has been designed to better understand how firms develop their technological capabilities (Katz, 1987; Lall, 1992; Bell and Pavitt, 1993 and 1995). However, most works have focused on the experience of Latin American and East Asian countries, and limited attempts have been made to assess these issues in Africa (Biggs, Shah and Srivastava, 1995; Mengistae and Teal, 1998; Tyler, 1995; Lall and Pietrobelli, 2002; Muchie, Gammeltoft and Lundvall, 2003; Oyelaran-Oyeyinka, 2006). Moreover, these studies tended to look at large firms in large countries, and largely ignored the characteristics that determine these processes in small and medium-size enterprises (SME). This paper addresses this omission by focusing on small firms located in a small African country such as the Cape Verde islands.

Based on the NIS approach, the aim of this paper is to explore the problems that Capeverdian firms confront in the building up of technological capabilities. Particular attention is paid to the links between the private sector and the State, and its impact on the capability building process. An additional objective of this paper is to generate some insights for the design of a more effective policy to accelerate this capability building processes in Cape Verde.

A case study methodology is used for the analysis of the two firms located in the Software and Food processing sectors respectively. This selection will allow analytical comparisons between the capability building processes of firms pertaining to sectors with different technological

complexities and market orientations. The main sources of information are in-depth interviews.

The content of this work is as follows: Section 2 discusses the literature on learning and technological capability building in the context of the NIS approach; Section 3 describes a set of key features of the country; Section 4 explains the research design and methods; Section 5 contains an analytical description of the empirical evidence of the two sectoral innovations systems examined: software and canned fish; Section 6 compares and discusses the results; finally, Section 7 contains some final reflections.

Learning and technological capability accumulation and the role of the State

Literature overview

There is a growing consensus about the centrality of scientific and technological advance in driving economic progress, and that increasing national investments on innovation are essential to ensure a country's economic growth (Schumpeter, 1942; Solow, 1956; Abramovitz, 1956 and 1986). In fact, technological and institutional change, and national technological capabilities are seen as major determinants of economic growth and economic development. (Freeman, 1987; Fagerberg, 1988).

However, it is not clear enough how science and technology, which appear to be key factors for industrial development in advanced economies, can be effectively used for economic and social development in today's developing countries. The ongoing discussion on this issue has drawn attention on the role of knowledge as a basis for economic transformation (Nankani, 2005; Juma, 2005), emphasizing the role of policies stimulating business development, the renewing of infrastructure and the building of human capital. To a large extent, an effective use of science and technology for development depends on the ability of developing countries to build up a trajectory of learning and innovation. In particular, the process of learning generates the conditions for a knowledge creation process, thus becoming a key issue to endogenous development in less developed countries. However, where should a country set its priorities in the construction of a trajectory of learning? Each country has to identify the sectors that are worth investing and assist them correspondingly. Besides the specificities, the overall support for industrial development and particularly the acquisition of industrial skills in economic development are necessary to strengthen this fragile trajectory of learning (Lall and Pietrobelli, 2002; Oyelaran-Oyeyinka, 2006)

The identification of structural linkages at local, regional, national and international levels and the design of National System of Innovation (NIS) further contribute to successful choices of public investment (Freeman, 1987; Lundvall, 1992; Nelson, 1993; Edquist, 1997; Kim, 1997; Niosi, 2000; Cassiolato and Lastres, 2003). The choice of the right sector matters because the knowledge base and overall technological level can differ largely and affect the effectiveness of the learning processes as well as the knowledge generation and transmission. The Sectoral System of Innovation (SSI) is therefore a relevant concept (Breschi and Malerba, 1997).

Referring to the technological capability building process at the firm level in developing countries, existing literature highlighted how technologically immature firms learn through time and accumulate knowledge. This enables them to progressively carry out new activities and acquire new technological capabilities (Bell and Pavitt, 1995; Lall, 1987 and 1992; Kim, 1997). In this context, learning is defined as a process that involves repetition and experimentation to do things better and faster, and to identify new production opportunities. Learning processes have a gradual, accumulative, systemic and idiosyncratic character. These processes are influenced by the features of the NIS and by the type of linkages created between the agents in specific contexts and sectors.

Although the referred literature has focused mainly on the processes of technological capability building, some works have shown that managerial capabilities, particularly the profile and leadership of the firms' founders, are crucial to understand how firms deploy strategies of learning and technological capability building (Vera-Cruz, 2004; Vera-Cruz and Dutrénit, 2005).

Supporting SMEs in Developing Countries

However, not much is known about the characteristics of technological capability building process in SMEs, and limited attempts have been made to assess these issues in Africa (see Biggs, Shah and Srivastava, 1995; Mengistae and Teal, 1998; Tyler, 1995; Lall and Pietrobelli, 2002; Muchie, Gammeltoft and Lundvall, 2003; Marcelle, 2004; Oyelaran-Oyeyinka, 2006), particularly in the small countries context.

The analysis of the technological capability process, particularly in the context of small countries and particularly in the case of small island economies, cannot be dissociated from the discussion about the role of the State in economic activities, which is a recurring feature in the debate on the Washington Consensus (WC) and its implications for economic development. Although one could be tempted to consider the WC as an outdated issue, it should not be forgotten that it inspired a wave of reforms that fundamentally transformed the landscape of developing areas. In the case of Africa, the premise for the WC was that State-led development strategies were the cause of failure for the small economies of the region. Following the policy advice based on this premise, during the 1980s and 1990s developing countries introduced structural adjustment programmes. However, the failure of the WC has been commonly recognized, particularly in the case of the small economies (Habasonda, 2003). Referring to the neo-liberal model, basis of the WC, Stiglitz (1998) points out that it gives a minimal role to the government, essentially one of ensuring macroeconomic stability, with an emphasis on price stability, while getting it out of the way to allow trade liberalization, privatization, and getting the prices right. He argues that while many of these policies are necessary for economic success, they are far from being sufficient.

Today, in the so-called post-WC, the focus on a functioning market economy continues to be recommended and an active participation of the state in the economy continues to be discouraged. The role of the state is basically to create the necessary conditions for the markets to flourish. However, in the reformulated concept of the World Bank, there is a rehabilitation of the state's role. According to Habasonda (2003), "The question is no longer whether the state should be involved, but how it is involved. Societies are seeking to strike a new balance between public and private enterprises and are struggling to reassert the common good as a benchmark of governance. However, the extent or the limits of the state activities remains disputed, especially in the field of macroeconomic policy and public goods."

The role of the State in economic development is therefore still under discussion. In the case of Cape Verde, a small country that became independent just 33 years ago, the State has been a key actor in the evolution of the economy as a whole. According to the NIS approach adopted here, the State is called to play a fundamental role in the innovation process. Adopting that approach, this paper discusses the problems that Capeverdian firms confront in the process of building up technological capabilities. Special attention is paid to the links with other agents of the innovation system, particularly with the government, who continues to play a key role in the economic development.

The country specificity

Cape Verde is a very small country integrated by 10 islands, covering a total of 4,030 km^2. It was a Portuguese colony until 1975, when it obtained its independence. 55.9% of a total of 403,000 inhabitants live in urban areas.

Until its independence in 1975, Cape Verde was essentially an agricultural country, based on subsistence production. The industrial activities were basically the extraction of salt, the production of rum, the desalinization of water, the cooling industry for fish conservation, a firm of canned fish that was created in 1930, and a few other facilities. Commerce was the most important activity, and it was based mostly on imported products. The country independence brought new activities, and a strong concern for the development of the industrial sector.

During the first years of independence, the nationalist government built up a planned state-led economy funded by external aid. Several public firms were created in the key sectors. A strong effort was made to create the modern institutions and dependenable infrastructure.

In 1990, the nationalist party lost power and the new government implemented a liberal model. Economic reforms were introduced, which meant a change in the development model from a planned to a more market-oriented economy. The three characteristics of the new development model were: (i) a tight control over the public expenditure to ensure a limited budget deficit; (ii) an economic management approach with a market orientation instead of a central planning approach, along with trade liberalization; (iii) a reduction of the participation of the State in the direct economic operations and privatization of public assets.

The privatization of public assets, such as those in energy generation and telecom services, brought different kinds of problems, such as high prices and irregularities in the provision of services. It is not clear to what extent these problems are associated with the privatization of public

assets or the way this process was carried out in the country, but the result was that the population and the firms' performance were affected.

Since economic reforms were introduced, the private sector is recognized as the engine for national development. However, the State continued to participate in direct economic operations. For instance, in 1993 it created the interinstitutional Commission for Innovation and the Information Society (CIISI), whose mission it was to implement a strategy to move toward electronic government and an information society. CIISI promotes the use and development of the Information and Telecommunication Technologies (ICT) in Cape Verde. In the case of the fishing sector, the State possesses and has increased its participation in the fishing infrastructure (modern fishing boats, a pier with a cooling system, and freezing facilities).

At present, Cape Verde is implementing a development strategy based on growth, reduction of poverty and good governance. The private sector in Cape Verde is however weak and still lacking an incentives structure that would reward it for more innovation and competitiveness, which would enable it to play the role of an engine of economic growth as assigned by national development plans.

The country is characterized by a small industrial sector; the industry and energy sectors together only contribute with 7.7% of the GDP. In fact, their contribution to the economy decreased from the level they had six years in 1999, as listed in Table 1. In turn, commerce (wholesale and retail trade), transport and communications sectors have a share of 20% each. Agriculture is also a small sector, taking a share of only 8.0% of the GDP. Its share of GDP shrunk over the past 8 years while construction and other services have gained importance.

Table 2 contains some indicators that reveal the effort carried out by Cape Verde to develop human capital, reduce poverty, and improve the living conditions in the last decade. Some of these figures reveal a better performance than the average in Sub-Saharan Africa (SSA), as recognized by the IMF (2005c). The Cape Verde GDP per capita (US$1915) represented almost three times that of the SSA (US$632) in 2004. Regarding development of human capital, Cape Verde's net enrolment ratios in primary and secondary school (90.1% and 57.5% respectively) are above those of the SSA (averaging 69.2% and 25.5% respectively) for the same year.

Table 3 describes the profile of Cape Verde in terms of its resources, industrial organization, institutional set-up and incentives structure for learning and technological capability building. There is a limited endowment of natural resource and a very small local market. Micro and

Table 1. Cape Verde: Gross Domestic Product by Sector 1999-2005 (% of the total GDP)

Sector	1999	2003	2005
Agriculture, forestry and livestock	11.3	9.4	8.0
Fishing	2.3	1.5	1.1
Industry and energy	8.7	6.6	7.7
Construction	7.8	8.4	9.3
Commerce	17.7	19.6	18.5
Hotels	2	2.6	2.1
Transports and communications	19	18.6	19.0
Banks and insurance	4.9	4.3	3.8
House renting	5.3	5.3	5.1
Public service	13.4	12.9	12.0
Other services *	7.6	10.7	13.3
GDP/ total	100	100	100.0

Source: IMF (2005a, 2006)
* Includes "Intermediary banking services" and "Taxes and duties on imports"

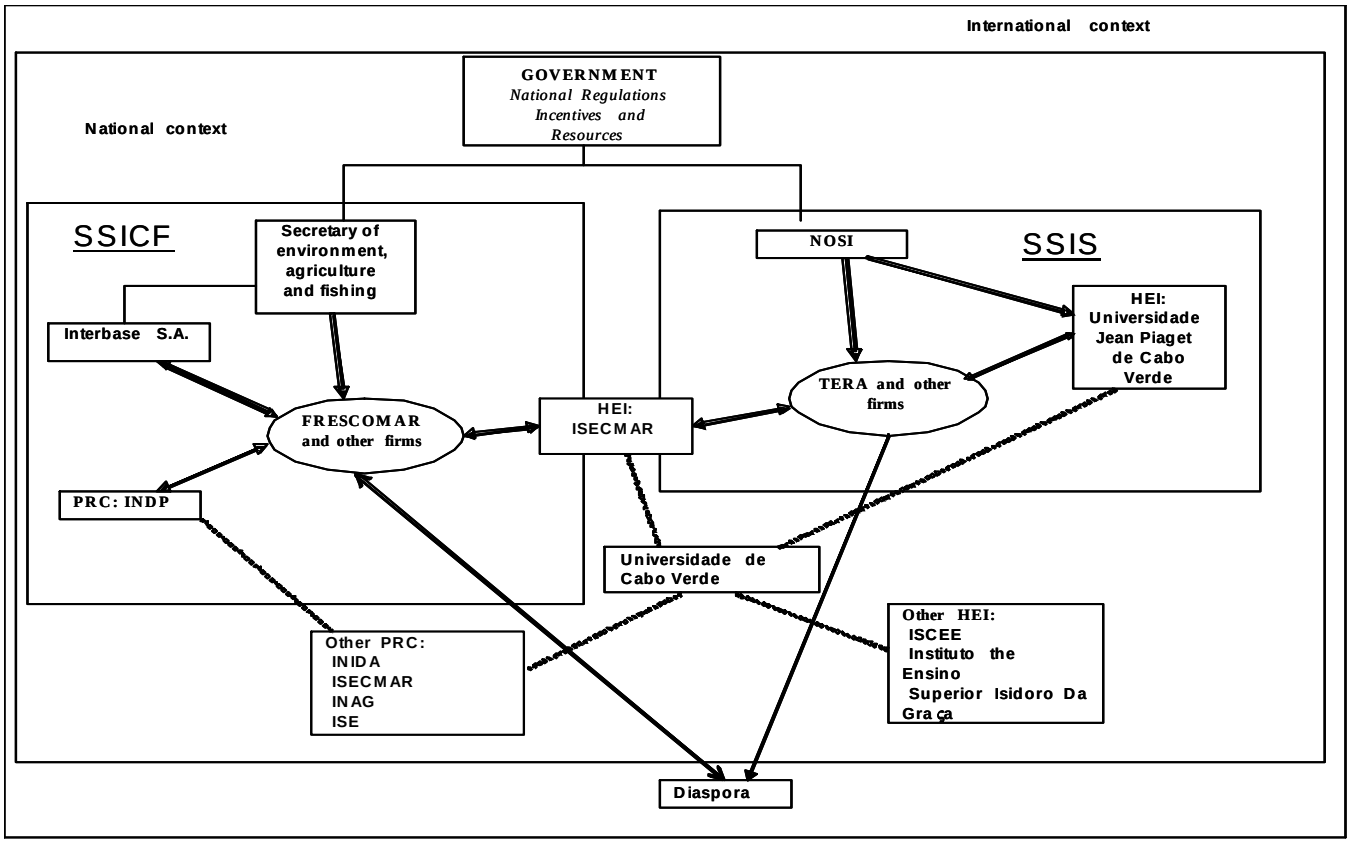
A set of open-ended interviews with policy makers allowed us to identify five cases in different sectors having exemplary outcomes, amongst which we selected two for this research regarding accessibility, importance of locality and main sector of activity. Based on that, this research focused on how and why these outcomes were achieved, in other words how the accumulation process was carried out, and what are the determinants and constraints to the accumulation process. Firms constituted the unit of analysis of this work.

A pilot case study of TERA (the software firm included as a case study) was carried out to gain empirical evidence and insights about the challenges and opportunities of an SME in Cape Verde. Based on that, the initial research design was improved and data collection plans were refined. Afterwards, the two case studies were conducted successively. A report was written for each case and finally a cross-case report was elaborated. Three sources of evidence were used: (1) interviews with managers, owners and personnel of the firms, policy makers and researchers, (2) casual meetings and informal conversations and (3) printed materials internal and external to the firms. Interviews were the main source of information, 12 interviews were carried out. Their main topics covered were: evolution of the product lines, type of clients, type of links with suppliers, evolution of the technological activities carried out locally, links with educational institutes and research centres, and links with the government. Effects of the local environment in general on the technological activities of the firms were a focal issue at the interviews.

The empirical evidence

Each system of innovation investigated in this study, the Sectoral System of Innovation in Software (SSIS) and the Sectoral System of Innovation in Canned Fish (SSICF), aims at identifying the main agents, their links and the characteristics of the accumulation of technological capabilities of a representative firm. Figure 1 illustrates the

Figure 1. Capeverdian NIS and two Sectoral Innovation Systems



Note: HEI: Higher Education Institutions, PRC: Public Research Centres, SSIF: SSI in canned food, SSIS: SSI in software.

Source: Own elaboration, the institutions are described in table 3 and below.

main agents and their links in the context of the Capeverdian NIS, which are described below. Particular attention is given to the role played by the State, through government agencies within the system functioning.

THE SOFTWARE INDUSTRY

The SSIS is incipient and it is integrated by 3 key agents: NOSI (a government agency), higher education institutions and firms.

The characteristic of the system of innovation

The agents

1. NOSI: a government agency

After the government carried out the economic reforms in the early 1990s, it decided that the Cape Verde economy was to be better integrated into the information society. It was within this context that in 1993, the Interinstitutional Commission for Innovation and the Information Society (CIISI) was created. CIISI's target was to implement electronic government and to make the people of Cape Verde part of to the information society. CIISI created NOSI (Núcleo Operacional de la Sociedad de la Información - Operational nucleus of the information society), an operational group for promoting both the use and development of ICT in Cape Verde. NOSI proposes policies and, if approved by the cabinet, diffuses them within civil society and participates in their implementation.

NOSI has two main donors to fund its projects: the World Bank and the European Union. It has a flexible organization structure with a projects focus. It employs 50 technicians, 40 of which have a university degree in Telecommunications, Electronics, or Informatics; most of them have been certified by Microsoft or Oracle.

NOSI has a decent share of technicians of the SSIS in Cape Verde, and contributes to the human resources training in this area by different ways: it offers training courses for its personnel, invites personnel from other agencies to their courses, and has students from educational institutions who carry out short stays at NOSI.

NOSI runs 3 large projects: (i) the system for the financial management of the government; (ii) the electoral management; and (iii) the house of the citizen . NOSI is in charge of the conception and development of information systems. It basically has to generate integral solutions for the problems, which is largely adaptive R&D.

2. Higher education Institutions

Instituto Superior de Engenharia e Ciências do Mar (ISECMAR)

The ISECMAR was created in 1996, after the reorganisation of the Centro de Formação Náutica. It is a polytechnic institute that initially offered careers in the areas of Engineering and Ocean Sciences. Later on, it diversified its offer, including Informatics and Automation Engineering, Electric and Electronic Engineering, and Telecommunications Engineering.

Universidade Jean Piaget de Cabo Verde

Instituto Piaget is a Portuguese higher education institute. It has 3 campuses in Africa: Angola, Mozambique and Cape Verde. The Universidade Jean Piaget de Cabo Verde was created in 2001. Two careers related to software are offered: Engineering Systems and Informatics, and Communication Sciences, both at technical and university degree levels. At the end of their studies, the students carry out a practice at NOSI and firms of the sector.

3. The firms and the market

Even though there are several firms selling computers, there are only 10 firms that are, at different levels, oriented to software development. They are SMEs with shortage of capital.

Four types of agents compete in the market: freelancers, the 10 local firms, foreign firms and NOSI. Demand is quite high but supply is reduced; in addition, the market is not structured. Local firms are largely oriented to carry out services in informatics and do not have qualified personnel. For this reason they have lost market share, and at present there is a strong dependence on foreign firms and technicians for the most basic activities of software development. Even though there are trained human resources in Cape Verde with university degrees, they are isolated and there are difficulties to incorporate them into an entrepreneurial project. They prefer to work for the Government.

Nature of the links in the SSIS

NOSI-firms. This is an unequal link in terms of the technological capabilities of both agents. NOSI considers

that the existent firms are insufficient and do not have enough maturity of their technological capabilities; that is why it believes it has to attend the market demand to ensure the accomplishment of its mission. NOSI is working with some firms largely for the installation of local networks and not for web design. It transfer the firms those activities that it considers they are capable of carrying out. Even though the strategic plan includes activities oriented to foster the creation of new firms, these activities are neglected or at least not prioritized.

NOSI-Higher Education Institutions. NOSI has signed a protocol with the Instituto Piaget for the creation of a SISCO academy. It also signed a protocol with Microsoft for the certification of human resources in this platform, and is looking to transfer this project to an education institution for the organization of the courses and the follow up of this project. These two cases illustrate that NOSI is opening spaces to develop the SSIS in Cape Verde, and is looking to transfer some of the new activities to other institutions. To accomplish its mission, NOSI needs to develop the market, and it is only interested in maintaining the activities related to the design of the informatics policy.

The case of a firm: TERA

Profile of the firm

The firm was created in February 2002. The owners are two young people with university degrees from Brazil, one in business administration, and the other in Communication Sciences. This latter has previous experience in another firm of the same sector in Cape Verde.

TERA is a micro-firm; it only has 3 people involved, the 2 owners and 1 employee, who is a technician in informatics. The firm has the flexibility to hire more personnel for specific projects. During 2004 the average number of people hired was 6. TERA has four areas of specialty:

- ⇒ Informatics consultancy (e.g., maintenance of computer equipment, management of informatics parks in desk environment, Cyber coffee, etc., this is a continuous service)
- ⇒ Managerial consultancy (e.g. business plans, market research, data analysis and processing)
- ⇒ Web development (e.g. development of a virtual work environment and web pages)

Development of software solutions

The firm uses open technology (open software like Linux, php, apache, mysql), which it considers to reduce uncertainty in the long-term by avoiding technological dependency. It uses open tools and multiplatform. TERA is in a process of migration towards a better technology (not completely open). It has not certified its processes, but the firm is aware of the certification needs, thus it carries out a set of activities to ensure the quality of its processes and services.

Its clients are largely other SMEs. It has had 25 clients, 5 of which are regular. TERA has experience in the international market and its long-term market strategy includes obtaining a position in the Portuguese speaking countries (PALOPs).

Characteristics of the learning processes and the accumulation of technological capabilities

The first activities carried out by the firm were web development, design, montage and maintenance of the site; after that, they added the informatics consultancy to their portfolio of business activities. Gradually the firm developed an integrated solutions approach with 4 major areas of specialty.

The innovation activities are focused on the development of new products. The firm has acquired experience in developing tailor-made local solutions. The most important development project was designed for a firm, which was initially an FM radio and became an internet radio stream site. The site has a dynamic nature as it is based on very simple routines that enable the client to continuously update it. This is a new concept for Cape Verde. The project presented a technological challenge for TERA, and a marketing challenge for its client as it allowed it to open new options, such e-Commerce.

The main motivations for developing new products were a combination of the firm's initiative and the clients' suggestions. Innovation activities increased the scope of products, their product quality and market share, opening new markets and reducing costs.

TERA acquires knowledge from internal (through project development) and external sources (through clients and specialized publications). Networks and informal contacts with technicians from NOSI and local and foreign firms are also important. In terms of learning mechanisms, TERA learns from its own business activities, the interaction with students of higher education institutions who spend internships in the firm, and interaction with customers. In the

case of the Global FM radio project, they have been interacting regularly with customers over the past 3 years. The proximity has allowed TERA to react quickly to client needs, and it has also facilitated feedback from clients. TERA maintains cooperation links with NOSI, and they are partners in one project. In contrast, the links with other firms in the sector are limited.

Even though the firm is aware of most incentives schemes offered by the government, it was difficult to apply because the call for fulfillments was not regularly opened. Once the firm was willing to apply to a fiscal exemption scheme, however that year the program was suspended.

The firm's strategy is to develop a set of modules that can be easily articulated to offer solutions to clients along their value chains. The still limited experience in development projects did not allow TERA to generate the minimum knowledge base that would enable it to create a set of standard products (like in the case of the radio). A wider range of products/solutions, and the provision of quicker answers to the queries would definitely attract more clients and increase its future growth potential.

Some of the important advantages of the firm are: availability, quality and low cost of human resources; proximity to clients; infrastructure of services; and limited rivalry with local competitors with a similar profile (in fact there are no other firms with the same 4 areas of specialty).

However, the firm also considers its growth to be hampered by a set of problems:

Market characteristics. There has been a high demand for routine services, and a shortage of demand for qualified work. This has pushed the firm to dedicate most of the employees' time to elementary services, leaving limited space for developing new ideas, learning and innovating, which in turn requires dedicating time to adaptive R&D activities. Currently the demand is growing, above all in web pages; the former constitutes the main competence in this area. Capeverdian firms have limited visibility in the market, therefore clients tend to rely more on foreign firms. Additionally, the firm's clients, competitors and technicians have developed a short-term mind-set, in the sense that they want to reach their objectives immediately. This puts a lot of pressure on the firms and makes it difficult for them to plan their actions and to get involved in a learning development process.

The price policy of CVTelecom. CVTelecom is a telecommunications firm. Originally it was a public firm; it was subsequently privatized and sold to Portuguese firm in the 1990s. This firm maintains a monopolistic position in a key sector for development. Its prices for Internet access (ADSL) are too high, and this increases TERA's costs to get access to the web and reduces its potential client base. In short, this price policy limits the development of ICTs.

The functions assumed by NOSI in the SSIS. NOSI was created to sort out the government's informatics needs and promote the introduction of ICTs. It has played a key role in the creation of the SSIS, but it has not created conditions for the development of the private sector. Government's purchases are important because the market is small, but they are not supportive of local private sector development. NOSI carries out 4 activities: specify, buy, implement and control. If the SSIS would be mature, it could concentrate on the control activity and leave the rest to the private sector. But the government's needs for modernization push NOSI to become engaged in a trajectory of development more consistent with a private firm. NOSI has difficulties in transferring these activities to the private sector, as it has not yet reached the capabilities to assume them. In fact, NOSI competes with the firms, even though that is not its purpose. It is indirectly crowding out private sector activities. At present, it is reducing its participation in system administration and informatics consultancy, but it is keeping its presence within the applications area.

Lack of an adequate incentives structure for local firms. Even though there are some fiscal incentives for private firms, they are more oriented to attract foreign firms than to stimulate the emergence and technological development of local ones. Access to credit is difficult and the procedures very bureaucratic, thus the firm uses mostly its own resources for investment. There are some financial schemes for punctual projects, which are used largely by commercial firms. However, they were not sought to promote technological development.

THE CANNED FISH INDUSTRY

The characteristic of the system of Innovation

The Sectoral System of Innovation in Canned Fish (SSICF) is incipient and consists of 5 key agents: a minis-

Table 2. Some indicators of Cape Verde

	1999	2004
A. Economic performance		
GDP per capita in current U.S. dollars	1379.3	1914.7
Real GDP growth (%)	8.8	4.4
B. Population		
Population (000)	423	495
Urban population (%)	52.4	56.7
C. Human capital		
Youth literacy rate	85 (1995)	89.1 (2003)
School net enrolment, primary (rate)	93.8 (2000)	90.1 (2005)
Secondary net enrolment (rate)	54.1 (2000)	57.5 (2005)
Tertiary Level (rate)	3.6 (2000)	6.9 (2005)
D. Effort in Human capital Development		
Public expenditure on education as % of GDP	3.6 (1990)	6.6 (2005)
Public expenditure on education as % of total government expenditure	NA	17.0 (2003)
E. Poverty		
Incidence of absolute poverty 1/	49 (1990)	37 (2003)
Under-five mortality rate (per 1,000)	60 (1990)	35

Sources: IMF (2005a), IMF (2005b), World Bank (2006), UNESCO (2005).

small sized firms, some of them with State participation, characterize the industrial organization. The private sector is reduced in size and, in spite of the economic reforms of the 1990s; the State continues to play an important role in economic development.

Cape Verde is at an early stage of the institutional building, with a limited incentives structure to foster private investment. Firms also confront a poorly developed industrial and technological infrastructure, as highlighted by Muchie, Gammeltoft and Lundvall (2003) and Oyelaran-Oyeyinka (2006) for other African countries. Although it has got higher rates of school enrolment than those of the SSA and a number of technically well-trained human resources, the amount of people with skills and abilities required to foster the development process is still scarce. Cape Verde is dislocated from the main international sources of technology and R&D, and at the same time, there is still a very limited capability of the country's universities and research institutes to generate new knowledge and technologies. This constitutes a mayor limitation for local firms to access modern technologies and competitive advantages.

Research designs and methods

The problems that Cape Verde Islands' firms (illustrated by two cases) have been confronting in the process of building up technological capabilities are investigated by means of case studies. The cases are two Capeverdian firms that are part of a Sectoral System of Innovation (SSI) that operates under a NIS. An SSI contains the agents and institutions (related to a specific sector) that interact to improve the performance of firms and promote innovation. The firms in the two case studies are part of the software and food processing (fish) SSIs.

A multiple-case research design was applied, thus following a replication logic. Each individual case study consisted of a specific set of evidence and respective conclusions. At the end, a cross-case analysis was conducted and general conclusions were drawn. Following Yin (2003), the cases were selected to predict similar results and make the findings more robust (literal replication). The selection included a set of two cases with exemplary outcomes regarding the accumulation of technological capabilities.

Table 3. Cape Verde Profile in terms of resources, industrial organization, institutional set-up and incentives structure for learning

Topic	Characteristics
Physical Resources	Limited endowment of natural resources. A poor and expensive transport infrastructure (cooling tracks, fishing boats with cooling systems, etc.)
Human Resources	Well-trained human resources, as compared with SSA, and a young population (e.g. high rates of School enrolment at secondary and tertiary levels as compared to SSA. Even though Cape Verde has a number of technically well-trained human resources, capable of running the existing institutions, their capabilities and skills for creating and consolidating the new institutions that Cape Verde needs for the development process are still feeble.
Market Size	A reduced local market. It is one of the smallest countries of SSA, with about 0.06% of the total population of this region.
Industrial Sector and entrepreneurship	There are only 483 industrial firms, most of them micro and small firms, having 10 employees in average. The entrepreneurial culture is more oriented towards commerce than industry, which limits the long-term investments, risk taking, etc.
Technology and Higher Education Institutions	There are five research institutes: the Higher Institute of Engineering and Sciences of the Sea -Instituto Superior de Engenharia e Ciências do Mar (ISECMAR), the National Institute of Management -Instituto Nacional de Administração e Gestão (INAG), the Higher Institute of Education -Instituto Superior de Educacao (ISE), the National Institute for the Development of Fishing -Instituto Nacional para o Desenvolvimento Das Pescas (INDP), and the National Institute of Research and Development of the Agriculture -Instituto Nacional da Investigacao e Desenvolvimento da Agriculture (INIDA). The national university (Universidade de Cabo Verde) is still in the early days, it was founded in 2006; there are three private schools of higher education: the Universidad Jean Piaget de Cabo Verde (a campus of the Portuguese Instituto Jean Piaget), the The Higher Institute of Economics and Entrepreneurial Sciences -Instituto Superior de Ciências Económicas e Empresariais (ISCEE), and the Instituto the Ensino Superior Isidoro Da GraVa., (a higher education private school owned by Capeverdian capital) The young national university is promoting the integration of the existent research and teaching institutes. A poorly developed industrial and technological infrastructure, poor suppliers of engineering skills and technological services. In general, the country is dislocated from the main international sources of technology and R&D.
Institutional setting and incentives structure	It is in an early stage of institution-building. With the independence process, many of the old institutions were dismantled and new institutions were created. A limited incentives structure to strengthen the private sector: It has been established some economic incentives for promoting employment, stimulating investment in some new economic sectors, and in the creation of new firms, such as: (i). Incentives for the generation of employment for young people, (ii) Incentives for telecommunications and Internet, and pharmaceutical firms, (iii) Fiscal incentives for new firms. However no incentives are been designed for promoting the raise of the general investment in existing industry and export activities Strong dependence on international aid under project finance, which contributed to the macroeconomic stability and to infrastructure development, but limited the national capacity to design a development strategy.

Source: Own elaboration based on information from interviews with Cape Verde policy makers and researchers, and various printed materials from diverse sources such as EFA, IMF, World Bank and UNESCO.

try (the secretary of environment, agriculture and fishing); a public firm with colonial roots (Interbase); a research centre (INDP); a higher education institute (ISECMAR); and firms.

The agents

1. Secretary of environment, agriculture and fishing

The Secretary is directly involved in the economic activity of this sector in four ways: (1) through a promotion function, that consists of negotiating and channelling external aid for the fishing sector, (ii) acting as an intermediary between different agents, (iii) regulating the market and signing international agreements, and (iv) regulating the access and exploitation of national resources.

The State has invested resources foreign donor money in a set of facilities related to the fishing industry. In 2001, the State acquired 8 new and modern large tuna fishing boats, and built a pier for small fishing boats that includes a freezing tunnel for fish conservation and an ice machine to support the small boats that generally lack a freezing system.

2. Interbase S.A.

This is a public firm that provides freezing service and commercializes frozen fish and other products from the sea. This firm is rooted in the colonial period; it was founded in the 1960s. Interbase provides the freezing service for the traditional fishing business and the industrial firms of canned fish.

3. Research centre: Instituto Nacional de Desenvolvimento das Pescas (INDP)

The INDP is the national institute for the development of fishing; it was established in 1992 is active in two main areas: scientific research and the diffusion of new fishing technology.

Regarding fishing technology, the main tasks are: to experiment and diffuse technology among the operators of the sector, to improve and adapt techniques of capture according to the conditions of Cape Verde; to carry out experimental fishing of non-exploited species. Regarding fish technology, the main tasks are: to experiment and diffuse new conservation and processing techniques; to explore new fish-based products; to support the national operators in the market forecast for their products.

It is also concerned with the advice on how to improve the economic and social impact of fishing in Cape Verde, and promote actions for the development of fishing technology. The INDP consists of 60 researchers and technicians.

4. Higher education institute: Instituto Superior de Engenharia e Ciências do Mar (ISECMAR)

The Centro de Formação Náutica (CFN) was established in 1984 to offer careers in the areas of Engineering and Ocean Sciences. These areas were strategic because Cape Verde was planning to acquire a new merchant and fishing fleet. Even though the ships were bought, the project did not evolve largely because of the country's low volume of international trade. In 1996, the CFN became ISECMAR, a polytechnic institute, which covers a broad range of knowledge fields including Informatics and Automation Engineering, Electric and Electronic Engineering, and Telecommunications Engineering, as mentioned in the case of the SSIS before.

5. The firms and the market

The production of canned tuna fish has some tradition in Cape Verde. The first firm was set up in 1930 on the island of Sal. A few years later another firm was established in the island of San Nicolau; both were founded by Portuguese entrepreneurs and were equipped with old machinery from Portuguese plants. In spite of using out of date equipment and technology, it seemed that the quality of the products was good because they were well accepted by the market.

The producers of Capeverdian canned fish produce mainly for the domestic market. There is a high domestic demand absorbing more than 80% of the total production. Exports are low basically because of a chronic shortage in shipping supply.

At present, there are three firms of canned fish: Frescomar S.A.; J.A. Nascimento & Filho, Lda; and the Sociedade Ultramarina de Conservas, Lda. They are located in different islands within the country.

The nature of the links in the SSICF

INDP-firms linkages: Weak links; the INDP and most firms rarely interact. Actually, firms perceive the INDP as a research centre linked to fishing but not involved in the fish processing technology.

Firm-firm linkages: Firms participate in the same domestic market, but the rivalry seems to be low. This is partially due to the fact that the firms are located in different islands and their fish suppliers are local. Additionally, the market is big enough to absorb their still small production. The firm has not joined ventures nor do they cooperate. Links with the government also appear to be weak. It seems that the firms are not able to send the government clear messages regarding their needs.

Interbase-firms linkages. These are commercial linkages between clients and suppliers, as Interbase provides freezing service and commercializes frozen fish. Neither flows of information nor knowledge were identified in these links.

In general, the SSICF is not well integrated; links between the agents are very weak.

The case of a firm: Frescomar S.A.

Profile of the firm

Frescomar SA was legally founded in 1997 and started operations in 2000. It is located in the island of São Vicente. Initially, the firm was based on private equity; however, due to financial difficulties, the State acquired a part of the capital to ensure its survival. The State's participation also provided better access to the conservation infrastructure and to raw materials through international fishing agreements.

The firm employs directly 100 workers. It has 10 employees with a bachelor's degree and one with a master's degree. Frescomar SA manufactures 4 types of fish: tuna, melba, mackerel and sardine, and has 6 products (fillets and slices). Fish is the main input, but it also uses malagueta Chilli, oil and cans. The firm is largely equipped with second hand non-automated equipment; it integrates different vintages of equipment technology. Since 2001, Frescomar is certified by the U.S. Food and Drug Administration (FDA). Frescomar produces for the domestic market, but also exports to the US and the European Union, especially Italy, Holland and Portugal, with exile Capeverdian communities as its main consumers.

Characteristics of the learning processes and the accumulation of technological capabilities

Frescomar was created to produce canned tuna fish for the European market. According to the original business plan, the firm was only supposed to produce tuna fish in small cans. To penetrate the European market, the firm underwent the required certification processes. An important supplier was Interbase, who provided the tuna. It supplied the required infrastructure to freeze the fish according to the quality norms of the European Union in 2001.

Shortly after operations were initiated, Interbase had a problem of ammonia leaking, so the European Union imposed an embargo on Cape Verde for the fish related products. Consequently, Frescomar could not export to its original target-market and had to redefine its market strategy towards the domestic market, US, Brazil and Central Africa.

In the case of the US, there is a market niche consisting of the Capeverdian and Portuguese communities. Even though Frescomar could rely on the Agora agreement to penetrate the American market, a new problem emerged. It required a direct connection between the export country and the United States. As Cape Verde does not export an important volume of products, there are no regular maritime liaisons with the US, in fact, there is only one ship that makes the liaison between Cape Verde and the United states, making the frequency limited and non-regular. In other words, problems related to the marine infrastructure of the country limit the export capacity of the firm. As a result, in spite of the focus on exports since the early days, 90% of its production is designed for the domestic market.

Not being able to rely on Interbase, it looked for other local suppliers of tuna fish. However, Cape Verde does not have an industrial fleet dedicated to the fishing of tuna; there are only small boats that fish for the local market (each island), and they do not have the capacity to supply for the industry. There are problems regarding volume and quality, since they do not have sufficient equipment for industrial fishing and conservation. This is another problem related to the maritime infrastructure. As a result, the firm had to frequently stop production, and had on average only a utilization rate of 30% of its production capacity.

To sort out this problem, the firm had to undergo a process that started by the diversification of its product mix, first by incorporating new varieties of fish (melba, mackerel and sardines), and then by introducing larger sizes of cans. This diversification process reveals that the firm not only acquired production capabilities to stay in the market, but it also acquired some innovative technologi-

cal capabilities. Meanwhile, the European Union ended the embargo against Cape Verde and the firm diversified even its product mix both in raw materials and packaging, by introducing shellfish and glass containers.

The firm has used different learning mechanisms to acquire its technological capabilities. Learning from experience has been very important, particularly in the area of maintenance and plant operation. Training has been another important learning mechanism. The firm uses in-house training and also sends its personnel to be trained in their foreign firms, particularly in fish processing. For instance, before introducing the shellfish production line, the firm sent some technicians to be trained in large shellfish processing facilities in Europe.

Even though Frescomar seems to gradually be acquiring more capabilities, as revealed by the diversification activities and the penetration of new markets, it faces existential risks due to problems that are beyond its decision-making capacity. The problems are related to the supply of input (fish) and the transport system.

The supply of fish. The supply of fish is associated with the fishing infrastructure, the freezing infrastructure and the fishing agreements with countries that fish in the Cape Verde economic area. The fishing and freezing infrastructure was designed to improve private sector activity; however it seems was not sufficiently dependenable to attract the sector. Thus, the government had to further get involved again. The case of the acquisition of 8 new and modern large tuna fishing boats, and the building of the pier with an associated freezing facility illustrates this involvement. The government has signed an agreement with the European Union, which makes available for the local market a mere 5% of the fish captured in the Capeverdian economic zone. According to the firm, the government should sort out two issues in order to solve the problems of lack of fish by means of the agreements: (i) signing good agreements with other countries for fishing activities, and (ii) regulating the access and exploitation of the national resources according to the agreements. At present, the government does not control the volume of fish caught and the problem of lack of supply still persists. The difficulties associated with the lack of fishing and freezing infrastructure and control over the international agreements make it difficult for the firm to engage in a continuous process of learning from either the foreign or the domestic market, and steady growth.

The transport system. The lack of regular maritime liaisons with the United States limits export activities.

The determinants and restrictions of the accumulation

Both SSI cases are characterized by incipient and limited links between the agents; in fact they are in the first stage of the building process. The difficulty of the learning and technological capability accumulation processes observed by a firm of each SSI was discussed. Both firms are small and find themselves building and consolidating the routine production and basic innovative technological capabilities. This stage is particularly critical in the case of the small firms.

A set of factors that stimulate the accumulation in both firms were identified:

⇒ Well-trained human resources. This is associated with an important effort made by the country in higher education.

⇒ Incipient but growing market (increasing returns). The market is very small but expanding and there is a substantial amount of uncovered needs.

⇒ Market niche both in Cape Verde and in the emigrant community where local products are well accepted.

In addition, in the case of TERA, the software firm, proximity with the client and a quick response to client requirements are also factors that stimulate accumulation.

The two cases also suggest the existence of a set of factors that constrain the accumulation process:

⇒ High costs due to the lack of local input suppliers.

⇒ Weak and expensive infrastructure, as illustrated by the costs of the CVTelecom services in the case of TERA and lack of a merchant marine and fishing fleet in the case of Frescomar.

⇒ Limited links with other agents of the SSI were observed, as revealed by the limited links of TERA with NOSI, and Frescomar with INDP and ISECMAR.

⇒ Lack of entrepreneurship and/or a first generation of entrepreneurs.

⇒ Lack of an industrial fabric and industrial culture, in contrast to the existence of a trade tradition and culture that leads to focus more on buying than on

doing, thus hampering innovation activities. The Capeverdian Commerce and Industrial Association is integrated largely by commercial firms dedicated to export and import activities. In the case of software, most of the firms are focused on selling computers instead of being focused on software development.

Unclear boundaries between the functions of -local private sector).

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ENTREPRENEURSHIP INVESTMENT SUPPORT 2008 (UP TO US$ 50'000!)

Powering entrepreneurship to innovate and realize their dreams!

Deadline for Submissions: 30 April 2007

ATDF Entrepreneurship Hub is please to announce the call for business plans for the second annual Zambian Entrepreneurship Investment Support. This initiative is designed to promote young Zambian men and women below the age of 45 who have innovative business ideas and the necessary discipline and skills to convert their ideas into a successful companies that creates new products, services and employment for the Zambian people.

Obligations for the winners of the Support

You must be a Zambian citizen or resident who live in Zambia and are willing to establish a company based in Zambia

Application Form and Guideline

Please submit the business plan, according to the guidelines below, electronically to invest@atdforum.org or send hard copies to: ATDF Entrepreneurship hub, P.O: Box 31484, Lusaka. Telephone number: +260-211-840430.

Business plan requirement

Title page: Company name (or proposed), address, contacts and names and contacts of all partners) - 1 page.

Executive Summary: Provide a summary of the business idea/firm, the products/services, your customer base and competitiveness, sales/profits, the investment sources and its use) **(1-2 pages)**

Introduction/background: Who, what and where is (will) your firms be based, when was the firm developed? What are your products/services and are they unique or similar to those on the market and what do wish to achieve?

Market: How large and how fast is your market growing, what are the opportunities and threats? How will you reach your target market and what is the best mode? **(1-3 pages)**

Competition: (who are your direct and indirect competitors, what is their market share and how do you intend to gain market share) **(1-2 pages)**

Strategy and Implementation Summary (when will you undertake specific activities (month and year)? What are the sources of revenue, the costs and the assumptions these estimates are based on? Any key contractors, suppliers, distributors, technologies and employees you will need and when?. **(1-4 pages)**

Management: Who is in your team, what is their contributions, skills, qualifications and accomplishments? Why did you choose them and what is your organization structure? **(1-2 pages)**

Financial Plan *(For existing ventures)*: include a 12-month income statement, balance sheet and cash flow statement and make three year projections from there on. ***For start-ups*:** How much is in the bank or are you about to raise? How much do you need from ATDF and from others? In both cases, provide monthly estimates for the first year and quarterly estimates for the next two-three years.

Appendix

Place CVs, contracts and detailed sales and financial reports as well as support details in the appendix (e.g. certificates of incorporation, operating licenses etc)

P.S. How did I learn about the ATDF business hub and its entrepreneurship award?

- _ Newspaper Add
- _ Report in the following newspaper:
- _ Bill board
- _ TV news
- _ Radio coverage
- _ Internet
- _ Personally approached by

ATDF Entrepreneurship Hub
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Adapted from the Press

INFRSTRUCTURE AND BEAUTY: THE CASE OF CHINYINGI BRIDGE

Infrastructure projects often evoke the feeling that it will be monumental, expensive, sophisticated and daunting. And yet some of the best sites in the world are actually infrastructure-related: the Great Wall of China, Millau bridge and Eiffel Tower in France and Pyramids in Egypt. The history behind many of these projects is often not as admirable as the final product.

The Chinyingi suspended foot-bridge, perhaps one of the longest foot bridges in Africa and the third over-pass that crosses the Zambezi river, seems to fall in a catergory of its own. The bridge is less than a metre wide, 50 meters above the river water level and about a kilometre long. Its steel base and wire sides make visibility possible. Whilst the locals walk across it without ado, some even running on it and still others carrying luggage on their heads or shoulders as they walk on it without even keeping their hands on the sides, visitors have problems walking upright once on the structure.

Some people liken the experience to that of a toddler leaning how walk. Imagine walking on the structure that shakes and ripples with your weight each time you move a step as thought it were made of jelly, that you are not so good at scaling heights, and that you see not only where you are stepping but also the river 50 metres under yourself each time you look down to your shoes.

But if you are brave enough to get near to the middle of the bridge right at the centre of the river, you might enjoy watching the most absorbing sight of the expanse of the Zambezi river. In fact a view of sundown from the centre of the bridge always makes the water appear like molten gold. But to enjoy the sight, you have to ignore the gentle breeze that now and again gently shakes the whole bridge from side to side, making the experience more interesting if you are lion hearted, but sending cold chills running down the spine if you are faint hearted.

The legends of the bridge

Legend has it that in the middle of one night, a pregnant woman admitted to the mission hospital developed complications and a decision was made to take her immediately to the district hospital which was better placed to handle the situation. Fr Rock, Sister Delphina and the pregnant woman attempted to cross the river in a dugout canoe that capsized midstream and the three drowned.

This disaster inspired Brother Crispin Valeri to construct a suspended bridge. He started working on it by asking for pieces of steel from the mines on the Copperbelt and started building the bridge in 1974. For the next three years, Valeri was engaged in obtaining steel cables, which he ferried across the Zambezi using dugout canoes and set up a work station on the river banks. Using local untrained manpower, the bridge was completed and opened in 1977 with a wooden base.

It will take another disaster to improve it. Legend also has it that one priest, weighing about 200 kilogrammes, was carrying a crate of soft drinks when he stepped on a loose plank on the bridge and fell into the river. It is claimed that the fall caused a splash so loud that all the crocodiles near the scene swam for their lives and the fallen priest never for once let go of the crate. This led to the replacement of the wood with steel.

The view from the bridge

While the bridge was not built to provide people with a spectacular view of the river, it is none the less seen as the best the remote district of Zambezi has to offer tourists. Estimating its value as a tool for facilitating the flow of goods and people across the river underestimates the full value of this piece of human creation. Perhaps it highlights the difficult in determining the contribution of infrastructure to growth.

Perhaps infrastructure should be viewed in the same vain as the arts

Based on Stephen Kapambwe Visit Zambia News First Published 04/05/2007

Mobilizing domestic financial resources for Africa's development

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Abstract

The paper discusses the possible sources of domestic finance for Africa's development and the challenges entailed in its mobilization. It argues that the difficulties involved in mobilizing domestic resources are not insurmountable and that significant advances can be made even in the short run as evidenced by the success of several countries in raising domestic revenues. Improving domestic resource mobilization in Africa requires an innovative configuration which calls for a rationalization of existing approaches to resource mobilization in general. This includes reforms to: (i) Africa's financial systems to address financial segmentation in order to improve the efficiency of financial intermediation and enhance domestic savings; (ii) revenue collection and administration to increase public revenues; and (iii) specially targeted programmes to enhance the flow of remittances through formal channels for investment, and to stem the flow of flight capital. The support of the international community is critical to the success of these reforms, which will benefit the whole economy.

The views expressed in this paper are those of the author, and should in noway be attributed to the UNCTAD secretariat or its Secretary-General.

1. Introduction

Alternative sources of closing Africa's development resource gap only started to be seriously considered in the wake of the first UN International Conference on Financing for Development (FFD) held in Monterrey, Mexico (March 2002). This conference pushed the limits of the debate about development finance beyond its traditional boundaries of increased official development assistance (ODA) and its effective use, debt relief, and foreign direct investment (FDI) to the mobilization of domestic financial resources. Thus, mobilizing domestic financial resources for development, an issue which had until then been neglected, was forced into the headlines.

Despite this, however, not much headway has been made and domestic resource mobilization has to date received little attention, even in the literature[1]. In part this is explained by the mistaken assumption that it is not realistic to expect a large and sustained increase in domestic resource mobilization in Africa because of low levels of income, demographic factors and the weakness of financial markets. This method of closing Africa's resource gap has therefore been described by one observer as "hard option", which is only feasible in the long term (Aryeetey, 2004). The upshot of this is that the international development community has more or less continued to be fixated on closing the continent's resource gap primarily from external inflows (aid, FDI, and debt relief), at least until 2015 (see McKinley, 2007).

The objective of this paper is to discuss the possible sources of domestic finance for Africa's development and the challenges entailed in its mobilization. It argues that the difficulties involved in mobilizing domestic resources are not insurmountable and that significant advances can be made even in the short run as evidenced by the success of several countries in raising domestic revenues. Improving domestic resource mobilization in Africa requires an innovative configuration which rationalizes existing approaches to resource mobilization in general:

(i) Africa's financial systems to address financial segmentation in order to improve the efficiency of financial intermediation and enhance domestic savings;

(ii) revenue collection and administration to increase public revenues; and

(iii) specially targeted programmes to enhance the flow of remittances through formal channels for investment, and to stem the flow of flight capital. The support of the international community is critical to the success of these reforms, which will benefit the whole economy.

2. Closing the development resource gap: brief overview of options

*Much of the material for this paper is derived the Economic Development in **Africa: Reclaiming Policy Space - Domestic Resource mobilization and Developmental States published by UNCTAD in July 2007** and an ongoing Project on Domestic Resource Mobilization in Africa. The author is the Team leader for the report.*

The growth and gap models of the 1950s and 1960s established the economic case for providing aid to poor developing countries. These models assumed that in an open economy, savings finance investment with the total savings in the economy comprising domestic and foreign savings. A savings gap exists if domestic resources are much less than what is required to fund the investment necessary to attain a target rate of growth. Similarly, a "trade gap" or "foreign exchange gap" is identified if there is insufficient foreign exchange (i.e. insufficient exports) to pay for imported goods, which must complement domestically produced investment goods in order to attain a target growth rate (Rosenstein-Rodan, 1961).

These models posit that aid, by providing an initial boost to domestic capital formation and incomes, can raise domestic savings in both the corporate and household sectors. As a result, it will stimulate an investment-export nexus that will eventually close the gap between domestic resources and the supply of foreign exchange. In the medium to long term, growth and development should become self-sustaining and the needs for aid disappear.

The two-gap model of Chenery and Bruno (1962) contended that the main constraint to economic development was capital accumulation, and therefore the role of aid was to supplement domestic savings. The prevailing notion that there were significant market failures and externalities implied that the government had a role to play in managing the investment and aid process in poor recipient countries. During much of this period, private capital markets had little or no interest at all in these poor developing countries (colonies). The interests of the erstwhile European colonial masters revolved around increasing exports and retaining cultural and commercial ties. And in the case of the United States (US), political strategic and military advantages were the main driving force in providing aid to these countries.

For much of the 1950s and 1960s, there appeared to be some consensus that the resource gap of developing countries should be financed by transfers from the developed countries (bilateral aid). Multilateral aid began to take hold much later from about the early 1970s, but like its bilateral counterpart, it was essentially to governments which were regarded as the main agents of development within a statist development paradigm.

The intellectual case for openness, against statist development strategies, started gaining ground in the 1970s.[2] However, it was a series of economic and political developments in the 1970s and 1980s that eventually swung the development pendulum in favour of openness, and with this, a change in the aid doctrine.[3] The financial crises of the late 1970s and early 1980s, in the wake of global instability, provided a great leverage for those able to finance or refinance developing country debts. The then nascent neo-liberal paradigm provided the basis for market oriented development policies packaged into the intellectual framework that came to be known as the "Washington Consensus".

The "Structural adjustment programmes" (SAPs), derived from the Washington Consensus, see increased FDI as the key to sustained economic growth, in conformity with "market fundamentals". FDI inflows have come to be perceived as an essential source of investment finance for all low-income countries, for a variety of other reasons. First, other sources of development finance – ODA, private capital flows and domestic savings – dwindled to levels way below that required for undertaking projects or programmes needed to bring about economic growth, development and poverty reduction. Second, the composition of capital inflows had shifted away from bank loans and other forms of capital inflows towards FDI and portfolio investment. Finally, it was contended that the resilience of FDI during financial crises and the fact that there exists substantial evidence that such investments are beneficial to its hosts, particularly developing countries, makes it a development finance of choice (Loungani and Razin, 2001).[4] The experience of the newly industrializing economies (NIEs), a small number of fast growing countries in south East Asia, was also important in endorsing the new notion that attracting FDI was the key to bridging the resource gap of low income countries and avoiding a new debt build-up. Typically for Africa, the implementation of responsible macroeconomic policies, within a context of accelerating pace of liberalization, deregulation and privatization was expected to attract FDI (UNCTAD, 2005), and among other things, to close its resource gap.

The unanticipated outcomes of SAPs in Africa, and the mounting debt crisis, led to much soul-searching on the part of the World Bank and the IMF. The two institutions launched the Heavily Indebted Poor Countries (HIPC) Initiative in 1996 (and enhanced in 1999) to address the debt overhang of debt distressed poor developing countries. Ironically, this Initiative created opportunities for external resource "transfers" to these countries, about two-thirds of

which are African, as it largely wrote off their external debt obligations. An important conditionality of the Initiative was that debt relief resources transferred to a beneficiary country should not be offset against its normal ODA flows. That is, debt relief should be additional to the amount of ODA that it would ordinarily have received, hence the principle of "additionality". That these "additional" resources were to be devoted to poverty reduction in the HIPCs gave rise to the idea of resource transfers occasioned by debt relief to close, or at least bridge, the resource gap in debt distressed poor countries.[5]

3. How big is Africa's resource gap?

The resurgence of interest in aid to Africa since the turn of the century dates to the UN Millennium Summit in 2000 at which all member states signed up to the MDGs, the first one of which is to halve world poverty by 2015. This is derived, in principle, from the consensus that the continent lacks sufficient domestic resources to attain an annual growth rate of 7 per cent, which most analysts consider to be the minimum rate required to achieve the first MDG. However, there is no such consensus on the amount of official development assistance (ODA) required to bridge the resource gap in order to attain this rate of growth. This uncertainty itself drives, in part, from the difficulties of estimating the costs of meeting the MDGs in general[6] which has led to the wide variety of estimates produced by different institutions (see table 1).

In sum, it is difficult to estimate with any degree of certainty the size of Africa's resource gap that needs to be filled to enable it to attain the MDGs by 2015. The accuracy of this estimate will depend *inter alia* on the specific assumptions made regarding infrastructure needs, the outcome of efforts to increase domestic resource mobilization, and the current state of absorptive capacity. Nevertheless, on the basis of existing estimates, it would appear that, at the minimum, Africa's additional aid requirements are likely to be around $20 billion per annum by 2008–2010, and increasing to about $25 billion per annum by 2015. This figure could almost certainly be reduced, at least by half, if efforts to mobilize domestic resources bear fruit in the medium term.

4. The rationale for domestic resource mobilization

The discussion above illustrates that proposals regarding how to close the resource gap in poor developing countries appear to have shifted consonant with the evolution of development thinking, and the prevailing development ideologies at each period: from aid flows (state-led development) to FDI (neo-liberal development framework), and then to debt relief (prioritization of poverty reduction).

The debate on how to close the financing gap for Africa is, however, far from settled. Both ODA and FDI are unlikely

Table 1. Estimates of additional resource requirements for Africa

Source	Estimates (US$ per annum)	Comments
Zedillo report (Zedillo et al., 2001)	50 billion	Applies to all developing countries
Devarajan et al. (2002)	40-60 billion	Two different approaches were used. The first approach estimates the MDG resource needs by calculating the required economic growth rates of countries, and then the investment required to achieve these. The second approach separately estimates the costs of achieving individual goals. Both estimates exclude certain costs, notably those of the complementary infrastructure required to support the necessary rates of growth and investment.
NEPAD framework document (Funke and Nsouli, 2003)	64 billion	Equivalent to 12 per cent of Africa's GDP
Commission for Africa (CFA, 2005)	$37.5 billion	This is to finance public expenditures until 2010. One third of this is to come from domestic resources and $25 billion from aid.
G8 Gleneagles Declaration	$25 billion a year by 2010	N/A
World Bank and IMF (Gupta, Powell and Yang, 2006)	14–18 billion (2006–2008); 24–28 billion (by 2015)	It is argued this is the amount Africa could use effectively for the improvement of infrastructure and human development.

to flow in sufficient quantities to plug the resource gap, and serious questions remain about their quality, impact and the set of conditionalities that come with them. Indeed, both remain very volatile, with estimates suggesting that ODA, for example, is up to four times more volatile than domestic revenues (For a detailed discussion of FDI and ODA with reference to Africa, see UNCTAD, 2005 and 2006 respectively). And despite all its good intentions, the HIPC debt relief programme has fallen short of its own cardinal principle of additionality, although it has provided a great relief from the debt distress that afflicted the beneficiaries at the time it was launched.[7] Furthermore, several observers have cautioned against the possibility of re-accumulation of external debts, and the destabilizing impact of huge domestic debts, all of which raise the spectre of a new debt overhang in these countries.

In this context, domestic resource mobilization and its efficient investment acquire greater significance. More reliance on domestic resources will reduce the dependence of African countries on external capital inflows and associated conditionalities, and reduce their probability of accumulating unsustainable external debts. Furthermore, this will enable them to regain the policy space that is necessary for the pursuant of truly nationally-owned development strategies that respond to their development priorities. That is, a structural transformation of their economies which leads to sustainable development in the medium to long term.

Unfortunately, mobilizing domestic resources for development has not been systematically addressed in African countries beyond financial sector reforms and the introduction of consumption taxes such as VAT (value added tax). The next section seeks to address this imbalance by discussing possible sources of domestic resources and policies that may be useful for mobilizing them.

5. Mobilizing Domestic Financial Resources

The question that one frequently confronts when discussing the mobilization of domestic resources to fund development in Africa is usually: where would these coming from? And even if they exist, do these countries have the capacity to mobilize them?

These questions are quite pertinent, and are in part a reflection of the low revenues generated by low income countries during the 1980s and early 1990s. The tax revenue to GDP ratio of a representative of low income countries during this period was in the region of 17-19 per cent. This state of affairs has been explained partly by the recession or low growth experienced by these countries during this period as well as the downsizing of governments in these countries because of the perception that they were too big. Most controversially, the international financial institutions are blamed for their "faulty tax advice" to these countries (McKinley, 2007).

Most often, however, the fact that these countries have domestic resources which could be mobilized is overlooked; or the size of these resources is underestimated by most analysts. And while it is true that there is a capacity problem in most African countries, it is also correct to say that even whatever capacity is available is being seriously underutilized. The available evidence suggests that with some innovation, principally in diversifying their approach to revenue mobilization, countries can mobilize more domestic resource than they do at present. Countries as diverse as Ethiopia, Ghana, Mali, Rwanda and Uganda, for example, increased their revenue GDP ratios by four percentage points or more during 1994 to 2004 by increasing their reliance on multiple sources of revenue (McKinley, 2007).

The immediate sources of domestic financial resources in Africa that could be mobilized are domestic savings, and public revenues. Workers' remittances and curbing or reversing capital flight would also yield significant resources that could be considered domestic.

(a) Domestic savings

Domestic savings can be categorized into public and government savings. The latter has, however, been estimated to be very low in Africa over the last decade, averaging about 2 per cent of GDP (Brownbridge, 2007). Hence domestic savings in Africa consist almost entirely of private savings.[8]

In sub-Saharan Africa (SSA) savings rates are low: they are the lowest of any region. In 2005, gross domestic savings represented just about 18.0 per cent of GDP in the region; four percentage points lower than in Latin America and the Caribbean, and less than half the average in East Asia and the Pacific countries (World Bank, 2007a) (Figure 1). The trend in savings in the developing world has been one of increasing disparity between various regions, especially after 1980. Africa's saving

rates have fallen, Latin America's have stagnated and East Asia's rates soared (see figure 1). These trends mirror the general economic performance of these regions over the past four decades or so (Hussein and Thirlwall, 1999).

In addition to savings rates, stability of savings over time is crucial for smooth and predictable investment, and Africa again fares worse than other developing regions in this area. A major reason for this is the volatility of the sources of income, which is higher in Africa than in other developing regions, due mainly to exogenous shocks. The standard deviation for gross national savings as a share of GDP from 1965 to 1992 was 8.7 per cent for Africa, 6.6 per cent for the East Asian "Tigers" and 6.0 per cent for Latin America and the Caribbean (Schmidt-Hebbel et al., 1994).

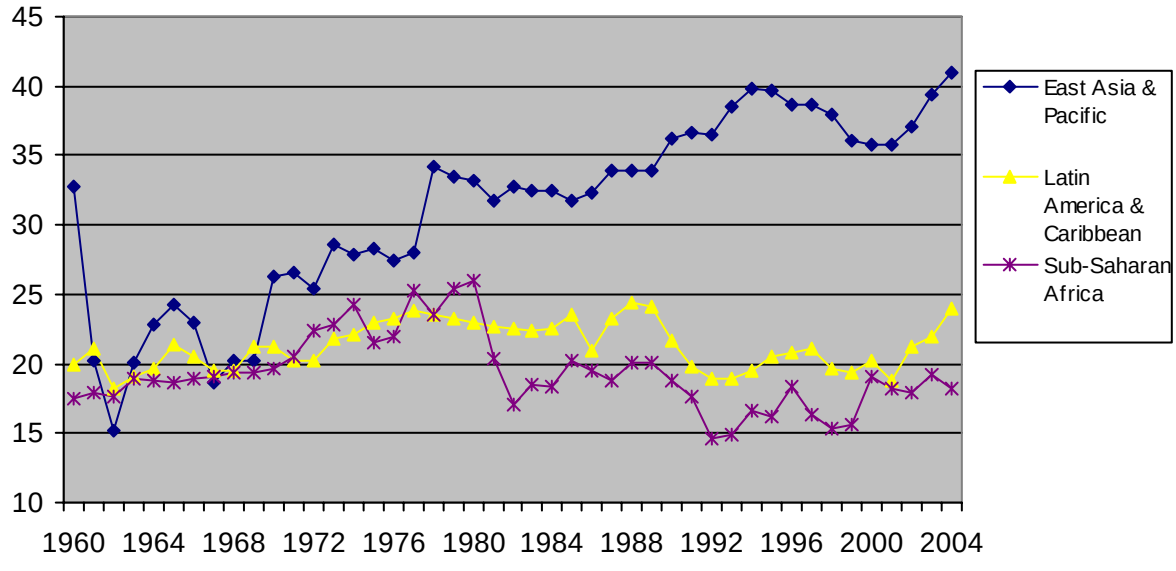
The capacity to save is mainly determined by income level, rate of income growth and the dependency ratio, i.e. the ratio of population under 16 or above 60 years old to that of the working-age population (Loayza et al., 2000). A positive relationship exists between savings rate and per capita income (Hussein and Thirlwall, 1999). Savings rates have also been found to increase in response to rises in the rate of growth of per capita income. Finally, savings rates appear to respond negatively to increases in the dependency ratio. On the other hand, the willingness to save is believed to depend on the ease of access to savings instruments, the attractiveness of such instruments and the prevailing economic conditions (Wright, 1999; Hussein and Thirlwall, 1999).

It is important to note that there are three characteristics of Africa's domestic savings that are often ignored in the current discourse on African development. First, the average savings rate for Africa masks important disparities across the continent. In 2005, Algeria and the Republic of the Congo both achieved gross domestic savings rates of more than 50 per cent of their GDP, while Eritrea and Sao Tome and Principe both had rates far below minus 20 per cent, indicating dissaving on a massive scale (World Bank, 2006) (see also Table 2).

Second, the savings rate for SSA has broadly evolved over the years. From 1960 to 1974, it increased steadily from 17.5 per cent to 24.3 per cent of GDP (World Bank, 2007). It then experienced much higher volatility before reaching its highest rate of nearly 26 per cent in 1980. Then came Africa's "savings collapse" (Eldabawi and Mwega, 2000), as the rate fell to under 15 per cent in 1992. Since then, there has been a tentative recovery, yet the rate has remained low, and was only 17.6 per cent in 2005 (see Figure 5). It is important to note also that until Africa's savings collapse, SSA, for example, was able to finance its investment from its own savings (Figure 2).

Third, official savings data do not capture the full extent savings already being made by households in Africa: fi-

Figure 1. Gross domestic savings by developing regions, 1960–2004
(percentage of GDP)



nancial savings in the formal financial sector represent only a small fraction of total savings. Domestic savings in much of Africa are being held in the non-financial form (e.g. physical assets such as jewellery, livestock, etc) and in the informal system of susu or savings and rotating credit agencies (ROSCAs). The evidence is limited, no doubt, but it is estimated that about 80 per cent of all households' assets in the rural areas are in non-financial assets. These are not available for further intermediation, and only a small part can be used for productive investment. Besides in both urban and rural areas, there are financial savings outside the banking/financial system, which are not captured by official statistics. These savings are also not available for intermediation.

Considering Africa's savings performance during the 1970s and 1980s it is not impossible for Africa to attain higher savings rates to fund much of its domestic investments in the future. The important ingredient of this is economic growth, which has been increasing steadily in the past five years, with Africa attaining high growth rates not witnessed in the past three decades. It is therefore not surprising that since 2000 Africa has emerged as the most dynamic region in terms of investment way ahead of Asia, although the latter received a much higher share of FDI. The continent has doubled its fixed investment because of a robust growth domestic investment (UNCTAD, 2007b).

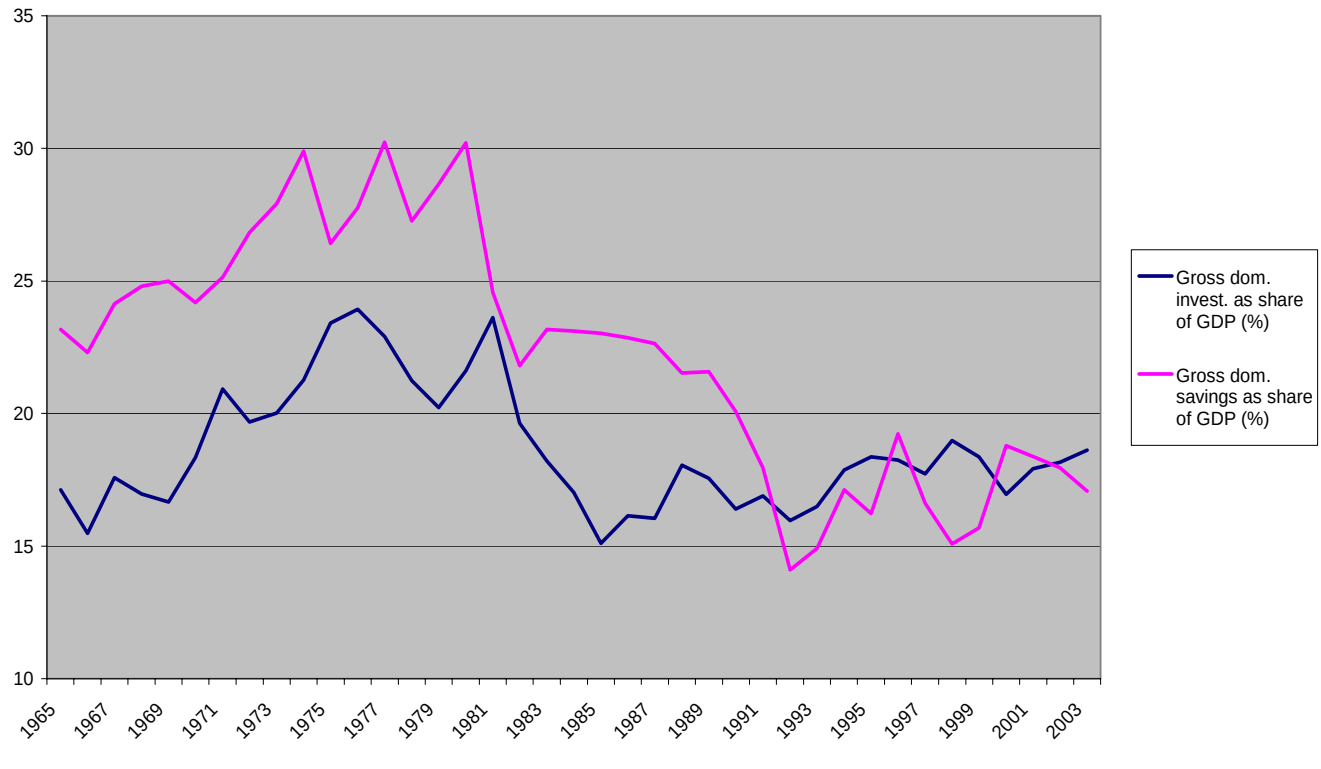
If current growth rates are sustained into the future, Africa could well surpass its highest savings rate of 26 per cent registered in 1980. And with the necessary

Table 2: Distribution of savings rates in Africa, 2000–2005 (number of countries)

Negative	0–10% of GDP	10–20% of GDP	20–30% of GDP	Over 30% of GDP
11	14	13	7	5

Source: UNCTAD, 2007a

Figure 2. Gross Domestic Investment and Gross Domestic Savings in Sub Saharan Africa 1965-2003
(source: World Bank Africa Database 2005)



reforms, the savings mobilization efforts would benefit from the financialization of non-financial assets (i.e. converting them into financial assets and lodging them into the formal financial system) (see discussions below).

(b) Public revenues

As in the case of private savings, low per capita incomes in Africa limit the volume of public revenues that could be mobilized via taxation. This is exacerbated by the structural features of most economies - a dualistic economy with a large informal sector, including subsistence agriculture which exist side by side with a small (and in several cases) shrinking formal sector. Furthermore, the weak and corrupt tax systems of most countries means that most of total potential tax goes uncollected and in some case diverted into private pockets.

Nonetheless, there is a considerable diversity of experience in tax revenue collection among African countries. The ratio of tax revenues to GDP, for instance, ranged from less than 10 per cent (Chad, Niger, and Sudan) to as high as 38 per cent (Algeria and Angola) in 2002. And the tax ratio is much higher in North Africa (25 percent) than in SSA (20 per cent). Excluding South Africa, the tax ratio for SSA is only 16 per cent (UNCTAD, 2007a).

Furthermore, in recent years some countries have been able to improve their tax-GDP ratios considerably, on average by about four percentage points or more. Ghana, for example, improved its tax-GDP ratio from about 12 to 24 per cent between 1990 and 2004 (McKinley, 2007). In Zambia, recent reforms to tax policy and administration have increased the share of income tax from about 35 per cent to almost 50 per cent, even as the proportion of VAT more or less stagnated and that of trade taxes declined from more than 50 per cent to well below 30 per cent over the same period. Domestic revenues are projected to account for about 71 per cent of the 2008 budget.[9] During the 2005-2006 fiscal year, Kenya relied on its own domestic resources to finance all but 4 per cent of its budget, which was financed by grants (compared to more than 50 per cent in several African countries). These experiences suggest that, several countries could double their current level of tax revenues. This will however require concerted efforts directed at reforming and strengthening the tax system and tax administration, as discussed later.

(c) Workers' remittances

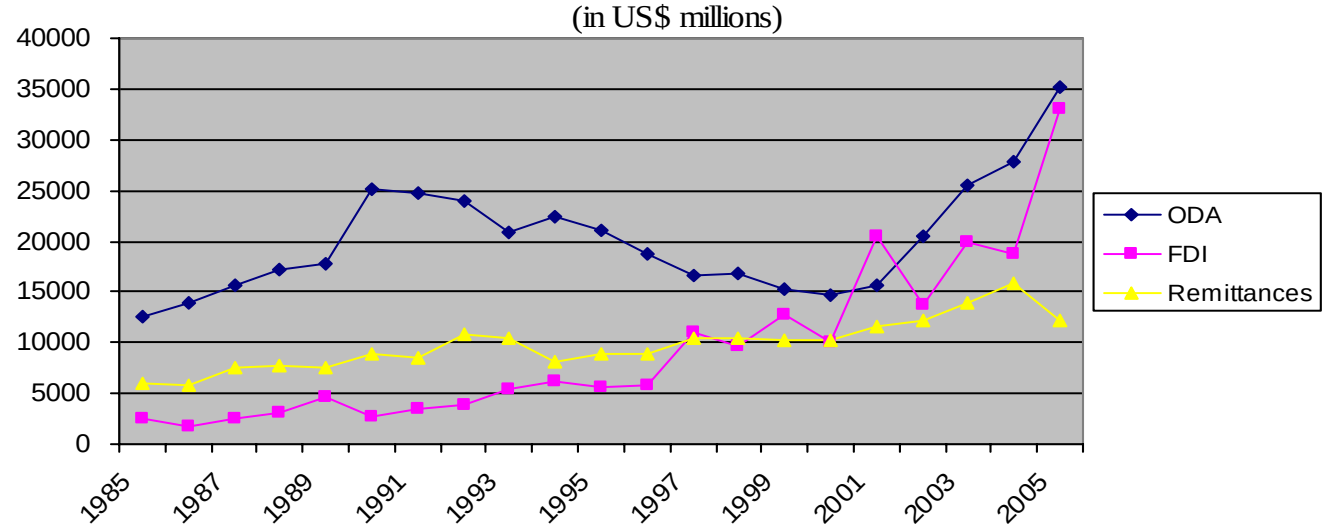
The International Monetary Fund (IMF) Balance of Payments Statistics has been criticised as not accurately reporting data on remittance flows (Solimano, 2003). This data tend to include transfers that are not strictly speaking remittances as it includes all private transfers to the non-corporate sector. This notwithstanding, there is a general belief that official remittance figures underestimate the actual flows. This is because a large proportion of remittances which flow through informal channels tends to be unreported, Intra-regional remittances are particularly prone to under-reporting, if at all reported.

Official figures do, however, provide an idea of the importance of remittance flows and of their evolution over time; and these suggest that in recent years, remittances from migrant workers to the developing world have increased considerably. At about $184 billion in 2005, remittances ranked second in terms of capital inflows after FDI (about $281 billion); and are estimated to have grown at a rate of about 8 per cent per annum between 1980 and 2002 (Solimano, 2003). Generally, however, estimates for remittances to developing countries range from $240 to $300 billion per annum.

The UNECA estimates that Africa as a whole receives around 15 per cent of global remittance flows, with around two thirds of these going to North Africa (UNECA, 2006). Remittances to the continent have increased considerably since the mid-1990s, overtaking FDI as the second most important capital inflow till about 2000, when they were overtaken by the phenomenal increases in FDI flows to the continent (Figure 3). They are thus increasingly being seen as important resources for development.[10] According to recent IFAD estimates, actual remittance transfers to sub-Saharan African countries are worth around twice the recorded amount of US$ 9.25 billion in 2006. For Africa as a whole, these amounted to about $40 billion in 2006, mostly to North African countries. Country-by-country data suggests that remittances represent about 5 per cent and 27 per cent of GDP and export receipts respectively, although the importance of remittances varies hugely from country to country. They make up more than 5 per cent of the GDP of Egypt, Gambia, Lesotho and Morocco; about one-fifth of that of Burundi, Liberia and Lesotho; and more than a third of the GDP of Cape Verde and Eritrea (Table 3), both of which have historically experienced high rates of emigration.

Figure 3. Capital flows to Africa, 1985–2005

(in US$ millions)



Sources: UNCTAD 2007a

Table 3: Remittances to Africa, 2006 (per cent of GDP)

Share of GDP (per cent)	Countries (amount in US$ million)
0-5	Algeria (5,399); Angola (969); Cameroun (267); Central African Republic (73); Chad (137); Cote d'Ivoire (282); Equatorial Guinea (77); Ethiopia (591); Gabon (60); Egypt (3,637); Libya (134); Malawi (102); Mauritania (103); Nigeria (5,397); South Africa (1,489); Sudan (759); Swaziland (89); Tunisia (1,559); Tanzania (313); Zambia(201).
6-10	Congo (423); Congo, DR (636); Morocco (6,116); Madagascar (316); Mauritius (356); Mozambique (565) Rwanda (149); Uganda (642): Zimbabwe (361); Benin (263), Burkina Faso (507); Ghana (851); Guinea (286); Niger (205); Senegal (667); Togo (142).
11-15	Mali (739); Sierra Leone (168).
16-20	Gambia (87).
20+	Burundi (184); Comoros (85); Lesotho (355); Liberia (163).
30+	Eritrea (411); Cape Verde (391).

Source: Extracted from IFAD at http://www.ifad.org/events/remittances/maps/africa.htm (assessed 29 January 2008)

It must, however, be noted that remittances are at present largely being transferred through unofficial channels and are therefore not recorded. Furthermore, the costs of transfers have remained very high because of regulatory restrictions and prevalence of monopolies (banks and few money transfer operators) which have exclusivity deals with banks.[11] These and the lack of appropriate financial services for remittances in recipient countries will have to be addressed before the full potential development impact of these funds could be unlocked.

(d) Capital flight

Capital flight is not a clearly defined concept; and there are probably as many definitions and measurements as there are writers on the subject! Basically, it involves the investment of domestic or national savings in foreign assets, and as such entails a loss of resources which could otherwise be invested domestically. Broadly defined, it would cover all investments in external assets by the private sector, whether legal or illegal. A narrower definition would be all investments in external assets by the private sector which are not reported to the authorities and, therefore, not recorded in balance of payments statistics. The latter definition would include the proceeds of corruption and money gained from illicit activities.

The essential conceptual difference between various measures for capital flight, however, lies in the coverage of outflows of capital. That is, whether the distinction is made between capital flight caused by increased risk entailed in holding domestic assets (i.e., political and economic uncertainty), and "normal" capital outflows that would happen regardless of such uncertainties. One set of measures looks at the total amount of resources leaving the country, while the other looks more specifically at episodic surges of capital "fleeing" unfavourable conditions, including low returns. Understandably, these different sets of measures produce different, and sometimes conflicting, estimations of the magnitude of capital flight in African countries. Unfortunately, there are not many empirical studies of capital flight in African countries and differences in the definitions of capital flight, calculation methods, sample countries and years covered make comparisons between these studies almost impossible.

Highly conservative estimates of capital flight from Africa suggest that it averaged nearly $3 billion per year between 1976 and 1997, an annual loss of 2.6 per cent of GDP (Lensink et al., 2000). Other estimates report capital flight levels of above $13 billion per year between 1991 and 2004, a staggering 7.6 per cent of annual GDP (Salisu, 2005). It has been estimated that the cumulative stock of flight capital for sub-Saharan Africa from 1970 to 1996 was approximately $285 billion. Considering that the combined external debt of the region was $178 billion as of 1996, this arguably makes SSA a "net creditor" vis-à-vis the rest of the world (Boyce and Ndikumana, 2001). A recent update of this study puts the accumulated stock of flight capital in SSA at $476 billion in 2004, representing more than two times the region's external debt stock. In some countries, capital flight is estimated to be as much as four times their external debt stock (Boyce and Ndikumana, 2007).

The extent of the problem varies from country to country. In Burundi accumulated capital flight was worth 216 per cent of the country's GDP in 2004. In Sierra Leone and Mauritania, the comparable figures were 214 per cent and 62 per cent respectively. However, in Benin and Niger capital flight is negative, implying that these countries experienced higher capital inflows than outflows (Boyce and Ndikumana, 2007).

Capital flight is currently diverting a large amount of resources from countries that are in urgent need of financing for development. The social cost of flight capital in terms of lost output is high. Africa's GDP per capita would have been 16 percent higher if its private wealth had been retained at home (Ibid.). In effect, irrespective of the absolute magnitude of capital flight, it is clear that African countries have lost a considerable amount of resources to capital flight and reversing this will greatly reduce their resource gap.

Capital flight is the result of a decision to hold assets abroad rather than within the domestic economy. As such, it is responsive to factors such as macroeconomic and political instability, as well as financial market depth, all of which influence the risk-adjusted returns of domestic assets. These issues have to be taken into account in designing programmes to reverse or stem capital flight.

To sum up, if the robust economic growth rates experienced in recent years continue, Africa should be in a position once more to fund more and more of its investment needs from its own resources, as rates of savings pick up. Tax revenues should also increase in such an environment although this would require specific policy reforms. Macroeconomic stability and current improvements in governance should make it much easier to stem capital flight and possibly reverse it, and encourage the transfer of remittances into productive investments.

If as estimated by IFAD, the flow of remittances to African countries was indeed about 5 per cent of GDP on average for each country in 2006, then conservatively, resources mobilized from remittances and from the other sources discussed here (tax revenues, reversing capital flight, enhanced savings mobilization, including the financialization of non-financial assets) could fill at least half of Africa's resource gap in the short to medium run. There are, however, some challenges to be overcome before African countries are able to raise this much of their own resources to close their resource gap, but these are not insurmountable. The next section discusses some of these challenges and proposes some policies top respond to them.

6. Addressing the challenges

The main challenges to domestic resource mobilization in Africa are generally related to attaining and sustaining robust economic growth rates. This in turn requires improvements in macroeconomic management to attain low and stable rates of inflation as well as stable and flexible exchange rates. Maintaining political stabil-

ity through improvements in good governance is also critical to Africa's good economic performance.

Some of the challenges, however, relate to taking specific actions at the micro or sectoral level. These include improvements to the financial sector, reforms to the tax system and tax administration, and programmes targeted at enhancing the flow of remittances and directing these into productive sectors, stemming and finally reversing flight capital.

(a) Increasing domestic savings

Reforms to enhance domestic savings will have to be directed at deepening and improving the efficiency of the financial system though better prudential regulation and supervision to ensure efficient management of financial institutions. These reforms must encourage the financialization of non-financial assets held in the informal sector and tackle the issue of prevailing segmented financial systems. This will be policies to encourage greater competition, more diversified and new financial products that cater to the interests of different categories of clients - poor, rich, urban and rural. These financial products must respond to the saving needs of most households, in particular the precautionary motive for saving. As such, they must permit easy access and small transactions at frequent intervals in order to smooth consumption patterns.

These objectives cannot be attained without bridging the gap between informal, (semi-) and formal financial institutions. To tackle this, would require a differentiated regulatory system that accommodates different actors in the financial sector, in particular those in the informal sectors. This regulatory mechanism if properly designed and implemented should encourage the emergence of different categories of financial institutions (semi-formal and formal) that serve the potential customers in these sectors.

For these reforms to work, they will have to be accompanied by policies that improve access to the formal financial system, enhance trust in financial institutions, as well as encourage households to deposit financial savings in (semi-) formal financial institutions. These could be through increased use of technology and more innovation to extend coverage of the formal financial institutions, and the establishment of deposit insurance schemes to protect small savers in case banks fall into financial distress. Indeed, the advent of mobile telephone banking is already revolutionizing savings in some African countries - e.g., Kenya, South Africa and Zambia.[12]

(b) Improving public revenues

The main problem of raising public revenue in African countries is that the tax base tends to be particularly narrow, with a small number of people and businesses accounting for a significant proportion of tax revenue. This situation has often become more acute in recent years due to the fall in international trade taxes resulting from trade liberalization. One main factor contributing to this narrow tax base is the huge size of the informal sector in most African countries. This is estimated to account for about 58 per cent of GNP in Nigeria and Tanzania (UNCTAD, 2005). And according to Xaba et al. (2002), in 2001, the informal sector accounted for 78 per cent of non-agricultural employment in Africa.

The first step to increasing revenues will therefore have to be to widen the tax base in order to reduce the sometimes excessive burden currently imposed on a small number of large contributors.[13] This will include policies to entice more businesses into the formal sector by reducing the costs of entry while at the same increasing the benefits for these informal sector operators coming out of the shadows. This is because the decision of firms to remain in the informal sector is one of costs versus benefits. The costs normally faced by these businesses are those of obtaining a license, hiring staff, or obtaining legal title deeds to land and other real estate, which act as powerful disincentives for firms to join the formal sector. On the other hand, the provision of useful services (such as, training, improved access. to credit, participation in business forums, assistance with export procedures, etc) and facilitating registration or obtaining title deeds can help to induce firms to enter the formal sector voluntarily. This will also unlock the actual value of real estates, which can then contribute to increasing financial depth and sophistication. The creation of a 'one-stop shop' for businesses where they can register legally, obtain or renew licences, register property and fulfil their other administrative obligations is one of the ways in which states can seek to reduce the administrative burden on them. This was successfully implemented in Benin in 1995 and has contributed to improving the business environment there.

Most African public revenue structures are over reliant on tax revenues, so there will be the need to explore non-tax revenue mechanisms, such as car park fees, advertising fees, royalties, licenses, etc in order to expand the tax base

Reforms will, however, need to go beyond simply expanding the tax base to improving its efficiency, including simplifying tax regimes and codes, in particular taking into account equity issues, and introducing presumption taxes, and realistic income tax thresholds (below which a firm is not taxed) to encourage compliance. Tax and duty concessions granted to various entities will have to be rescinded or rationalised as African countries lose a sizeable portion of their potential tax revenue though them (e.g., 55 per cent of total fiscal revenue in 2005 was lost in Burundi to these exonerations). These concessions are difficult to implement and contain many loopholes which are easily exploited. Besides, once granted they are difficult to renegotiate even if conditions dictate otherwise. They should be replaced with accelerated depreciation and capital allowances for both domestic and foreign investors, which has the additional advantage of levelling the playing field for all investors. A reorganization of the tax system along functional lines rather than along tax handles, as at present, will enhance efficiency, reduce corruption and evasion.

Improving tax collection will obviously require greater capacity within the tax collecting institutions, which points to the need for a reform of the public financial management system with a view to strengthening it in the medium to long term. Human as well as financial and physical resources will need to be invested in improving the quality and volume of tax collected. Corruption in tax collection agencies must be seriously addressed by designing a system that rewards efficient and honest staff and imposes stiff penalties on the dishonest. Automation of tax administration could also reduce the possibilities for graft, in particular if complemented with regular audits of firms and corporations and measures that encourage voluntary compliance. Voluntary compliance with tax obligations would be enhanced if the tax system is simple, perceived to be fair, and tax resources are put to good use.

(c) Specially-targeted programmes.

Remittances, as discussed earlier, represent major capital inflows to many African countries. There is nonetheless good reason to believe that it is possible to augment the impact of remittances on development beyond its current level, and usage which is mainly consumption. Reducing the transaction costs on the transfer of remittances that fund investments can increase their developmental impact. Indeed, such transfers occur as a result of a portfolio choice to invest in the receiving country rather than elsewhere. They are therefore much more sensitive to transaction costs and investment conditions in the receiving country.

The financial sector should seek to improve the relevance and quality of their services with regards to remittance transfers in order to attract a larger proportion of these transfers into formal transmission channels. This would require the development of appropriate institutions and products for the transfer of remittances with minimum transaction costs from their originating country to the beneficiary. Products could also be developed to capture a larger amount of remittances for investment. Foreign currency accounts operated by local banks at competitive costs are one example of such products implemented by several African countries in recent years. This ensures that savings are ring-fenced from the economic instabilities in the home countries as they are safe from devaluation of the national currency, thereby reducing the risk of loss of value.

Other successful policies involve offering investment opportunities tailored to the Diaspora. One bank in Burundi, for example, offers the possibility for Burundians residing abroad to use their remittances to fund real estate developments. This provides a valuable service as it is very difficult to purchase a property or have one built whilst residing abroad. The savings of the Burundian Diaspora who took part in this project reached $1.5 million in 2007, the launch year.

African countries could also sign partnership agreements which oblige developed countries from which the remittances originate to help lower transaction costs on remittance transfers that use formal channels. For example, these countries could offer tax breaks on the sums remitted,[14] thereby lowering the final cost. These tax breaks could be considered as development assistance for the receiving countries, constituting a novel and indirect way

of delivering aid to the private sector. An added advantage of this will be enhanced transparency of remittances which will facilitate the identification of remittances for illegitimate purposes, such funding acts of terrorism.[15]

Capital flight basically refers to private assets held abroad. Some proportion of these assets leave their country of origin simply as the result of a portfolio choice to invest in foreign markets which may be safer and/or offer better returns. However, a sizeable portion of these assets may comprise the proceeds of criminal activities that are fleeing the country to avoid being used as evidence to prosecute owners and thereafter confiscated. This dual nature suggests that some proportion of capital flight might be prevented if more investment opportunities are created at home. Preventing 'portfolio choice' type capital flight is only one aspect, however. Countries that suffer from capital flight should seek to attract some of the large stock of capital flight back home and should also take measures to reduce the size of criminally-induced capital flight. Assets held abroad in order to evade the law will only return to the originating country if the owners of these assets feel that they are safe from prosecution and that their assets are also free from expropriation. While this may constitute type of 'reward' for criminal activities, it may nonetheless be expedient to offer a "no-questions-asked amnesty" as a time-bound measure to attract capital back into the country.[16] In Italy for example, a one-year amnesty on private holders of foreign assets yielded $ 30 billion from Swiss banks.

Another approach to the repatriation of illegally acquired assets held abroad may be to use legal channels to impound these assets and forcibly repatriate them. These assets are generally held in foreign banks, which make it difficult for African countries to have them repatriated or even obtain information them. Increased cooperation and dialogue with banks combined with appeals for assistance from governments of countries in which the assets are held could help to identify and repatriate some of these assets. A 'naming and shaming' approach has also proved successful in some high-profile cases to obtain the repatriation of illegally-gained assets.

7. Concluding remarks

Domestic resources certainly have some advantages over external inflows such as ODA and FDI. They are more stable. They have no conditionalities attached and therefore give governments more leeway to design and implement development policies that they believe address their most urgent priorities. As they do not also generate external debt obligations they are probably more suitable for countries just emerging from a severe debt crisis. In the short term, they are essential for complementing external capital inflows. Over the medium to long term, the successful mobilization of domestic resources should enable governments to reduce gradually their over dependence on external resource inflows. Considering these advantages, and in particular the fact that the conditionalities associated with external inflows greatly curtail the policy space of governments, domestic resources should become the main source of development finance, rather than a complement to external resources, for Africa.

The issue is just not about mobilizing more resources domestically, however. There is the need to channel these into productive investments to ensure a sustainable basis for development as well as for greater and greater volumes of domestic resources. This requires a well-functioning financial system, which is capable of performing its role of financial intermediation efficiently. Unfortunately, most African financial systems are weak and shallow, although reforms in recent years have started bearing fruits in a few countries. In the medium to long term, however, capital and bond markets will have to be developed to support investments in the real sector. In addition, there is the need to strengthen the administrative and technical capacity of the private sector, while reducing the administrative barriers to the activities in the sector. The infrastructural bottlenecks faced by the sector will also have to be addressed (see UNCTAD 2007 for more details).

Policies relating to the reform and reorganization of the tax system and tax administration should enable scarce expertise to be deployed more effectively. These should also improve the efficiency of collecting tax revenues by encouraging the willingness to pay thereby reducing the opportunities for evasion, fraud, and graft, and lead to improvements in overall tax take. As informal sector activities account for a large proportion of the GDP of most African countries, improving the efficiency of production in this sector, as well as expanding taxable activities being undertaken will benefit the whole economy. Reversing

capital flight and increasing remittances will expand the volume of development finance available to these countries without creating future debt obligations. While there may be dangers of a Dutch Disease arising from large inflows of foreign exchange and from a lack of absorption capacity, this could be averted with proper management, in particular if inflows are used to address supply constraints in the economy.

The problems of implementation notwithstanding, the potential benefits of successful policy reform are enormous. Indeed, improved mobilization and use of domestic resources will reduce the over dependence of African countries on external sources of capital with their associated conditionalities. It will also strengthen the capacity of the state to identify and pursue a truly nationally-owned development strategy which facilitates the internal integration of the economy.

Recent improvements in governance, exemplified by the African Peer-Review Mechanism of NEPAD/AU, and the greater stability of African economies compared to previous decades offer some hope for the future of African development. Growth rates are improving and commodity prices are high. At present, African countries thus have a good opportunity to place themselves firmly on the track to faster and more inclusive growth.

These same factors, nevertheless, point to the fragility of the growth process and how it can easily be undermined. Africa could not build on similar high growth episodes in the past for a variety of reasons. First, these were not accompanied by diversification away from primary commodity production and export entailed in a process of structural transformation. Second, with its boom and bust cycles (the bust period historically longer lasting than the former), high dependence on commodities has proved the Achilles heel of most African economies.

While some developing economies, in particular China and India, have emerged as new sources of growth for the global economy, the impact of the US economy as the main engine for the global economy cannot yet be so easily dismissed. Thus, in all probability, the capacity of African economies to continue to enjoy these high growth rates and sustain them into the foreseeable future depends on their success in diversifying their economies into higher value-added exports, including manufactures and dynamic export products. This demands good economic and political governance in the following areas: public expenditure management, specifically in the management of windfall income from high commodity prices, credibility of public appointments, and in maintaining overall macroeconomic stability, including avoiding a debt overhang and exchange rate instability. In the final analysis, even with a highly successful mobilization of domestic resources, several African countries may continue to rely on external resources even in the long term. Indeed, external assistance may even have to increase in the immediate period if some of the proposed reforms are to succeed.

Disclaimer

The views expressed in this paper are those of the author, and should in anyway be attributed to the UNCTAD secretariat or its Secretary-General.

Endotes

1. There are notable exceptions to this, however: Aryeetey, 2004, UNCTAD, 2007, and Mckinley, 2007
2. See, for example, the writings of Bela Bellasa, Jagdish Bhagwati, Anne Krueger, Ian Little, during this period.
3. These are the: OPEC oil shocks of 1973-1974, and 1979-1980; the Latin American debt crisis of the early 1980s; the emergence of conservative administrations in US (Reagan), UK (Thatcher) and Germany (Kohl) during the 1980s; and finally, the fall of the Berlin Wall and subsequent collapse of the Soviet Union in 1990.
4. When UN member states signed up to the MDGs in 2000, some analysts also started advocating FDI as capable of filling Africa's annual resource gap of 12 percent of its GDP, or US $64 billion to enable it achieve the estimated 7-8 percent annual growth rate needed to meet them – particularly, the goal of reducing by half the proportion of Africans living in absolute poverty by the year 2015 (NEPAD, 2001: 44).
5. It has to be added, in all fairness however, that no one ever really argued that the HIPC Initiative would be able to fill all the financing gap of the beneficiary countries.

6. Two broad methodologies have been used in estimating the resource needs for attaining the MDGs. One is based on global costing exercises with global elasticities and an average cost guide, the other is based on country-level estimates from which global level requirements are extrapolated. Neither effectively incorporates the multi-sectoral dimension, which is addressed by two well-known studies: the Report by the High-Level Panel on Financing for Development (known as the Zedillo Report (Zedillo et al., 2001)) and a World Bank study by Devarajan et al. (2002).

7. For detailed discussion of the HIPC Initiative, including its shortfalls, see UNCTAD, 2004 .

8. This can be disaggregated into household and corporate savings, but data on corporate savings component of private savings in Africa is non-existent for many countries.

9. Government of Zambia, Budget Statement delivered to parliarment on 28 January, 2008.

10. Remittances have some notable advantages too. They are a more stable resource inflow than either ODA or FDI, they have no associated conditionalities, and they reach their beneficiaries directly thereby playing an important poverty reduction role notably by allowing recipient households to pay for school fees or health services, and boosting aggregate demand.

11. See IFAD, http://www.ifad.org/events/remittances/maps/africa.htm

12. The Equity Bank in Kenya, for example, has increased its delivery of financial services in rural areas without incurring the large costs involved in setting up a branch network. It has invested in vans that serve as mobile branches, visiting areas on a frequent cycle. Each van is equipped with the hardware and communication capacity to provide a large array of financial services. The bank has also combined this extension of coverage with new savings products more adapted to the needs of poor and rural households in order to attract their custom. As a result, the bank grew from serving 100,000 depositors in 2001 to serving 375,000 in 2004. By mid-2003 two thirds of its loan portfolio was accounted for by clients served through mobile banking. In South Africa, some banks have improved their cash delivery service to remote areas by installing ATMs or even small bank branches that are powered through solar electricity and rely on satellite communications. In many other African countries, e.g. Democratic Republic of Congo and Zambia, mobile phones enable the "unbanked" to access financial services. Typically, this involves allowing customers who have a deposit account with a bank to make payments and transfers, as well as check their remaining balance via mobile phone.

13. Programmes that seek to augment tax revenues without widening the tax base (i.e., simply by levying higher taxes on existing taxpayers) are likely to have a negative effect as a higher tax yield is attained at the cost of private savings.

14. This could be all sums, or those remitted for specific investment purposes.

15. In addition to an Inter-Agency Task Force on Remittances, the World Bank, IMF, DFID (UK) are conducting studies to enhance their understanding of remittances in order to be able to design effective policies to improve their benefits, including developmental impact (see IFAD, 2006).

16. The success of such a policy is largely dependent on careful phasing. Indeed, capital will only be attracted back to the country if sufficient profitable investment opportunities are created. If the domestic economy is attractive enough, holders of capital abroad may consent to the implicit trade-off of capital repatriation. Indeed, while the owner of capital benefits from being able to repatriate his assets, he also acknowledges his past faults and implicitly accepts a higher level of scrutiny in the future.

17. Indeed, the "return of stolen assets" is a fundamental principle of the UN Convention Against Corruption.

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Infrastructure and Development – Malaysia's experience

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Abstract

The Malaysian experience highlights the importance of public investment in infrastructure in facilitating technological and economic development. This article outlines the country's milestones in infrastructure development. It argues that the state must actively facilitate technological change by providing the infrastructure necessary to attract foreign direct investment and encourage local entrepreneurship.

Introduction

Malaysia has just celebrated the 50th anniversary of its independence from United Kingdom on 31st August 2007. 50 years ago, there was no such country called Malaysia, but a territory called the Federated Malay States or Tanah Melayu, consisting of four small Sultanates from the federated Malay states and five unfederated Malay states, which were separate British territories. In addition, the North Borneo and Sarawak both in the Island of Borneo joined the Federation of Malaysia in 1963. The Federation of Malaya and later Malaysia was very a poor country. Ghana, a country in West Africa also obtained independence from United Kingdom in the same year. At that time, Malaysia was less developed than Ghana.

Nevertheless, in 2008, Malaysia has become one of the success stories in Southeast Asia, despite still having many weaknesses which are also prevalent in many other multiracial emerging nations that have to manage the many demands and interests of the different ethnic groups. Malaysia is now an upper middle income country by the World Bank's standards and one of the 20 important trading nations in the world. This is not surprising as the land where Malaysia is now located has always been part of the main Asian trading routes. Its trade activities at that time peaked during the Melaka Sultanate between the 13th and 16th century.

Malaysia's ability to climb out of poverty and renewed rise as a trading nation is related to the government's the long term planning in the form of five year plans (the current Malaysia plan is the 9th Malaysian Plan which ends on 2010) This Industrial Master Plan, includes the Malaysia Third Industrial Master Plan 2006-2010 and the Overall Perspective Plans (OPP). These plans are not just a statement of good intentions but have a clear focus on implementation to ensure that the whole country benefits from the plans. There is no doubt that pork-barrel bargains tend to benefit certain organized interest groups more than others but the problem is not unique to Malaysia.

Malaysia has developed its infrastructure based on the various master plans. This infrastructure enabled Malaysia to facilitate the country's development. This article focuses on two areas, namely road and highways, and industrial and technology parks.

Roads and highways

According to the Highway Division of the Ministry of Works Malaysia, in Malaysia, Road transportation accounts for 96% of total passenger and goods transport in the country. It is not surprising that roads and highway play an important role, to connect people and industries and a proper road and highway network has managed to contribute towards economic development in the country. The road and highway networks also contributes towards the increase in the number of privately owned public transportation network in the form of express buses. As these express bus operators are run on a profit making basis, some areas are not in their routes, leaving the population to continue relying on privately own transport.

The Ministry of Works Malaysian states that in 2006, Malaysia has a road network infrastructure of 90,129 km of which 79% were paved roads. The highways in operation total 1,890 km comprising mostly of interurban highways across a country surface of 329.750 km^2 and designed for population of 25 million people.

Malaysian development plans have always believed that development efforts including roads and highways will

contribute towards a significant reduction in the incidence of poverty and a more equitable distribution of income. Comprehensive planning for roads in the country began in the 1st Malaysia Plan (1966-1970). During the 7th Malaysia Plan (1996-2000), the overall development of roads is guided by the Highway Network Development Plan that was formulated in 1993. In the 8th Malaysia plan, road and bridges were allocated a budget of US$5 billion and which was 11% of the total budget for 2000-2005 and in the current 9th Malaysia plan the amount allocated is US$ 4.7 billion which makes up about 9% of the total budget from 2006 - 2010.

Spending on roads and highways by the government does not include several privatized highway projects which mainly connect the southern part of Malaysia bordering Singapore with the northern part of the country bordering Thailand. In 1983, the Government introduced privatization as a national policy and a new approach in national development. This is due to the budgetary constraints in the highway network expansion program. Privatized highways are very successful in Malaysia and these highways have become an engine of growth in the country's development.

Under the privatized system, private companies are given concessions for up to sixty years in certain cases to collect tolls from the highways. The concession companies are responsible for obtaining all the finance, both debt and equity, necessary to construct, operate and maintain the highways. The private sector's main challenge to access funding is to have a financial model that passes sensitivity test analyses involving fluctuation in toll revenue, increase in costs, delay in construction and changes to concession agreement. The government benefits from the privatization program in terms of savings in capital expenditure amounting to RM 28.7 billion (US$ 8.9 billion). In addition a total of 3,590 employees were transferred to the private sector.

Due to the 1997 economic crisis in Malaysia and other parts in Southeast Asia, many of the highway concession companies have been bought over by government related companies, thus, whilst maintaining a private status, these companies are de-facto owned by the government's investment arms. For example, United Engineers Malaysia (UEM) which is by far the biggest concession company with many important highway links in Malaysia is 100% owned by the Khazanah Nasional, which is the sovereign investment arm of Malaysia.

The importance and the impact of these privatized highways to the Malaysian economy cannot be understated. For example, the traffic volume for the month of December 2006 for the North South Highway, the most important highway link in Malaysia as reflected in million passenger car units/kilometer (pcu-km), saw an increase of 0.8% as compared to December 2005. Annual traffic volume in 2006 has increased by 1.6% (Works Ministry, 2007).

Industrial and Technology Parks

According to the Malaysian Industrial Development Authority (MIDA), Malaysia has more than 200 industrial estates or larger parks developed and operated by State Economic Development Corporations, Regional Development Authorities, port authorities and municipalities. Private developers are also developing industrial parks. Among these industrial and technology parks, two of them, Kulim Hi Tech Park (KHTP) in the Northwestern State of Kedah and the Technology Park Malaysia (TPM) in the south of the capital Kuala Lumpur require special mention.

Covering an area of 1,450-hectare KHTP is the country's first, fully-integrated high technology park. Besides providing one of the best infrastructures for high technology manufacturing and R&D, the Park's Master plan also puts emphasis on the quality of life within a self-contained township. Amenities incorporated in the plan include a shopping centre, a hospital, educational institutions and recreational facilities. To meet the increased demand for industrial land at the park, KHTP will be extended to cover an area of 1,600hectares.

To-date, KHTP has attracted some RM21 billion (US$ 6.48 billion) investments and houses over 20 companies including Intel, Infineon Technologies, Fuji Electric Malaysia, Celestica, Frontken, BCM Corp and wafer fabrication makers such as SilTerra and Hamadatec. Among major tenants of the Kulum Hi Tech Park are Intel and Fuji. Fuji is building its second substrates manufacturing plant, while Intel is setting up its facility for the design and development of chipsets, scheduled to begin operations next year as well as its new administration facility.

KHTP has also set up its own subsidiaries such as the Kedah BioResources Corp Sdn Bhd (KBioCorp). The new company is expected to spearhead the overall biotechnology initiatives of Kedah, including developing a biotechnology cluster over a 20 hectares designated site in the Park.

KBioCorp is also geared towards joint collaborations with the private sector and institutes of higher learning to further boost its biotechnology programmes.

Technology Park Malaysia (TPM) has been established to facilitate the eventual commercialisation of the R&D outputs of its tenants, mostly from the private sectors. Public sector research continues to concentrate within the campuses of universities and public research institutions. TPM offers low rental rates, incubators and some form of venture capital assistance towards seed organisations. Organisations conducting research in the IT sector may qualify for special incentives in the form of tax benefits, fast tracked approval for foreign professionals and other benefits from the multi media super corridor scheme.

In other words, TPM is to promote an environment which brings together key stakeholders in technology commercialisation. These include the technology providers (universities/RIs), the business community (industry), and the financial institutions (venture capital companies). In order to be more pro-active in its role, TPM has recently launched the Technology Intelligence Network to help prospect for potential technologies within Malaysia as well as outside the country. In addition, TPM will formalise the Technology Business Consultative Panel which will have representation from key stakeholders in the technology commercialization exercise. Apart from the technology providers, the other stakeholders include the business community, the government and venture capitalists.

TPM has been given the task to facilitate the technology commercialisation of herbal and nutraceutical products, especially those derived from the country's vast biodiversity. In order to carry out the mandate given, TPM management has decided to initiate a new mechanism to promote better linkages between the technology providers which include the universities and research institutes, the industry and business community and the financial establishments including venture capital companies.

Over the years, the linkages have not been sufficiently strong. As a result, there has been a lot of mismatch between the technologies that are generated by the R&D community and what the industries need. Lately this has developed into a media issue, the R&D group blaming the local industry for not being forthcoming in taking up the technologies they have developed and the industry complaining that the R&D findings have no relevance to market needs.

However, the Government is starting to recognise the problem and is encouraging universities and public research institutions to have more strategic linkages with the private sectors and potential employers. In addition, private sector research institutions such as those owned by Sime Darby, the biggest plantation conglomerate in the world has also started to have more linkages with the public sector.

Conclusion

The many projects to build roads and bridges to connect the various parts of the country fosters and smoothes the flow of goods, services and people, which contributes to economic development in Malaysia. Whilst the road and highway networks connect the various parts of the country and provide smooth flow of goods and traffic, industrial parks play an important role in the providing the necessary infrastructure for high technology companies that require specialist facilities. In addition, many indigenous research and development activities are also nurtured in these technology parks.

Knowing the importance of this physical infrastructure for economic development, Malaysia has been persistent in ensuring that physical infrastructure remains a top priority, including its operation and maintenance.

Malaysia's experience may be a good lesson to some other developing countries such as those in Africa. A good network of roads and highways and research and development facilities in the form of technology parks is ideal to foster economic growth across a vast region. Nevertheless, these infrastructure requires huge public sector and private sector investment, including the involvement of foreign investors and foreign funds. The current international economic climate may not be as favorauble as the time when Malaysia started its drive for infrastructure development.

Thus, African countries have to rely to international development fund such as the World Bank to continue improving the infrastructure network. These countries may also decide to have research and development hubs by expanding existing facilities instead of building a new purpose built technology park.

MODIFYING INFRASTRUCTURE PROCUREMENT TO ENHANCE SOCIAL DEVELOPMENT

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Abstract

The paper reports the findings of a study by Engineers Against Poverty (EAP) and the Institution of Civil Engineers (ICE) into the factors in infrastructure procurement that are currently inhibiting the achievement of social development objectives. The paper explores, the impact, performance and the sustainability of the asset and the service it delivers (the product), and the opportunities during the project's construction and operation (the process). The study adopted a very broad definition of 'procurement' to embrace all stages from project identification to the final monitoring, enforcement and evaluation. Methods included reviews of procurement documentation and practice in four case study countries (India, Indonesia, Kenya and Nigeria), roundtable discussions and in depth interviews with stakeholders. This yielded a long list of inhibiting factors but also some encouraging efforts at reform. The paper concludes that procurement procedures and contract agreement have the potential to promote social objectives. However, the objectives should be clearly identified in the project design, the budget and procurement strategy have to be appropriate and implementation must be monitored and enforced.

Keywords

Procurement, social objectives, project design, tender, contracts, capacity building

Introduction

This paper presents the findings of an investigation into the possibility of modifying the way in which infrastructure projects are procured in low and middle income countries in order to enhance the delivery of social development objectives. The research is based on the assumption that the procedures followed in the procurement of infrastructure and the details of the contracts entered into can have a significant impact on the social and operational performance of the asset, as well as contributing to the achievement of broader social and economic goals. Procurement procedures can therefore be used as a vehicle to deliver social objectives in infrastructure projects.

The research was undertaken by Engineers Against Poverty (EAP) and the Institution of Civil Engineers (ICE) through its Presidential Commission, Engineering Without Frontiers (EwF). These organisations share a number of common objectives.

EAP is an international non-governmental organisation that works with the engineering industry to promote social and economic development. EAP is supported by the UK Department for International Development (DFID), the ICE and the Institution of Mechanical Engineers (IMechE)

The ICE represents over 70,000 professionally qualified civil engineers worldwide. It seeks to advance the knowledge, practice and business of civil engineering, to enhance the engineer's contribution to sustainable economic growth and promote ethical standards. Engineering without Frontiers (EwF) is a Presidential Commission of the ICE established to examine the engineer's role in meeting the UN Millennium Development Goals.

The aim of the research was to identify opportunities to improve the delivery of social objectives in procurement procedures and contracts. The areas of social development opportunity explored by the project are:

- ⇒ The impact/performance of the asset and the service it delivers (the *product),* and
- ⇒ The opportunities during the project's construction and operation (the *process).*

Opportunities within these areas fall into two main categories, those that benefit 'labour' (defined to include employees and the self employed in the formal and informal sec-

tor) and those that bring benefits to a broader group which we call 'society'. The greatest benefits to labour are derived from the process and to society from the product, but the division between these categories is not clear cut. Examples of the former are (i) the expansion of opportunities for employment with decent working conditions during construction and operation of the asset and (ii) the development of business opportunities through the local production of inputs (machinery, equipment, materials and components) to the construction process, as embodied in the concept of 'local content'. Examples of benefits to society are the delivery of an asset that is fit for purpose, is operated and maintained in an appropriate manner, serves the needs of the community over many years and contributes to social and economic development goals. Good governance is also considered as an objective as it provides the enabling framework for delivery.

The work was guided by a panel of expert advisors set up by the ICE, who met from time to time to monitor progress and review outputs. On the advice of the panel an early decision was taken to expand the usual definition of procurement to include 'project identification' at the initiation of the project and 'monitoring and performance evaluation' at the conclusion of the construction phase. Five stages in the procurement cycle were identified as: (1) Identification, planning and design (2) Finance and procurement strategy (3) Tender and selection (4) Contract agreement (5) Monitoring, enforcement and evaluation. Consideration was also given to the operation and maintenance of the asset.

1. Research methodology

At the outset the research aimed to address two key questions:

1. How do existing procurement procedures inhibit (or enable) the achievement of beneficial social impacts of infrastructure projects in low to middle income countries?
2. How can procurement procedures be improved and utilised as a mechanism to increase the contribution of the project to the achievement of social development objectives?

Three major avenues of enquiry were adopted to address these questions:

1.1 Case studies in four countries:

Analysis of current procurement procedures and how they are applied in practice is key to understanding the factors inhibiting or enhancing social performance. It is also important to establish where social objectives are identified within procurement procedures and contract documents. In order to achieve these objectives a detailed study of national procurement policy, procedures and documents was undertaken in a small number of countries chosen as case studies. Four countries were selected: India, Indonesia, Nigeria and Kenya. They were selected because they are strategic regional leaders with capacity to promote the recommendations emerging from the research and to influence other countries in the region.

In each country a detailed analysis was undertaken of national procurement policy and legislation, national standard bidding regulations and documents. The relevant development bank's harmonised bidding document and a limited number of project documents were also consulted.

This approach allowed the identification of social obligations in current procurement procedures. In order to examine the extent to which these contractual obligations are actually met, we looked at health and safety in construction projects in the case study countries. As the research progressed, it also became important to consider the infrastructure policies adopted by the governments to meet country MDG targets.

1.2 In-depth interviews:

Interviews were conducted with representatives of over 40 key stakeholders. Respondents included the following donors: The World Bank, Asian Development Bank, Department for International Development (DFID) and the European Commission. Other respondents were government departments, international and national consultants and contractors and NGOs. Each respondent was asked about their individual work experiences and their views on current practice. The information gathered from the interviews, together with the findings of the case studies, was used to identify the factors inhibiting the delivery of social objectives through procurement. Some enabling factors also emerged from the interviews with key stakeholders. The identification of enabling factors was supplemented by an extensive review of past and current initiatives undertaken by donors, financiers or other groups to

improve the performance of procurement systems to deliver social objectives.

1.3 Roundtable discussions:

Roundtable consultations were held in each of the case study countries. These meetings were facilitated and/or sponsored by the ICE country representatives, multi-lateral development banks, governments and private companies. Altogether over 100 delegates from across the stakeholder groups (donors, clients, consultants, contractors, NGOs and other local stakeholders) attended these one-day meetings.

Roundtable discussions were seen as a way of bringing developing country voices into the study. The participants in each meeting were asked to address two questions:

What are the opportunities to increase social development within engineering procurement procedures in the case study country?
What are the enabling factors for the opportunities to be achieved?

The issues raised in the discussions played a key role in drawing up the recommendations. While the views expressed were not attributed to individuals in the interests of confidentiality, it is felt that the findings and recommendations of the study (as summarised below) present a fairly accurate reflection of the views of those most directly involved in the delivery of infrastructure projects in the developing world.

2 Case study findings

Five common findings emerged from the study of procurement documents in the case study countries:

2.1 Public procurement reform is underway to improve governance

Since the late 1990s the governance of procurement policy in the case study countries has followed a similar pattern of reform and development. This is being driven by the donor's switch from funding individual projects to providing more general budget support, accompanied by an agreement to channel funding through national government systems whenever they are considered to be of adequate standard.

Following World Bank Country Procurement Assessment Reports (CPARs), Kenya, Nigeria and Indonesia took up the recommendation of the World Bank to establish a legal framework for public procurement based on the UNCITRAL Model Law on Procurement of Goods, Construction and Services (UNCITRAL, 1995)[1]. Kenya and Nigeria also adopted the recommendation to create a central authority to formulate procurement policy and monitor its implementation. The objectives of procurement legislation in these countries closely follow those stated in the UNCITRAL Guide to the Model Law, notably maximising competition, according fair treatment for suppliers and contractors bidding to do government work and enhancing transparency and objectivity. By following this principle, the Model directs a procuring entity towards competitive tendering with restrictions placed on other tendering methods such as restricted tendering and two-stage tendering.

The legal frameworks have also sought to improve the governance of public procurement by adopting a complaints and review procedure based on the guidance provided in the UNCITRAL Model, by prohibiting corrupt and fraudulent practises and including a code of conduct for all procurement officials.

2.2 A limited number of social objectives in standard bidding documents

National procurement legislation does not address the contract performance or implementation phase. Instead, the expectation from the CPARs is for national governments to publish standard bidding documents. Examination of the documents in the four countries found a limited number of social objectives related to labour (conditions of employment, health and safety and trade union rights) in the conditions of contract. All four countries also give a margin of preference in the tender process (commonly 10%) to domestic contractors. A margin of preference is also granted for the benefit of tenders using locally produced goods or services. Other local content policies include a classification system in Indonesia that reduces the ability of overseas contractors to bid and bonus scores for demonstrating a history of local participation in Nigeria. Environmental obligations are more common, with Environmental Impact Assessments (EIAs) increasing. EIAs so address some social issues, such as resettlement. However, the recommendations of the EIA reports are not always included in the scope of works and consequently not implemented.

2.3 Social obligations in Multilateral Development Banks bidding documents, but questions over enforcement

When Multilateral Development Banks (MDBs) finance a project it is their standard bidding documents that usually apply and their rules that take precedence when they conflict with national legislation. The 'Master Bidding Document for Procurement of Works', which includes the Multilateral Development Bank (MDB) Harmonised Edition of the FIDIC Conditions of Contract for Construction (2005), does address governance, labour and society issues. The obligations to the labour force go further than the national standard bidding documents examined, with prohibition of child and forced labour and an obligation to ensure the supply of food and water. There is also a requirement to appoint an accident prevention officer at the Site and a comprehensive contractual obligation for the contractor to conduct an HIV-Aids awareness programme via an approved service provider. However, stakeholders have questioned how these obligations will be priced and if and how the client and his contractor will measure whether the service provider has fulfilled his obligation. Also, many of the social requirements are a test of reasonableness or do no more than 'encourage' action. Two examples are a requirement that the contractor take 'all reasonable steps' to protect the environment' and that the contractor is 'encouraged' to employ staff and labour from sources within the country.

Other social requirements may be included as part of the condition of the loan or grant, but these are usually confined to governance issues and a requirement for Environment Impact Assessments.

2.4 Even minimal social obligations may not be met

Most contracts specify, as a minimum, that contractors must obey all local laws and regulations. Legislation is generally adequate with special provisions to ensure the health and safety of the construction workforce. In the three countries where this issue was studied (India, Kenya, Nigeria) legislation has been strengthened recently with the introduction of requirements for health and safety committees at all work places, with equal worker and employer representation.
However, the actual standard of health and safety on construction sites in the countries studied falls far short of what is required by law. Monitoring and enforcement of the provisions for health and safety in contracts is inadequate. Health and safety inspectorates are generally understaffed and visit construction sites only after an accident has occurred. Few contractors are charged for contravening the regulations and when they are the penalties are too small to serve as a deterrent. There is no monitoring of health and safety from within the project team. Fear of losing contracts to competitors is a powerful factor preventing contractors from including the full cost of meeting their health and safety obligations in tenders. Workers also are fearful of losing their jobs if they complain about unsafe or unhealthy worksites. Many are simply unaware of their rights.

2.5 New procurement strategies to meet MDG targets and private participation

Governments have set specific infrastructure targets to meet the MDGs, particularly in the provision of water and sanitation, roads and power supply to improve the lives of villagers and slum dwellers. The role of infrastructure in stimulating economic growth and reducing (both directly and indirectly) the number of people living in poverty is also recognised. All four countries aim to mainstream MDGs into national planning and budgeting, but it is not clear whether this has occurred in practice. In three of the case study countries (India, Indonesia, Nigeria) responsibility for the delivery of infrastructure is being devolved down to local levels but questions have been raised as to whether these tiers of government have the technical capability to deliver.

The lack of finance to meet MDG targets also means that governments are looking to the private sector to deliver, operate and maintain infrastructure and related services and recoup their investment through user charges. Community organisations are also being encouraged to operate and maintain small scale and/or rural infrastructure assets using the funds generated from charging users for the service. This is leading to a change in procurement procedures with governments wishing to engage contractors on long-term concession contracts ranging from 15 to 25 years. Social objectives within the concession contracts go beyond the traditional ontracts with examples of the requirements from the EIA and SIA report built in the project documentation (e.g. India). There is also legislation relating to private sector participation in infrastructure that specifies various social obligations, For examples laws relating to infrastructure in Indonesia make

consultation with the local community a legal obligation for the client[2]. It is then for the client to decide how this consultation is managed within the procurement process.

3 Summary of factors inhibiting beneficial social impacts

The detailed study of procurement regulations and contract documents in the four case study countries pointed to a number of factors in procurement procedures that could be inhibiting the achievement of social development objectives. For example, the lack of clear definition of social obligations in contracts and the failure to monitor and enforce the obligations that do exist in contract agreements or national legislation. The interviews and round table discussions covered a broader area (from project identification to monitoring and evaluation, operation and maintenance) and revealed other factors. The main inhibitors as they arise in the order of the procurement cycle are summarised below.

3.1 Lack of public consultation, national plans or other clear criteria for project identification

The process of delivering social development objectives through the procurement of civil works starts with the identification of a project. Respondents complained of a lack of transparency in the selection of projects and absence of public consultation, leading to fears that selection is based on personal or political interests rather than the interests of society as a whole. Project identification does not appear to be guided by national, local or sectoral plans, hence projects do not always meet a clearly identified need. Many projects are considered to be 'socially inefficient'. In the worst case scenario they may serve no apparent purpose – such as 'bridges to nowhere'.

3.2 Failure to incorporate social objectives in project appraisal, design and budget

The predominant source of project funding in low income countries is loans taken by governments from MDBs. Social conditions attached to loans are generally restricted to issues of governance. Donors fail to systematically consider social objectives during project appraisal or to set aside funds for their realisation. Social objectives are also overlooked by clients and there is little evidence of linkage between project planning and design and national development plans, national policies (e.g. for employment generation) or legislation (e.g. on occupational safety and health). Failure to consider social objectives at the design stage and to budget accordingly, may hamper the achievement of these objectives when introduced later on.

3.3 Failure to plan and budget for maintenance

African respondents in particular highlighted the persistent problem of poor maintenance of infrastructure assets which shortens the life of the asset and the social benefits derived from it. One obvious cause of the problem is inadequate funding for operation and maintenance, whether from general taxation, specific taxes, or user fees. Less obvious is the fact that the design and specification can themselves have a big impact on the ability to operate and maintain the asset. For example, if designs require heavy dependence on foreign technologies and skills, maintenance becomes a problem from the moment that foreign workers depart. Conversely, the capability to operate and maintain the facility should be enhanced when designs employ local technologies, skills, materials and components, embraced in the concept of 'local content'.

3.4 Inflexible procurement strategies and adversarial contract forms

The predominant method of procurement in developing countries is essentially traditional, with the client serving as the contracting authority and appointing through competitive bidding a consultant to design and contractor to deliver the project. The traditional method of procurement has a long history of reliability. But many regard this method as inflexible and not always appropriate. It is also highly adversarial. There is also concern at the excessive focus on competition at the expense of other objectives, such as the development of the local economy. There are several different procurement strategies that clients and donors could consider that might be more suitable in certain circumstances in delivering the project and social objectives (e.g. design/build, turnkey, output or performance based procurement). But despite their successful use in developed countries, donors have been reluctant to allow developing country clients to adopt these models.

3.5 Intense competition and selection based on lowest price

All four case study countries have accepted the basic tenet of the UNCITRAL Model Law that best value is achieved by

maximising competition. However, accepting the lowest price tender can have negative repercussions with implications for the achievement of social objectives. If the tender price is very low the successful bidder may be led to cut costs by cheating on materials and taking other shortcuts that can affect the quality of the product. The successful bidder may also cut back on labour costs by pushing down wages, hiring casual workers and failing to meet contractual requirements to ensure the health, safety and welfare of the workers. In many countries intense competition (particularly from Chinese companies and other 'new entrants' to international contracting) is seen to be driving down standards and leading to neglect of social obligations. It may also preclude local contractors from entering the market as they do not have the financial capacity to take on the risk of bidding at such low prices.

3.6 Vague and conflicting messages regarding social obligations in contracts

Vague and sometimes conflicting obligations in contracts complicate compliance. For example, as the case studies noted, contractors are expected to take 'reasonable care of the environment'. It is not clear what this means and interpretation is made even more difficult in a context where national standard and guides are lacking and little attention has been paid to the specification of sustainable resources in design and delivery. There is also ambiguity in FIDIC contracts on the employment of local labour, with one clause stating it is up to the contractor who s/he employs and another saying s/he should employ nationals wherever possible. Other contracts clauses, such as 'take due precautions to ensure the safety of staff' may state the general intent but lack operational detail to inform the contractor what actually has to be done.

3.7 No clear standards for social objectives and failure to monitor and enforce standards that exist

In the countries studied project performance is often poor, with the technical as well as the social requirements of the contract not fulfilled. Sometimes the failure can be traced back to problems at earlier stages in the procurement process, such as poor design and specification, weak definition of requirements and/or inadequate budgets. But failure to enforce the conditions of the contract is also due to inadequate supervision from within the project team as well as weak government enforcement of regulations. In very poor countries, government regulatory agencies rarely manage to enforce standards due to lack of capacity, logistical difficulties and corruption. Monitoring and enforcement of basic requirement for health and safety is certainly inadequate in all of the case study countries. Project auditing (in the sense of analysis after completion to identify shortcoming, errors or mistakes) is limited. Respondents expressed the view that the implementation of many objectives, not just social, is not evaluated to a relevant and appropriate standard, with auditors tending to follow paper trails rather than actually checking the asset on the ground. Lack of effective standards for monitoring is a further problem.

3.8 Corruption is a major inhibitor at every stage of the procurement cycle

Corruption is prevalent throughout the procurement and project life cycle, from identification of the project through to monitoring and enforcement, operation and maintenance. Corruption and fear of corruption is a major inhibitor to improved contractual and social performance. It hinders decision making, undermines the efficiency of the procurement process, blocks the entry of local firms and raises project costs. Consultants and contractors stated instances where they have walked away form bids because of corruption. Others build corruption costs into the price. In its Global Report of 2005 the anti-corruption group, Transparency International, estimates that almost 10% of investment in infrastructure is lost to corruption. The real figure may be much higher.

Analysis of the stakeholders who are mainly responsible for the factors that are currently inhibiting the setting and achievement of social development objectives through the procurement process threw up some additional inhibiting factors. For example, the fact that the MDBs measure success by the quantity of funds disbursed rather than the quality of outcomes, the focus of donors on financial auditing with minimal monitoring of social outcomes and the continuation by some donors of the practice of tying aid are all seen as detrimental to the realisation of positive social impacts from infrastructure spending. Governments are also criticised for failing to enforce their own regulations or to promote their own policies in infrastructure procurement.

4 Roles of key stakeholders as agents for change

As well as the long list of problems summarised above, the research also detected some encouraging developments led by key stakeholders in the procurement process. It is by now a well established fact that the decisions taken in the early stages of project procurement have the greatest potential impact on cost. This is also true for the identification and exploitation of social development opportunities. Hence the greatest chance to influence the setting and achievement of social development objectives in public procurement rests with the donors who provide much of the funding, in partnership with the clients who create the culture for project implementation.

Donors are currently driving procurement reforms in low income countries and helping to build the capacity of procurement officials. This is related on the part of some donors (led by OECD/DAC) to a move away from project funding toward budget support linked to national and sector plans. We have seen in the case studies that the MDBs have now adopted standardised contract documents that do address some social issues, although there are questions over enforcement. MDBs have also recently agreed a common approach to fight corruption, to develop proposals to assist country capacity in anti-corruption measures and to cooperate with civil society and institutions to enhance transparency and accountability. It is now important that these opportunities are taken up and that inflexible procurement procedures and the drive for market competition do not compromise donors' desire to derive increased social benefit.

Governments are also influential in promoting social objectives as they set the framework in which projects are identified, planned, designed, procured, constructed and maintained. Governments of many countries are reviewing procedures and promoting reforms, although these efforts are complicated by decentralisation programmes. In some countries the social performance of companies is being included in assessment criteria for prequalification or registration. Environmental Impact Assessments are increasing and Social Impact Assessments are beginning to emerge. Community groups are playing an increasing role in project identification, management, operation and maintenance with positive effect. These developments indicate a growing momentum to encourage good practice and social development impacts in public procurement.

Two particular examples of good practice can be singled out. The first is the use of 'targeted procurement' by government clients to assist disadvantaged groups. Targeted procurement is a system for awarding tenders that provides the option to set targets or goals to achieve socio-economic objectives that are contractually enforceable, whilst retaining donor rules of competition, fairness, efficiency and transparency (Watermeyer, 2000)[3]. A scoring system leads to bidders competing on the basis of price and how they incorporate the social objectives into the project (for example, 90 points for price and 10 points for social objectives). Developed in South Africa to specifically target those groups disadvantaged under the apartheid system, the system has also been used to support local economic development, to promote growth within the small business sector and to target the unemployed in poverty alleviation programmes. However, successful implementation clearly depends on appropriate planning and design and clear identification of goals, as well as the willingness and ability to apply sanctions to contractors who fail to deliver the social objectives they are contractually committed to.

The second example addresses the key issues of monitoring, evaluation and enforcement. One clear message emerging from the research is that contract agreements that require certain actions on the part of the contractor (even if this is simply to observe the law of the land) have to be monitored and enforced through incentives or sanctions. The Social Aspects of Construction project, supported by UK/DFID and tested in Ghana, has demonstrated how social obligations in contracts (in this case labour standards) can be monitored as part of the supervisory process within the project team (Ladbury, Cottam, Jennings, 2003)[4]. The process is greatly facilitated if the labour force is fully aware of their rights and entitlements and all the key stakeholders are involved. On DFID funded projects in Ghana the stakeholders (including the client, contractors, labour department and trade unions) collectively identified the appropriate labour standards to apply and periodically reviewed problems and proposed solutions. Contractors complying with the standards were rewarded with bonuses. Over time and after a number of different monitoring approaches had been tried, the supervising engineers began to take over the role of monitors. The experiment has shown that consultant engineers can effectively monitor compliance with social obligations and review accounts when these are clearly defined and budgeted in contract agreements.

Conclusion and recommendations

A number of key messages emerge from the research. First, it is clear that there are many stages in the procurement cycle and actions in one stage are constrained by decisions taken earlier. As a general rule the decisions that are taken in the early stages, have the greatest impact on the achievement of social development objectives. The biggest potential impact on poverty probably lies in the choice of the project. Therefore, project identification must be carried out in a clearly defined and transparent manner. It is suggested that it should be in line with national, local or sector plans and carried out in consultation with the community.

Second, it is equally clear that there is little point in including contractual obligations (whether the contract agreement or preferably the specification) that require certain actions on the part of the contractor unless the actions have already been considered at the design and planning stage and budgets drawn up accordingly. Some method has also to be agreed for monitoring and enforcing compliance. If these things are in place the contract agreement has potential as a means to promote social objectives at the tender stage.

Greater flexibility is needed in identifying a procurement strategy. The 'one size fits all' approach creates an inflexible system that is not appropriate for all projects. A move away from the lowest cost approach is envisaged, with a greater willingness on the part of donors to allow two stage and targeted procurement methods. A more flexible approach by clients and donors could improve the delivery of the project and the achievement of social objectives.

Fourth, the long recognised problem of poor maintenance is still very real. This is traced to the failure to consider the whole life cycle of an asset during planning and design, so as to ensure that the asset can be operated, as well as maintained, at minimum cost and with the resources that are available locally. If these considerations are at the forefront of decision making it is likely that 'local content' (of materials, labour and business) will automatically be enhanced. Respondents from all of the case study countries and many representatives of international agencies maintained that promoting local content is an efficient means of delivering significant social development impact. They recommended that investment to meet the MDGs should use and strengthen national engineering industries and resources.

Finally, it is worth noting that corruption (a major inhibiting factor) is pervasive and must be tackled at all stages of the procurement cycle. Tackling corruption at the tender and selection stage alone (which is the stage that currently received the most attention) is unlikely to be effective as the problem will simply move to a different stage of the process. The first step in tackling corruption is to increase transparency. It is therefore essential that processes at each stage of the procurement cycle are as transparent as possible.

Based on the above, the following recommendations are put forward for discussion. The recommendations are presented in the order in which they arise in the procurement cycle.

Project identification, planning and design

1. Project identification should be in line with national, local or sector plans and/or based on public consultation
2. The whole life cycle of the asset should be considered during planning and design and an operation and maintenance strategy developed for each new project
3. Social objectives should be clearly identified at the planning stage and incorporated into the design, with funds set aside in the budget for their realisation

Finance and procurement strategy

4 Consider alternative procurement strategies to ensure the appropriate approach to deliver the specified social objectives

Tender and selection

5 The social objectives must be clearly defined in tender documents and explained at pre-tender meetings

6 Attention should be paid in tendering to the bidder's social performance and capacity to deliver social obligations, through prequalification or the maintenance of robust registers

Contract agreement

7 The project team must agree contractual mechanisms to deliver social objectives

Monitoring, enforcement and evaluation

8 Contractual obligations must be monitored and enforced through incentives and/or sanctions

9 Social performance audits should be conducted with the same rigour as financial audits.

Phase two project

Following completion of this project, the ICE and EAP acknowledged that further research was needed to test the feasibility of implementing the recommendations in particular contexts, as well as to test their effectiveness in achieving specific social development objectives.

Therefore, a phase two research project was commissioned to investigate the circumstances in which the inhibiting factors might be overcome and the procurement of infrastructure projects used to deliver key social development objectives. The overriding objective emanating from workshops and meetings with international donors and developing country governments to date is the need to build capacity in borrowing countries and expand the 'local content' of projects, so that more of the funds invested stay in the region.

The issue of labour standards has also been highlighted, with organizations such as the European Union embracing the International Labour Organisation's 'Decent Work' agenda and many countries keen to improve on construction health and safety. We therefore intend, in the second phase, to focus attention on the key social development objectives of (i) building local capacity (ii) expanding local content (including through employment generation) in the construction and maintenance of infrastructure, while paying due regard to labour standards (health and safety, and the environment).

We hope to demonstrate how and in what circumstances, the above objectives might be furthered through innovative approaches in public procurement. The work will be based on a review of previous research and analysis of evidence gathered from a number of case studies of past or current projects. We would very much welcome any approach of examples of building local capacity and expanding local content which could be developed into a case study. We expect the final outcome will be series of recommendations in the form of guidance notes or toolkits. We look forward to sharing the outputs of this work with you.

Endnotes

1. UNCITRAL (1995) 'Model law on procurement of goods, construction and services with guide to enactment'

2. Law of the Republic of Indonesia, Number 38 of 2004 concerning Road

3. Watermeyer, R. (2000), 'The use of Targeted Procurement as an instrument of poverty alleviation and job creation in infrastructure projects', Public Procurement Law Review No.5 pp.230-231. see also Watermeyer, R. (2003), 'Implementing preferential procurement policies in the public sector in South Africa', Journal of the South African Institution of Civil Engineering, 45(3) pp.11-22

4. Ladbury, S., A.Cotton and M.Jennings (2003) 'Implementing labour standards in construction: A sourcebook' Water, Engineering and Development Centre (WEDC) Loughborough University

UNCTAD's Women in Business Award 2008

Setting up a successful business is a difficult venture for any entrepreneur - even under the most propitious of circumstances. Women entrepreneurs, however, face an additional burden of having to make their way in what is often considered a man's domain. It is for this reason that UNCTAD's EMPRETEC program, a pioneering UN vehicle for the promotion of entrepreneurship that operates in 27 developing countries, has launched the First Women in Business Award. The Award will be granted to women-owned businesses that have benefited from the business development services of the EMPRETEC programme. The winner and the second- and third-place runners-up will be invited to the Award Ceremony to be held on Monday, 21 April 2008 in Accra, Ghana on the occasion of the Twelfth Ministerial Conference of UNCTAD.

The 10 finalists below are being evaluated by a panel of experts composed of 12 women and 8 men in the field of entrepreneurship and private sector development, and are familiar with developing countries business environment.

Elba Rosa Torrado, Argentina

Business: *Se hace camino al andar*

The firm, whose title roughly translates as "make your own road as you go," provides services to other entrepreneurs through a website and a worldwide radio broadcast via the Internet. It arranges thematic events, organizes business awards, publishes magazines, and provides consulting on entrepreneurship.

Dédé Léa Edith Medji, Benin

Business: *Mon petit Bénin*

Based in Cotonou, the firm produces fruit juices and chips. Its major product is natural baobab juice, which is bottled and has a long shelf life. Company objectives include promoting local products and health benefits of baobab and other fruit juices, and providing extra income for rural women in Benin.

Paola Borges Barcellos Tucunduva, Brazil

Business: ROTOVIC - *Uniforme Lavandería e Locação Ltda*

ROTOVIC is a laundry business specializing in work uniforms and uniform rental. It is a pioneer in the use of fire-resistant uniforms, operates in an environmentally friendly fashion -- such as by recycling water -- and has 235 employees.

Messeret Belihu, Ethiopia

Business: Ras Amba Hotel

Ras Amba is a well-known three-star hotel in the Ethiopian capital, Addis Ababa. It provides jobs for 65 people, over half of whom are women. Along with lodging, the hotel has a restaurant, a wedding and meeting hall, a catering service, and an airport shuttle service.

Augustine E. Hammond, Ghana

Business: Jem Afrik Creations Ltd.

Jem Afrik designs and produces a wide range of afro-ethnic clothing for casual wear, business and evening dresses, among others. It began with a single employee behind a rented sewing machine in 1986, and now has 55 permanent employees, 15 trained and mentored workers who have set up their own businesses and function as subcontractors, and registered sales representatives in the United States, the Caribbean, and southern Africa.

Paully Apea-Kubi, Ghana

Business: Ebenut Ghana Ltd.

This firm, based in the Ghanaian capital of Accra, produces and packages dried fruits, nuts, and vegetables, including coconut, mango, papaya, pineapple, banana, eggplant, tomatoes, peppers, and spicy plantain chips.

Irene Bacchus-Holder, Guyana

Business: Irene's Creative Handicraft

This business, which is based in the city of Linden and now employs five people, began when Ms. Bacchus-Holder offered gifts made of wood from Guyana's rain forest to several friends. The handicrafts are decorative or functional, are based on original designs, and are made of rare -- but not endangered -- native wood species.

Sana Zaal Burgan, Jordan

Business: Med Grant

Med Grant, based in the Jordanian capital of Amman, promotes medical services in Jordan, especially to international "medical tourism" clients. Its activities are focused on a website called JoHealth.com, through which patients from all over the world can arrange for treatment within the country

Sapphira Nyabunwa, Uganda

Business: Safi Cleaning Services Ltd.

This firm, based in the capital of Kampala, provides professional cleaning services, including lawn cleaning, fumigation, garbage collection, dry cleaning, and commercial laundry work. It has 800 employees around the country and a monthly turnover of US$88,000.

Emelda Nyasha Nyamupingidza, Zimbabwe

Business: Nyaya Industries t/a Zesk Products

Nyaya Industries, based in Harare, makes candles and polishing products. Its founder, a trained chemist, started the business after she noticed a dearth in the quality candles and polishes in Zimbabwe in early 1990s of. She employs more than 150 people and exports 56 tons of candles to Malawi each month.

About EMPRETEC

EMPRETEC is an integrated capacity-building programme for entrepreneurship development. Under the leadership of UNCTAD and its public and private partners and donors, the EMPRETEC programme provides one-stop-shop for information and business training. By stimulating public-private sector partnerships and developing an institution with a forward looking Advisory Board, EMPRETEC Centres play a major role in connecting entrepreneurs with institutions.

Wherever implemented, the training workshops create lifelong bonds that are essential for future business growth, creating a critical mass of successful, committed entrepreneurs who then become the driving force of the project. EMPRETEC also helps promising entrepreneurs build innovative and internationally competitive small and medium sized enterprises (SMEs). It encourages the formation of mutually beneficial business linkages among SMEs and large companies including with transnational corporations (TNCs).

Countries where EMPRETEC is in operation