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Monitoring Road Works Contracts and Unit Costs for Enhanced Governance in Sub-Saharan Africa

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TRANSPORT SECTOR BOARD

MONITORING ROAD WORKS CONTRACTS AND UNIT COSTS FOR ENHANCED GOVERNANCE IN SUB-SAHARAN AFRICA

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FOREWORD

Scaling up its support for governance and anticorruption, the World Bank aims to ensure that governance issues are addressed in all sectors where it is engaged. The identification of points where the sector is most vulnerable, and prevention of opportunities for corruption, are among key elements of the World Bank's governance and anticorruption strategy. The transport sector is increasingly targeting its efforts at developing strategies to improve governance and tackle corruption in its operations.

Measures have been taken to reduce the risks of corruption in project design and at each stage of the project cycle are applied across the transport units. A number of recommendations have already been developed to synthesize the dimension of sector corruption and identify potential corrupt activities in Bank-financed operations in the transport sector.

This study is intended to develop a list of quantitative indicators to recognize and track vulnerabilities to corruption in the roads projects funded by the Bank. It is based on the procurement and implementation of the road works contracts in Sub-Saharan Africa. The study develops a new cross-country database with information on bidding, costs, performance, and other details of the Bank-financed road works contracts. An inventory of risks is performed for each contract using a checklist of alert indicators or red flags, which were defined from the study database. The data analysis captures a pattern of indicators consistent with the presence of allegations of corruption. This is achieved through comparison of the indicators with the road works contracts that had complaints received by the Bank's Department of Institutional Integrity (INT) and other contracts in the sample.

While the findings of the study are specific to the road works contracts in Sub-Saharan Africa, the diagnostic methods developed to recognize and track vulnerabilities to corruption in the road sector could be applied across other countries and regions. As various other task teams have been already using these data, this unique dataset and indicators create an important platform addressing governance concerns in the road sector operations financed by the Bank.

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EXECUTIVE SUMMARY

A set of indicators is constructed to perform comparative assessments of the contract procurement and implementation processes in the road sector across 13 countries in Sub-Saharan Africa: Congo, Democratic Republic of Congo (DRC), Ethiopia, Ghana, Kenya, Malawi, Mauritania, Mozambique, Madagascar, Nigeria, Tanzania, Uganda, and Zambia. A new specialized dataset is generated for 109 road and bridge works contracts and 76 supervision consultancy contracts between 1999 and 2007 in 22 projects financed by the World Bank.

The road sector contracting of the Bank-financed projects in the reviewed countries is characterized by a limited number of firms dominating large-scale road works contracts. The market is split between the African firms and mainly the Chinese and European contractors. The largest contracts are generally awarded to the international contractors, in particular those from China.

The overall number of pre-qualified firms to bid for large works appears to be competitive (more than six firms on average), however, the actual participation in tenders is quite low—only about half of the pre-qualified firms bid. Nigeria and Ghana have the highest number of pre-qualified firms. In Nigeria, however, the number of bidders turns to be one of the lowest.

Costs

The African firms outperform the Chinese and European contractors in a number of indicators related to the procurement process but underperform in the implementation. For the African firms, the pattern shows a narrower average range between the contract values and their engineer's estimates, a shorter period to evaluate the bids and sign the contracts, and a higher level of competition. However, they lag behind on the indicators related to the implementation process incurring higher cost overruns and longer delays.

The African firms have a cost advantage over the Chinese and European firms. They are in a tight competition with the Chinese firms whose cost to implement road works of similar nature is almost the same. The average cost of road works carried out by the European contractors is considerably higher.This is perhaps a result of their higher initial management and overhead costs.

Supervision costs

There is a wide range of average cost of supervision per kilometer of similar road works across the countries. The cost to supervise a kilometer of an inter-urban road of the rehabilitation and reconstruction works is US$15,422 in Ghana, and US$28,153 in Kenya. In Nigeria, the average cost of supervision of an urban road is US$38,024.

Contract values and engineer's estimates

The bid prices sometimes exceed the engineer's estimates by an excessive margin. The values of a quarter of the road works contracts in the sample are 30 percent or higher than their estimated costs. These high bid rates are observed in each country in the sample, except Ghana. The contract values in Ghana are consistently lower than their engineer's estimates. This may be a result of fierce competition, which is traditionally observed in Ghana.

Red flags

The data are examined using a number of "red flags," that is alert indicators of potential presence of fraud and corruption at various stages of the project cycle. The benchmarks for the selected indicators have been proposed by the report team and jointly reviewed with the World Bank's Procurement Policy and Services Group (OPCPR).

The presence of red flags does not prove that corrupt or fraudulent practices take place in the procurement and implementation of a contract. Rather, it is a warning signal of a potential procurement and implementation problem that may justify further investigation. At the same time, the absence of red flags does not imply that fraud or corruption did not occur.

Selected red flags examined on the newly generated dataset of the road works contracts in Sub-Saharan Africa are:

- **Period between bid opening and contract signing dates is more than seven months;**
- **Cost increases by more than 20 percent during implementation;**
- **Time overrun is more than 30 percent of the originally contracted period;**
- **Contract value is more than 20 percent above its engineer's estimate;**
- **Half or more firms buying bidding documents do not bid;**
- **20 percent or more of pre-qualified firms do not bid;**
- **Difference between winning bid and next lowest bid is within 2 percent;**
- **Difference between contract price and read-out bidding price is more than 10 percent;**
- **Winning bid is not the lowest bid accepted for detailed examination;**
- **Only one or two bidders;**
- **Cost per km for similar work is higher than the 75th percentile.** For the four types of work included in the study (rehabilitation/reconstruction, upgrade to paved, re-graveling, and periodic maintenance) a statistical distribution was computed to determine the number of contracts with cost per km above the 75th percentile.
- **Unit Road Work Costs are higher than the 75th percentile.** For the unit costs included in the study a statistical distribution was computed to determine the number of contracts with unit costs above the 75th percentile (asphalt concrete, Portland cement concrete, gravel subbase, gravel base, crushed stone base, soft and hard earthworks).

Frequency of red flags in the reviewed road works contracts

The most frequent appearances of red flags reflect the overall trends in the procurement and implementation processes in the reviewed countries of Sub-Saharan Africa. The red flags with the highest frequency in road works contracts are: (i) period between bid opening and contract signing dates is more than 7 months; (ii) time overrun is more than 30 percent of the originally

contracted period; (iii) 20 percent or more of pre-qualified firms do not bid; and (iv) contract value is more than 20 percent above its engineer's estimate.

Pattern of red flags in contracts with complaints received by INT

The Department of Institutional Integrity (INT) received complaints on 14 contracts from the sample of 109 road works contracts (13 percent of total). The nature of complaints was mainly related to allegations of bidder collusion or bid rigging, paying bribes, and bidding irregularities.

The pattern of red flags in the contracts with complaints received by the INT slightly differs from the overall pattern observed across all the contracts in the sample. The most frequent red flags in the contracts with complaints received by the INT are (i) 20 percent or more of prequalified firms do not bid; (ii) period between bid opening and contract signing dates is more than 7 months; (iii) cost per kilometer for similar work is higher than the 75th percentile; and (iv) contract value is more than 20 percent above its engineer's estimate. The frequency of the "red flag" of time overrun of more than 30 percent from the originally contracted period is lower in the contracts with complaints received by the INT.

In comparison with other contracts in the sample, there appears to be a high number of red flags related to gravel among the road works unit costs in the contracts with complaints received by the INT. Other unit costs seem to repeat the trend observed across the road works contracts in the sample.

Recommended actions

The following selected recommendations are geared towards enhancing accountability and attaining a higher degree of control of corruption in Bank-financed projects in the road sector in Sub-Saharan Africa:

- **Consider establishing a tighter timeframe for contract signing.** The extensions of bid validity period within which the contract should be awarded, should be less flexible. The Bank's procurement guidelines should be followed more strictly. The guidelines provide for an extension of bid validity "if justified by exceptional circumstances" which could be requested for the minimum period required to complete evaluation, obtain the necessary approvals, and award the contract.[1] A delayed process of the contract enforcement could be to some extent a result of the weak roads management capacity, regulatory environment, and administrative burdens. However, this underlying inefficiency is also exacerbated by weak governance providing opportunities for corrupt practices and back-door negotiations.

- **Allow using a selection procedure of post-qualification instead of pre-qualification in bidding for large works.** Knowledge of other pre-qualified firms carries a potential risk of collusion. Also, other firms may choose not to bid due to a potential collusion of well-connected companies. This results in unfair competition and market manipulation. In order to facilitate bidder competition and avoid collusion, the proposal of road agencies to use post-qualification for contracts above the pre-qualification threshold values could be endorsed.

[1] World Bank 2006.*Guidelines: Procurement under IBRD Loans and IDA Credits*, Section II, Para 2.57. Washington, DC: http://go.worldbank.org/RPHUY0RFI0

- **Create a system to monitor and assess contractors' performance and associated costs of works.** Tracking of information on prime contractors in the road industry in the region could mitigate risks of misjudging on qualifications of firms as well as ensure due diligence on poor performers. The system could include a firm's profile, the number and values of contract awards, unit cost of works, satisfactory completion of the job, completion within the schedule, quality of works, and so on. This database could assist local road agencies to be more efficient in completing evaluations. The rankings of major contractors and consultants could identify strong performers who could be encouraged to bid or hired through direct contracting in case of emergencies. This registry would provide performance incentives as well as facilitate accountability.

- **Strengthen monitoring of the procurement and implementation processes to enhance detection of the risks to integrity.** A detailed record and information, if available in the World Bank system, could reduce incentives for firms and other entities to participate in collusion, bid rigging, and other corrupt practices. It is important to generate the data to increase accountability. This study could be replicated in other regions where the World Bank operates as it provides benchmarks and references against which individual projects performance or outcomes can be compared. It also establishes thresholds above which there may be causes for concerns or for further investigations.

1 INTRODUCTION: ADDRESSING CORRUPTION RISKS IN THE ROAD SECTOR

The new measures are emerging to strengthen integrity in the transport sector and to address sector-specific vulnerabilities to corruption**.** Operational practices are moving forward with more effective ways to address governance weaknesses in the design of road projects. The following are selected examples of such initiatives in the roads sector:

- The Paraguay road project team developed a set of alert indicators and red flags together with the Bank's Department of Institutional Integrity (INT) and offered a control framework to mitigate those risks in the road maintenance project.[2] The team received an Infrastructure Networks Anticorruption Award for incorporating innovative anticorruption elements into the project design.

- The Philippines program for the National Roads Improvement and Management (APL, Phase 2) embedded several anticorruption measures in the various project components and introduced safeguards to deal with collusion and bid-rigging. Specific measures include the computerization of procurement and contract management systems, upgrading of the civil works registry for processing of qualification information, a parallel independent procurement evaluation, the enhanced procurement controls to ensure the reliability of contract cost estimates; detection of over-pricing through bid analysis, enhancement of supervision control over contract variations, and dissemination of complaints mechanisms in bid documents. [3]

- In the Orissa State Roads Project of India, the anticorruption action plan is divided in three categories: (i) *preventing corruption,* through procurement reforms and business process reengineering in corruption prone sectors and service delivery institutions; (ii) *enforcement actions*, through establishment of internal vigilance units and new special courts to try corruption offences; and (iii) *citizen 'voice' and public awareness*, through provision of information to communities about their service delivery rights.[4]

- A roads project is being considered in Indonesia for which the proposed anticorruption plan would be based on the following pillars: (i) *enhanced disclosure*, through creation of a webpage on the official website of the implementing agency that provides monthly updated information on project activities; (ii) *civil society oversight,* through participation of representatives of civil society in public bid openings and other key procurement processes; (iii) *mitigation of collusion risks*, through tracking key indicators related to procurement and periodic analysis of bids; (iv) *mitigation of forgery and fraud risks*, through conducting regular interim audits by third parties; (v) *complaint handling system*, through monitoring of complaints and tracking status of investigations; and (vi) *sanctions and remedies*, through enforcement of sanctions and remedial actions.

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[2] World Bank. 2006. Project Appraisal Document for a Road Maintenance Project in Paraguay. Report No. 36421. Washington, DC: http://go.worldbank.org/4QY224PCT0

[3] World Bank.2008. Project Appraisal Document for Phase 2 of the National Roads Improvement and Management (APL) Program in the Republic of the Philippines. Report No. 40764. Washington, DC: http://go.worldbank.org/26MJ5YPFA0

[4] World Bank 2007. Project Information Document for Orissa State Roads Project. Washington, DC: http://go.worldbank.org/6GUYHR8AM0

An analytical framework was established to assess the risks of corruption in transport by Paterson and Chaudhuri.[5] The authors synthesize the dimension of the sector corruption, looking specifically at the types of corrupt activities prevalent in the transport sector, the state capture and administrative corruption in the road sector, the mechanics of transport corruption at the project and transaction level, and a preventive strategy for enhancing institutional integrity in transport. A detailed corruption mapping matrix was developed by the India transport team that guides through each step of the project cycle addressing chances of corruption and misuse of funds. The matrix identifies activities where corruption occurs throughout three main project stages: (i) planning and design, (ii) procurement, and (iii) project execution, contract administration, monitoring and evaluation. At each stage it evaluates opportunities for corruption and recommends remedies and appropriate sanctions. The matrix is incorporated in a guidance note for new projects in India.[6]

The current initiative seeks to develop a list of quantitative indicators to recognize and track vulnerabilities to corruption in the road sector projects of the Bank. The study is based on a new specialized dataset generated for the road sector contracts of Bank-financed projects in Sub-Saharan Africa. It is organized as follows: Chapter 2 describes the data and a set of indicators constructed to perform comparative assessments of the procurement and implementation processes across 13 African countries. Chapter 3 points out the trends in selected key indicators and performs an inventory of risks for each road works contract using a checklist of possible entry points of corrupt activities or red flags. Through comparison of the road works contracts that had complaints received by the Bank's Department of Institutional Integrity (INT) and other contracts in the sample, it examines if the data exhibit a pattern of indicators consistent with the presence of allegations of corruption or fraud. Chapter 4 looks at selected issues such as high bid rates, low response to invitation to bid, and cost and time overruns as they were addressed by the project implementing agencies. Chapter 5 provides selected recommendations to enhance accountability and control of corruption in the road projects financed by the World Bank.

[5] Paterson, W. D. O., and P. Chaudhuri.. 2007. *Making Inroads on Corruption in the Transport Sector through Control and Prevention*. In "The Many Faces of Corruption: Tracking Vulnerabilities at the Sector Level," ed. J. Edgardo Campos and Sanjay Pradhan. 295-334.Washington, DC: World Bank. http://go.worldbank.org/OZLE95YA50

[6] World Bank.2008. *Reducing Fiduciary Risk through Increased Transparency and Accountability.* A Guidance Note for New Projects in India. Washington, DC

2 NEW DATASET OF ROAD WORKS CONTRACTS OF BANK- FINANCED PROJECTS IN SUB-SAHARAN AFRICA

2.1 OBJECTIVES

The objectives of creating a new database are to establish a framework for cross-country comparisons of the procurement processes and implementation of road works contracts in Bank-funded projects, develop a set of alert indicators or red flags based on quantifiable criteria to recognize and track vulnerabilities to corruption in the roads sector, and facilitate measurement of the performance of road works contracting in projects financed by the Bank.

2.2 DESCRIPTION OF DATA

This specialized dataset is generated for the road sector contracts of Bank-financed projects in Sub-Saharan Africa. It is built upon the data gathered from the contracts procurement and implementation documentation of the roads projects in 13 countries: Congo, Democratic Republic of Congo (DRC), Ethiopia, Ghana, Kenya, Malawi, Mauritania, Mozambique, Madagascar, Nigeria, Tanzania, Uganda, and Zambia.

The data sample covers 109 roads and bridges works contracts and 76 supervision consultancy contracts between 1999 and 2007. This is a random sample of completed and on-going road sector contracts in Sub-Saharan Africa. The range of road and bridge works contract values is between US$595,518 (Congo) and US$58,436,429 (Kenya). The time value of contracts is standardized by firstly converting the contract amount into a US dollar amount based on the exchange rate of the date of contract signature, and then inflating this amount with reference to the US Consumer Price index (pro rata in the case of contracts signed in the course of a year). Contracts signed in 2007 are not adjusted further. The list of roads projects and the corresponding number of contracts reviewed for each country is presented in Table 2.1

2.3 MAIN VARIABLES

The dataset builds upon the Road Costs Knowledge System (ROCKS)[7] developed by the World Bank's Transport Unit and goes beyond its scope including more variables**.** In particular**,** it includes a more detailed bidding information covering separately contracts with a pre-qualification requirement and without pre-qualification, data on consultants supervising relevant road works contracts, and names and nationalities of bidders participating in tenders. It also adds such road works unit costs as single and double surface treatment (US$/$m^2$), and unit costs of subbase (gravel, crushed stone) and earthworks (soft, hard), both in US$/$m^3$. The present database also distinguishes between contract cost per km (contracted value), its estimated cost (generated by design engineer), and actual cost (taking into account variation orders).

The new database classifies roadwork activities into four main categories: rehabilitation/reconstruction, upgrade to paved, re-graveling, and periodic maintenance. The roads are divided into three types: inter-urban, urban, and rural access. This road characteristics method was adapted from the Africa Infrastructure Country Diagnostic Study (AICD).[8] A set of main variables and their characteristics is presented in Table 2.2.

[7] World Bank. Road Costs Knowledge System (ROCKS): http://go.worldbank.org/NJQG1ABB60

[8] World Bank.2008. *Evidence of Unit Costs of Infrastructure Projects in Sub Saharan Africa*

Table 2.1: List of road projects in Sub-Saharan Africa included in the study

Country	Year	Project ID	No. of Road and Bridge Works Contracts
Congo	2004-2005	P074006- Emergency Infrastructure Rehabilitation and Living Conditions Improvement Project	8
Ethiopia	1999-2001	P000755- Road Sector Development Program Support	3
	2004-2006	P044613- Road Sector Development Support Program Phase Two (RDSP) II (APL I)	6
	2006	P082998- Road Sector Development Support Program II (RSDSP II- APL 2)	2
Mauritania*	2003-2006	P069095- Urban Development Program	3
Zambia	1999-2003	P003236: Roads Sector Investment Program Support Project	8
Ghana	2000	P000957- Highway Sector Investment Programme (HSIP)	1
	2002-2006	P050623- Road Sector Development Programme (RSDP)	9
Malawi	2000-2005	P001666- Road Maintenance and Rehabilitation Project (ROMARP)	7
Mozambique	2004-2006	P001785- Roads and Bridges Management and Maintenance Program	10
Kenya	2006	P082615- Northern Corridor Transport Improvement Project (NCTIP)	4
Nigeria	2004-2006	P069901- Community-Based Urban Development Project	9
	2005	P074963- Lagos Urban Transport Project	5
Tanzania	2005	P078387- Central Transport Corridor Project	5
	2000-2002	P002770- Integrated Roads Project (02)/TANZANIA ROADS II	5
Uganda	2002	P057007- ELNINO Emergency Road Repair Project	1
	2007	P074079- Road Development Programme Phase III (RDDP III)	1
	2003-2004	P065436- Road Development Programme Phase II (RDDP II)	5
Congo (DRC)	2003-2006	P057296- Emergency Multisector Rehabilitation and Reconstruction Project	6
	2004-2005	P081850- Emergency Economic and Social Reunification Support Project	4
Madagascar	2004-2006	P082806- Transport Infrastructure Investment Project	5
	2007	P083351- Integrated Growth Poles	2
Total	1999-2007	22 Projects	109 Contracts

* Mauritania has limited data in the study

Table 2.2: Main variables of the monitoring road works contracts and unit costs study

ROAD WORKS COSTS (7m wide, 2 lane equivalent road)		
Type of work	**Function**	**Type of cost**
Rehabilitation and reconstruction	Inter-urban	Estimate cost (2007 US$/km)
Upgrade to paved	Urban	Contract cost (2007 US$/km)
Periodic maintenance	Rural access	Actual cost (2007 US$/km)
Re-gravel		

COSTS PER UNIT OF WORKS EXECUTED	
Constituent layer	**Type of layer**
Asphalt concrete (2007US$/ m^3)	
Portland cement concrete (2007US$/ m^3)	
Base (2007US$/$m^3$)	*Gravel, crushed stone, bituminous*
Sub-base (2007US$/ m^3)	*Gravel, crushed stone*
Earthworks (2007US$/ m^3)	*Soft, hard*
Surface treatment (2007US$/ m^2)	*Single, double*

BIDDING	
Contracts with Pre-qualification	**Contracts without Pre-qualification**
Number of applicants for pre-qualification Number of pre-qualified firms Number of firms buying bidding documents Number of bidders Number of bidders accepted for detailed examination in the evaluation process	Number of firms buying bidding documents Number of bidders Number of bidders accepted for detailed examination in the evaluation process
Bid amounts	
Name and nationalities of winning bidders	
Name and nationalities of bidders	

DATES
Bid opening date
Contract signing date
Delay in completion of works

SUPERVISION CONSULTANCY CONTRACTS
Names and nationalities of supervision consultants
Supervision contract value
Actual supervision contract value

2.4 METHODOLOGY

The dataset is analyzed by: (i) assessing the statistical trends; (ii) examining the red flags; and (iii) performing a comparative analysis.

Statistical trends

A set of indicators is constructed to perform comparative assessments of the contract procurement and implementation processes in the road sector across 13 countries in Sub-Saharan Africa. The trends are captured through the following indicators: (i) difference between contract values and their engineer's estimates, (ii) cost overruns; (iii) time overruns; (iv) bidding statistics for contracts with and without pre-qualification: number of firms that applied for pre-qualification, number of pre-qualified firms, number of firms that bought bidding documents, number of bidders, number of disqualified bidders; (v) time between bid opening and contract signing dates; (vi) cost per km for similar works; (vii) road works unit costs; (viii) cost per km of supervision consultants; and (ix) ratios between supervision contract values and relevant road works contract values.

This also includes the statistical trends assessed by the geographical group of contractors implementing the road works contracts financed by the Bank in the reviewed countries of Sub-Saharan Africa.

Examination of red flags

A set of alert indicators is developed to recognize and track vulnerabilities to corruption in the roads sector. The benchmarks for selected indicators for the road works contracts analysis have been proposed by the team and jointly reviewed with the Procurement Policy and Services Group (OPCPR).

The dataset is searched for the following indicators: (i) period between bid opening and contract signing dates is more than 7 months; (ii) cost increases by more than 20 percent during implementation; (iii) time overrun is more than 30 percent of the originally contracted period; (iv) contract value is more than 20 percent above its engineer's estimate; (v) half or more of firms buying bidding documents do not bid; (vi) 20 percent or more of pre-qualified firms do not bid; (vii) difference between winning bid and next lowest bid is within 2 percent; (viii) difference between contract price and read-out bidding price is more than 10 percent, (ix) winning bid is not the lowest bid accepted for detailed examination; (x) only one or two bidders; (xi) cost per km for similar work is higher than the 75^{th} percentile; and (xii) costs of selected road works units is higher than the 75^{th} percentile.

Comparative analysis

The analysis is based on the comparison of contracts with the red flags assigned to them. The contracts with complaints received by the Bank's Department of Institutional Integrity (INT) are examined separately to check if they exhibit a pattern of indicators consistent with the presence of allegations of corruption and fraud.

2.5 DATA SOURCES

The information and data were obtained from the following source documents and project information systems of the Bank:

Source Documents

- Bid Evaluation Reports
- Road Works Contracts
- Supervision Consultancy Contracts
- Progress Reports
- Variation Orders

Project Information Systems

- Client Connections
- Integrated Records Management System (IRIS3 and IRIS4)
- Projects and Operations Database/ Contracts Awards
- Archives and Document Management

When not all data sources were available, the data were also retrieved from the correspondence filed in IRIS. A detailed data collection manual was developed by Sachiko Gause; it presents a step-by-step guide of retrieving data on the Bank-financed road works contracts in the internal system of the Bank.[9]

2.6 OBSERVATIONS

The main documentation related to the procurement and implementation of the road works contracts is not always available in the information systems of the Bank. The bid evaluation reports (BERs) and signed road works contracts are not filed systematically in the Integrated Records Management System (IRIS). The system contains extensive project information and documentation; however, it is often difficult to retrieve both a bid evaluation report and a signed contract for the same section of road works.

The progress reports to monitor performance of contractors are often missing in the system. Only a small number of the revised road works contracts have the corresponding progress reports filed in the system, including the final progress report.

It seems that the recordkeeping practice across country offices in Sub-Saharan Africa is uneven. Many project documents are often filed manually in the country offices, as there are large documents to scan. Upon request it was possible to receive the documentation by pouch or get it partially scanned into the IRIS (for example, bill of quantities from a contract document). However, not all the offices could respond with a full set of requested documentation.

2.7 SUGGESTIONS FOR RECORDS MANAGEMENT

Some recommendations on improving the records management of road works contracts procurement and implementation documentation of the Bank-financed projects are provided below:

[9] Gause, S.2006. Road Sector Contract Cost Study Project: Anticorruption Initiative in Roads and Highways. World Bank. Washington, DC

- **The records management system of the Bank could be largely improved through a more systemized practice in filing contracts procurement and implementation documentation.** A separate subfolder/file could be created in the Integrated Records Management System (IRIS) to sort out documentation and correspondence related to large contracts or a package of contracts procured together. It would provide an easier and quicker access to contract-related materials to other transport teams for comparative assessments of costs, bidding information, contractors' performance, and so on. The lack of systemized method of recordkeeping also undermines the efficiency of investigative efforts of the Department of Institutional Integrity (INT). A detailed guide to improve the administration of the procurement and implementation documentation of road works contracts in the Bank's information systems was developed by S. Gause.[10] Also, outsourcing of records management and administration of Bank's documentation to private firms could be considered as an option to get a more reliable data filing.

- **The length of the road section (km) should always be indicated for road works contracts in the Bank electronic information system.** The electronic systems of the Bank do not always contain the length of roads of the awarded contracts, that is Business Warehouse, SAP, Client Connections, Contract Awards Search, and Operations portal. The only way to find the number of km of a road works contract is to look for a signed contract document. A time-consuming process to find and retrieve these data from contracts makes it impossible to keep track of the recent costs. As other procurement data such as contract value, bid opening data, date of contract signature, name and nationality of the contractor, type of road work (contract name) are already in the system, an extra data entry of road length would provide a basis to evaluate costs of road works financed by the Bank. It would be essential to either create a separate data column for the road length or indicate it in the name of the contract entered in the electronic system, for example "Bitumen surfacing of Asempaneye-Kushea feeder road, 12.7 km".

[10] Gause, S. 2006. Road Sector Contract Cost Study Project: Anticorruption Initiative in Roads and Highways. World Bank. Washington, DC

3 ANALYZING TRENDS AND KEY INDICATORS

This section examines the statistical trends and develops a checklist of possible entry points of corrupt activities or red flags based on the selected key indicators. An inventory of risks is performed for each road works contract using the checklist of red flags. The section looks at the frequency of presence of the different types of red flags in the sample and for each country. Based on the comparison of the road works contracts with complaints received by the Bank's Department of Institutional Integrity (INT) and other contracts in the sample, it examines if the data exhibit a pattern of indicators consistent with the presence of allegations of corruption or fraud.

3.1 STATISTICAL TRENDS

The statistical trends are captured on the contract procurement and implementation data. The indicators are selected throughout the entire project cycle covering the design, contract procurement and implementation, and supervision processes.

Engineer's estimate and contracted price

A number of the road works contract values exceed their engineer's estimates by a large margin of 30 percent and above in the reviewed sample. The highest difference between the engineer's estimates and the contracted price is observed in Mozambique at 99.3 percent; it has also the highest average of 46.5 percent in comparison with other reviewed countries. On average, the contracts are 24.8 percent higher than their engineer's estimates in Uganda, and around 22 percent in Ethiopia, Nigeria, and the Democratic Republic of Congo (DRC). Only the contract values in Ghana are consistently lower than their estimated costs by 9.2 percent on average (Figure 3.1). This may be a result of fierce competition, which is traditionally observed in Ghana. The difference between the engineer's estimates and the contracted values varies significantly across and within the countries. Some differences could be attributable to the quality of the engineer's cost estimates that may have substantial shortcomings (for example, quantity, anticipated duration of work). Sometimes a cost estimation specialist may be located far away from the country and make cost estimates solely based on the design documents (drawings, BOQs, and specifications).

Cost overruns

Contract cost increase during implementation is considerably higher in some of the countries in the sample. The highest cost overruns are observed in Nigeria, where the contracts increased their original value by 39.7 percent on average during implementation. The average cost overruns in Ghana are 34 percent, where one contract increased its value by 86 percent. The cost increases for Mozambique and Tanzania are around 18 percent (Figure 3.2). No cost overruns are observed in the reviewed contracts of Ethiopia (where four out of nine contracts are still under implementation), Uganda (one out of seven is under implementation), and Kenya (all four are completed). All cost overruns reported here are based on variation orders and exclude price escalation.

Figure 3.1: Difference between contract values and engineer's estimates, averages and ranges

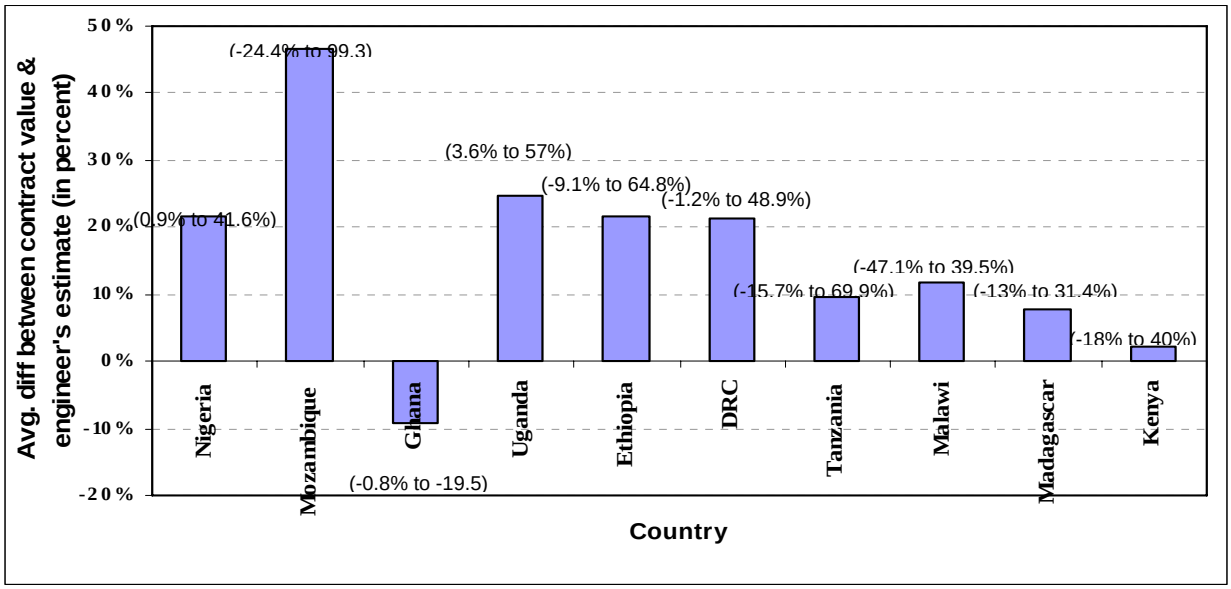
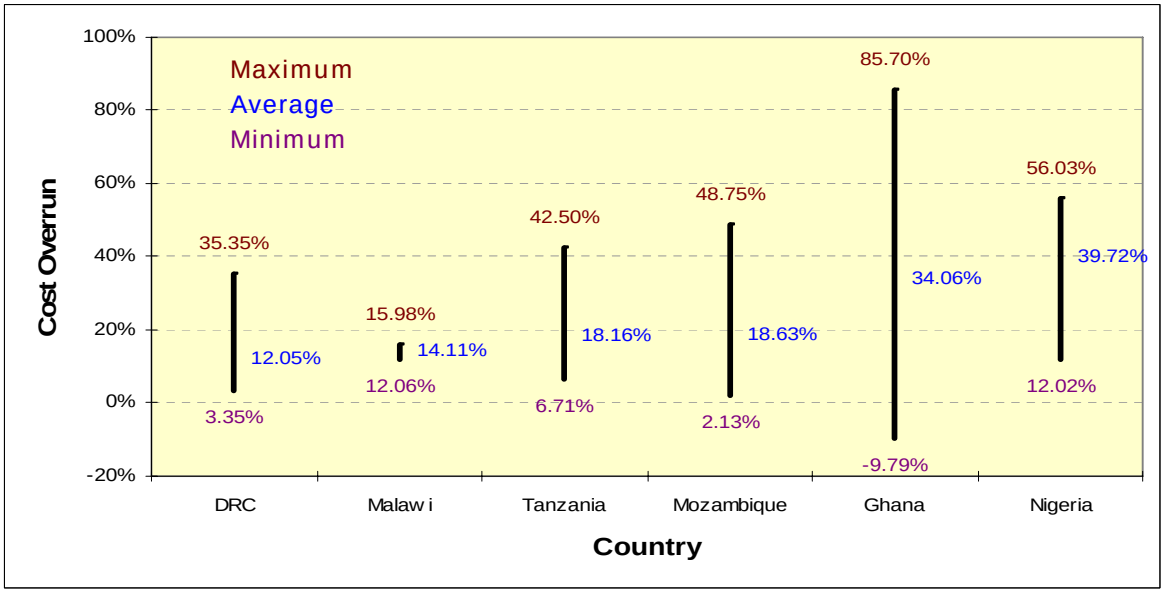


Figure 3.2: Cost overruns, averages and ranges by country



Cost overruns vary across the countries. Table 3.1 shows the percentage of contracts with cost increases of more than 15 percent during implementation, which is the threshold requiring official no-objection letter from the Bank. The highest number of contracts with cost overruns is in Nigeria where almost 43 percent of all the reviewed contracts increased their value by more than 15 percent. Mozambique and Ghana had cost overruns in 30 percent of the reviewed contracts for these countries. The magnitude of cost overruns in these traditional ad-measurement contracts that ranges on average between 15 percent and 25 percent could be a strong incentive to use lump-sum performance-based contracts.

Table 3.1: Percentage of contracts with cost overruns of more than 15 percent, by country

Country	Total Number of Contracts	Number of Contracts with more than 15% Cost Overrun
Nigeria	14	6
Mozambique	10	3
Ghana	10	3
Madagascar	7	2
Tanzania	10	1
Congo (DRC)	10	1
Malawi	7	1
Zambia	8	1

Estimated Costs, Contracted Price, and Cost Overruns

A pattern of cost recovery during implementation is not certain when the contract values are lower than their engineer's estimates. In Ghana, where the contract values are generally lower than their engineer's estimates, only one contract had a cost overrun among these contracts. In Tanzania, three contracts that are lower than their estimates by 3.9 percent, 4.2 percent and 15.7 percent have increased in cost by 14.4 percent, 12.2 percent and 42.5 percent respectively. The high costs overruns are sometimes observed in the contracts, which were awarded at high values compared to their estimates. As observed in Mozambique and Nigeria, a number of such contracts increased their cost significantly during implementation. Figure 3.3 shows the difference between the road works contract values and their engineer's estimates for selected countries, and the observed increase in cost during implementation in these contracts.

Time overruns

The delays in completion of work could reach up to a year and half. Nigeria and the Democratic Republic of Congo (DRC) have the longest extensions of time to complete the road works of about a year and a half. Ghana and Mozambique have an average delay of around a year. Kenya has all 4 reviewed contracts completed on time (Figure 3.4). While time overruns are common, some countries have longer delays than the others in the sample. It also could be a result of factors such as underestimation of the initial works schedule prescribed in the bid documents due to the reality of custom clearance, equipment availability, the length of rainy season, the adverse works conditions, availability of materials in the area. The design documents (drawings and BOQ) may not always correctly reflect the actual site conditions. Delays in landlocked countries may be aggravated by slower speed of mobilization (for example, initial import of equipment) and works execution/implementation (for example, import of various materials, spare parts).

Figure 3.3: Difference between contract values and engineer's estimates, and cost overruns

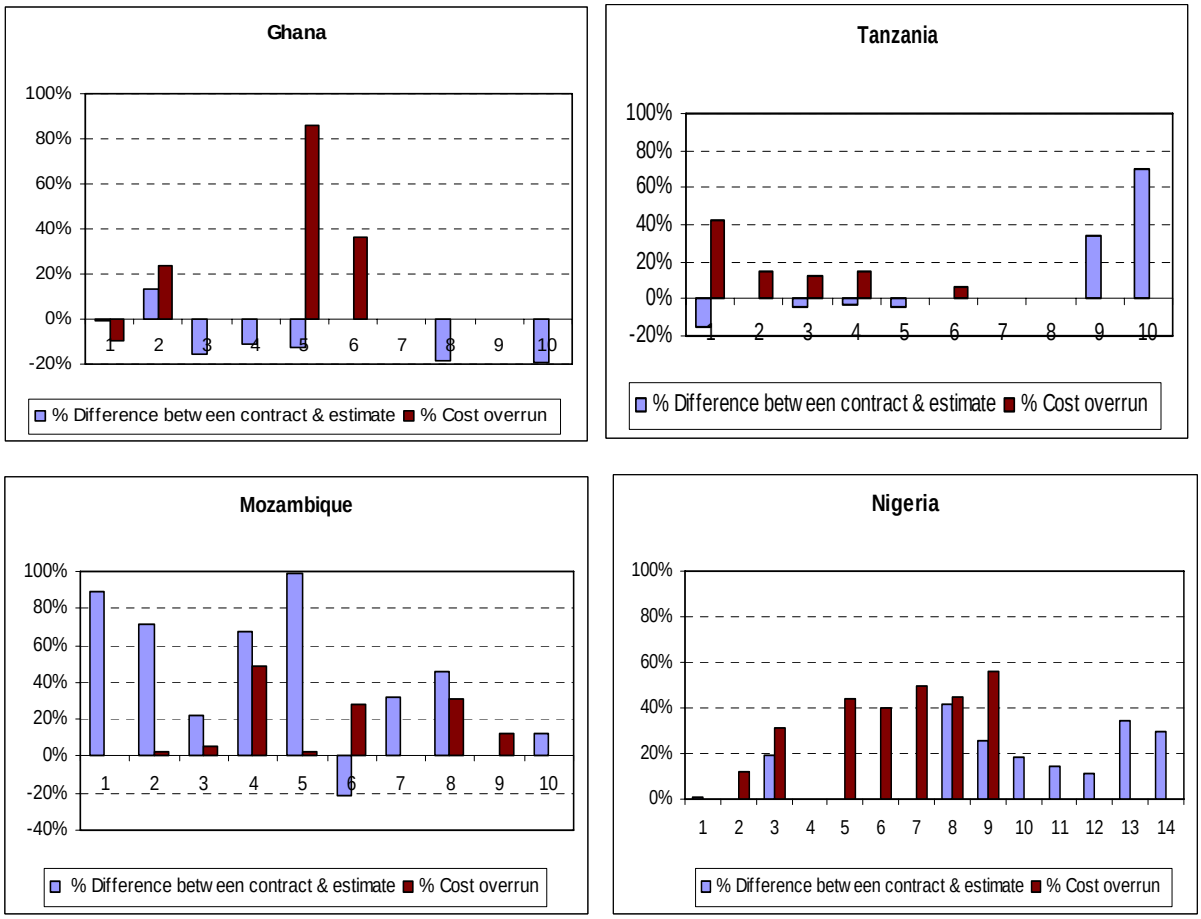
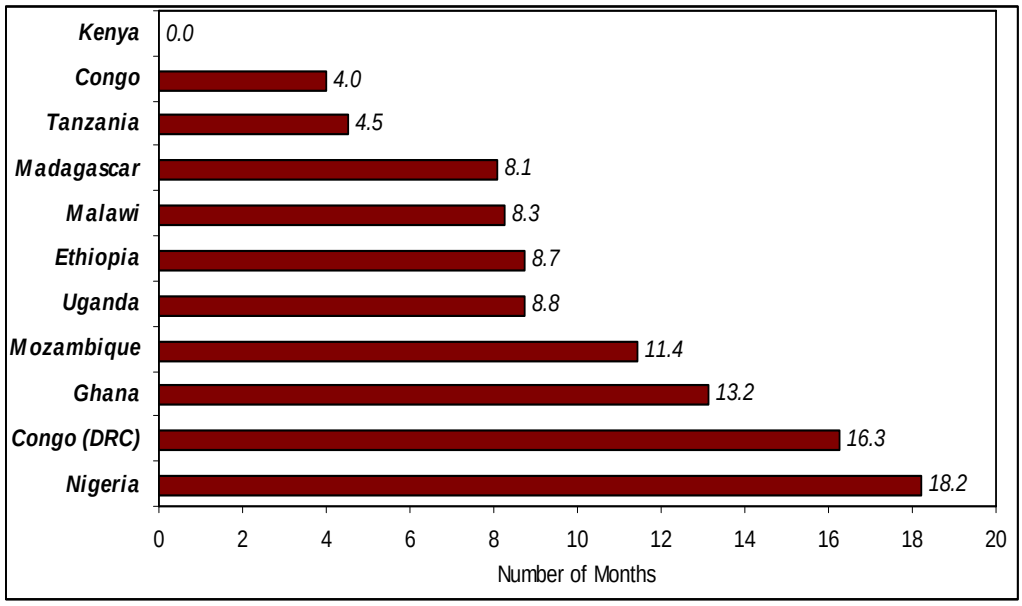


Figure 3.4: Average delay in completion of work in months, by country



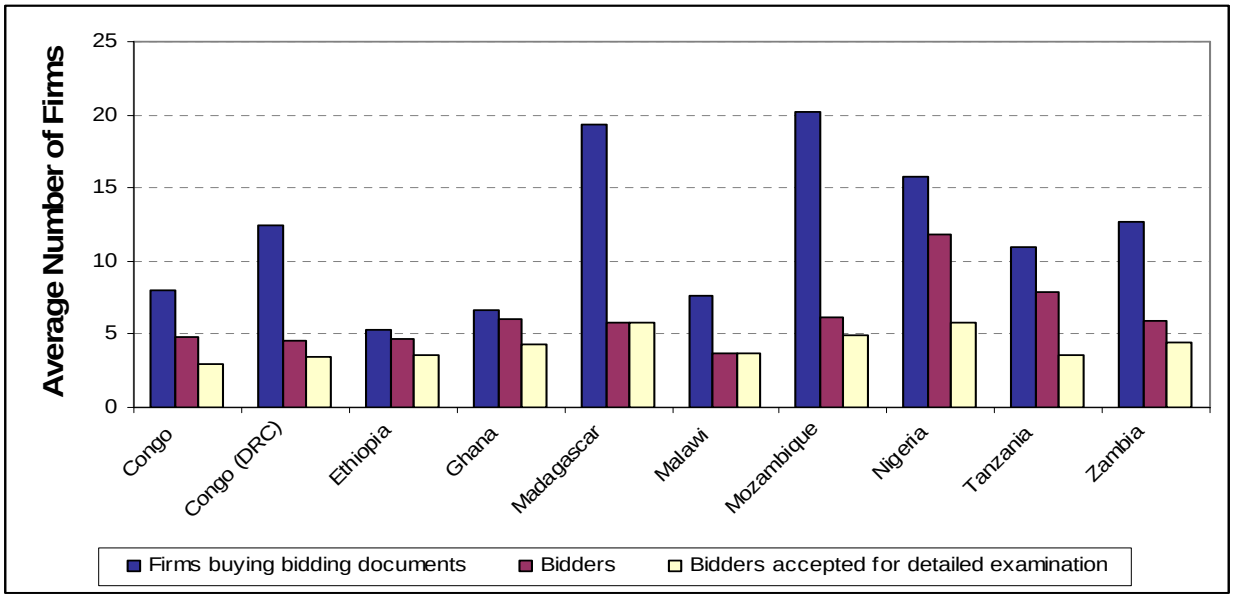
Bidding phase

A detailed analysis of the bidding process is carried out to compare the road works contracts between 13 countries. The bidding data are separately examined for the contracts with pre-qualification and the contracts without pre-qualification. The range of values for the reviewed contracts without pre-qualification is between $595,518 (Congo) and $41,719,780[11] (Ethiopia); the range of values for the revised contracts with pre-qualification is $3,713,589 (Nigeria) and $58,436,492 (Kenya).

Contracts without pre-qualification

Half or more firms buying bidding documents do not bid in the reviewed contracts in Mozambique, Madagascar, DRC, Zambia, and Malawi. In other countries this difference is smaller. Nigeria and Tanzania have a higher number of bidders compared to the average for other countries. At the same time, almost half of the bidders are getting disqualified during the bid evaluation process in these two countries. The number of firms that purchase bidding documents is the highest in Mozambique and Madagascar with 19-20 firms; however, only around 5-6 firms bid (Figure 3.5).

Figure 3.5: Average number of firms buying bidding documents, bidders, and bidders accepted for detailed examination, by country



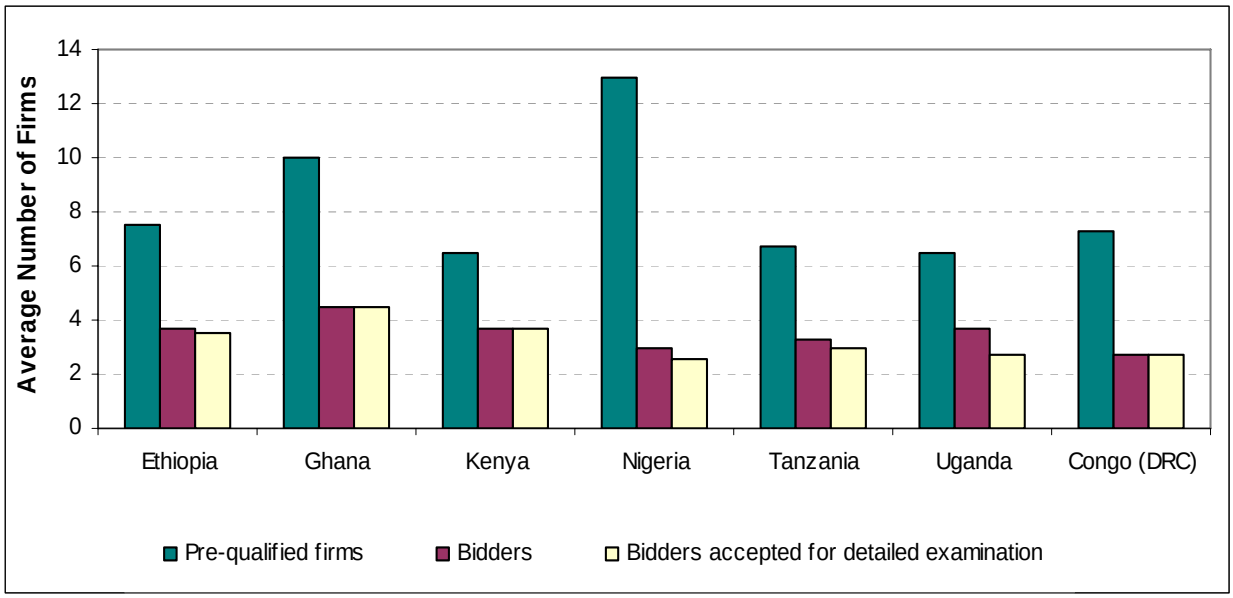
Contracts with pre-qualification

About half of the pre-qualified firms do not bid. **This trend is observed in all the reviewed countries. Only half of the pre-qualified firms participate in tenders. Nigeria and Ghana have the highest number of pre-qualified firms. In Nigeria, however, the number of bidders turns to be one of the lowest. In the process of bid evaluation, Uganda, Nigeria, and**

[11] Two contracts in Ethiopia were re-tendered without a pre-qualification requirement. The initial tender was with pre-qualification, however, the lowest evaluated price was found to be far higher than the engineer's estimate, and it was decided to re-tender the contracts.

Tanzania tend to disqualify some of their pre-qualified bidders. In other countries almost all the bidders are accepted for detailed examination (Figure 3.6).

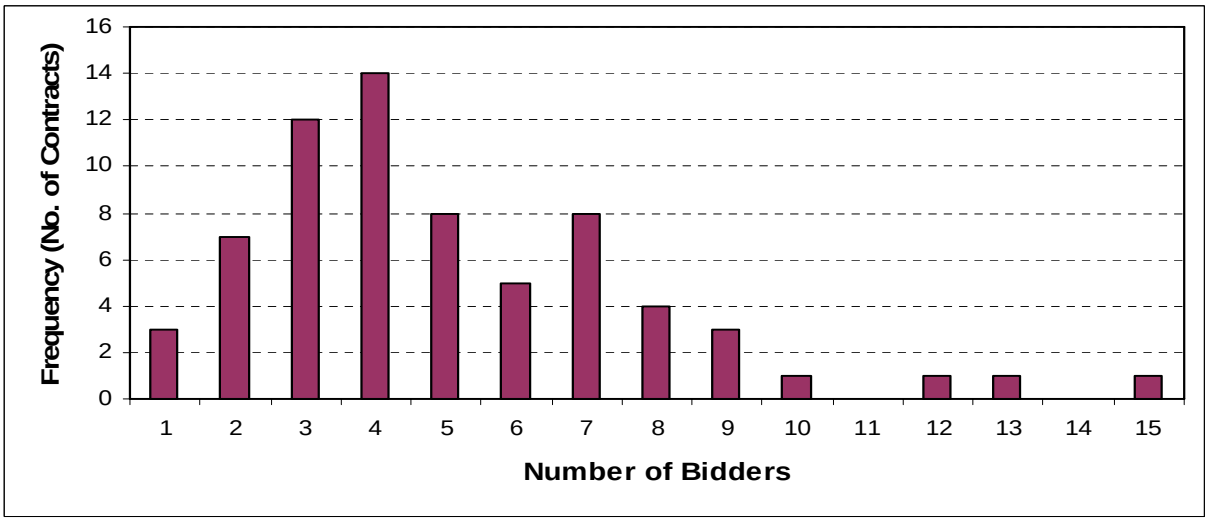
Figure 3.6: Average number of pre-qualified firms, bidders, and bidders accepted for detailed examination, by country



Distribution of bidders in 109 road works contracts

Three to four bidders most commonly bid in the reviewed sample of road works contracts. The number of contracts with one or two bidders is 10 out of 109 (9 percent). In four contracts the number of bidders were between 10 and 15 (Figure 3.7).

Figure 3.7: Distribution of the number of bidders by contracts



Time between bid opening and contract signing dates

The extensions of the original bid validity period seem to be a norm. Only the DRC, Congo, and Madagascar have the contracts awarded within the original period of validity of bids that is 90 or 120 days for the reviewed contracts in the sample. In Kenya and Uganda it takes almost a year, on average, to award the contracts (Table 3.2). This time gap between bid opening and contracts signing dates could be further disaggregated into (i) the time required for the Bank to issue no-objection, and (ii) the time actually spent solely by the project implementing agency. This breakdown of time would provide an important indicator for the analysis.

Table 3.2: Time Elapsed between bid opening and contract signing dates by country (109 contracts)

	Average period between bid opening and contract signing dates (days)
Congo (DRC)	71.2
Congo	88.8
Madagascar	88.8
Nigeria	144.7
Ghana	153.1
Zambia	187.9
Ethiopia	207.4
Mozambique	220.6
Tanzania	253.7
Malawi	261.5
Uganda	326.3
Kenya	348.0

Costs

Costs per km are calculated for a 2-lane 7m -wide road equivalent and disaggregated by the type of work (rehabilitation/reconstruction, upgrade to paved, re-gravel, and periodic maintenance) and the type of road (inter-urban, urban and rural access). The reviewed roads works had mainly the following surface types:

(i) Asphalt mix;
(ii) Asphalt mix & single treatment;
(iii) Asphalt base and single treatment;
(iv) Asphalt mix and bituminous base;
(v) Bituminous surface treatment;
(vi) Double surface treatment;
(vii) Single surface treatment;
(viii) Single treatment/Otta seal;
(ix) Asphalt mix and asphalt base;
(x) Gravel.

A wider range of the average costs per km is observed for the re-gravel and periodic maintenance works; the range is relatively narrower for the upgrade to paved and rehabilitation/reconstruction works. The summary statistics for the average costs per km for inter-urban roads is presented in Table 3.3.

Table 3.3: Cost per km of a 2-lane road by type of work for inter-urban roads (2007 US$/km)

Type of work	Q1	Mean	Q3
Re-gravel	28,877	66,270	83,973
Rehabilitation/Reconstruction	221,823	397,899	450,801
Periodic maintenance	78,065	133,135	183,838
Upgrade to paved	296,516	360,071	403,830

The countries compare well with each other in cost of the road works of similar nature, except for Kenya**. The average cost for the rehabilitation and reconstruction works is particularly high in Kenya in comparison to other countries in the sample (Table 3.4). The data for Kenya in the sample are restricted to four contracts for rehabilitation/reconstruction on the inter-urban roads with an asphalt mix pavement course and bituminous base. The periodic maintenance works in Mozambique cost twice as high as in Zambia for the asphalt mix surface roads.**

Table 3.4: Average cost per km of a 2-lane road by type of work and type of road, by country (2007US$/km)

A. Rehabilitation and reconstruction: inter-urban and urban roads

Rehabilitation & reconstruction (2007 US$/km)		
Country	*Inter-urban*	*Urban*
Congo (DRC)	228,872	
Ethiopia	388,207	
Ghana	261,052	
Kenya	955,755	
Mozambique	278,661	
Malawi	420,838	
Nigeria	329,909	1,505,480

B. Re-gravel: inter-urban road

Re-gravel (2007 US$/km)	
Country	*Inter-urban*
Congo	68,094
Congo (DRC)	65,750
Madagascar	54,602
Zambia	25,005

C. Upgrade to paved: inter-urban and rural roads

Upgrade to paved (2007 US$/km)		
Country	*Inter-urban*	*Rural*
Ethiopia	322,373	
Ghana		114,566
Malawi		56,874
Tanzania	348,209	
Uganda	420,220	

Table 3.4 (continued): Average cost per km of a 2-lane road by type of work and type of road, by country (2007US$/km)

D. Periodic maintenance: inter-urban road

Periodic maintenance (2007 US$/km)	
Country	*Inter-urban*
Madagascar	104,992
Mozambique	197,086
Zambia	87,946

Road works unit costs

Large variations are observed in the costs of road works units across the countries in the sample**. The unit costs in the Democratic Republic of Congo are consistently high throughout the different types of road works units (Table 3.5).**

Table 3.5: Average unit costs by country (2007 US$)

A. Asphalt concrete and Portland cement concrete

	Asphalt concrete (US$/ m^3)	***Portland cement concrete (US$/ m^3)***
Congo (DRC)	275.9	
Ethiopia	131.2	200.2
Ghana	139.2	108.6
Kenya	180.0	170.7
Madagascar	146.2	191.9
Mozambique	154.4	160.6
Malawi	220.6	136.3
Nigeria	290.2	
Tanzania	182.8	177.8
Zambia	172.6	
Mauritania	212.3	

B. Base course

	Gravel base (US$/ m^3)	***Crushed stone base (US$/ m^3)***
Congo		67.5
Congo (DRC)	54.1	62.6
Ethiopia	9.3	25.5
Ghana	6.0	32.2
Madagascar	9.2	31.7
Mozambique	7.1	
Malawi	9.3	39.4
Tanzania		36.7
Uganda	10.1	51.1
Zambia	12.2	

Table 3.5 (continued): Average unit costs by country (2007 US$)

C. Subbase course

	Gravel subbase (US$ / m^3)	*Crushed stone subbase (US$ / m^3)*
Congo (DRC)	23.5	
Ethiopia	13.5	20.1
Ghana	6.2	
Kenya	9.0	28.0
Madagascar	12.4	
Mozambique	7.0	
Malawi	7.3	
Nigeria	8.8	
Tanzania	12.9	
Uganda	8.9	
Zambia	11.5	

D. Earthworks

	Soft earthworks (US$ / m^3)	*Hard earthworks (US$ / m^3)*
Congo	4.6	
Congo (DRC)	5.3	48.4
Ethiopia	3.9	12.7
Ghana	3.0	
Kenya	7.7	15.8
Madagascar	5.5	
Mozambique	5.1	26.0
Malawi	9.4	
Tanzania	3.8	21.3
Uganda	5.3	
Zambia	5.7	
Mauritania	3.3	

C. Surface treatment

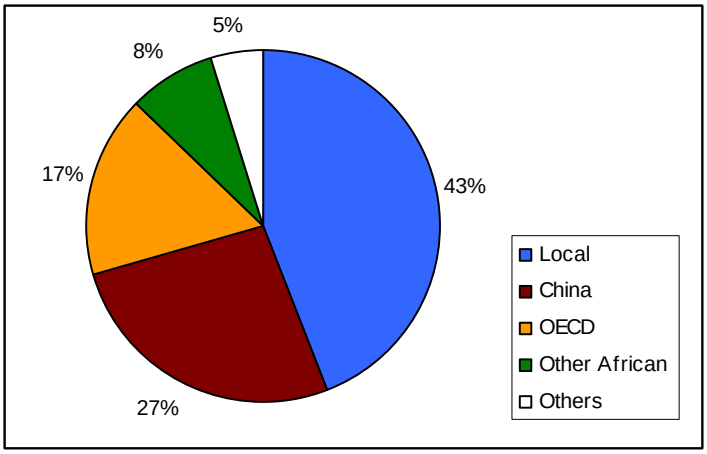
	Double surface treatment (US$ / m^2)	*Single surface treatment (US$ / m^2)*
Congo (DRC)	5.9	3.5
Ethiopia	3.7	
Madagascar		4.8
Mozambique	3.1	1.8
Malawi	3.9	1.3
Nigeria	5.7	3.3
Tanzania	3.2	2.5
Uganda	5.5	

Contractors

Geographical groups of contractors

The roads contracting of the Bank-financed projects in the reviewed countries of Sub-Saharan Africa is mainly split between the African firms (51 percent) and the Chinese and European firms (44 percent). The African local firms get the largest number of the Bank-financed road works contracts in their own countries (43 percent). They are followed by the Chinese firms (27 percent) and the European firms (17 percent) in the share of the road works contracts awarded by the World Bank (Figure 3.8).

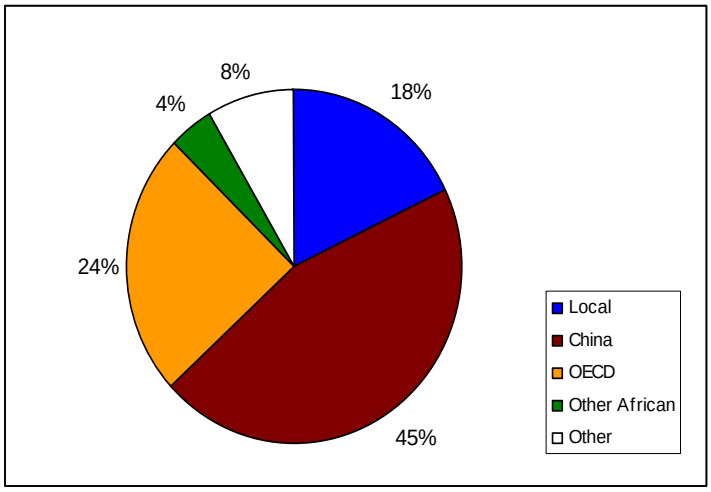
Figure 3.8: Percentage of contracts by geographical group



Size of contracts

The Chinese firms dominate with the contracts of higher values in the sample. They have the largest share of 45 percent of the total value of the road works contracts sample (total US$1,499,032,406). It is almost a double share compared to the European firms (24 percent) and the African firms (22 percent), as shown in Figure 3.9.

Figure 3.9: Share of total amounts of contracts awarded by geographical group



Leading contractors

The leading contractors are the China Road and Bridge Corporation "China", the SBI Holdings International "the Netherlands", and the Synohydro Corporation "China". They carried out the highest number of the Bank-financed road works contracts with the largest share of total values (Table 3.6).The total of road works contract values in the sample is US$ 1,499,032,406.

Table 3.6: Leading contractors by awarded contract totals

Name of Contractor	Nationality	Total amount of contracts signed (2007 US$)	Share of contract values to sample total	Number of road works contracts
China Road & Bridge Corp.	China	279,292,361	18.6%	7
SBI Holdings International	Netherlands	179,958,706	12.0%	6
Sinohydro Corporation	China	174,563,485	11.6%	8
China Henan International Corp.	China	93,543,637	6.2%	6

Statistical trends by geographical groups of contractors

The African firms outperform the Chinese and European contractors in a number of the indicators related to the procurement process but underperform in the implementation. For the African firms, the pattern shows a narrower average range between the contract values and their estimates, a shorter period to evaluate the bids and sign the contracts, and a higher level of competition. However, they lag behind on the indicators related to the implementation process, that is, they incur higher cost overruns and longer delays (Table 3.7).

Table 3.7: Statistical averages by geographical groups

	Difference between contract value and cost estimates (%)	Days between bid opening and contracts signing (days)	Number of bidders	Cost overruns amount (% increase)	Delays (months)
Local	14.7	152	5.6	25.0	13.1
China	21.6	253	4.8	15.4	8.8
OECD	21.5	215	4.8	22.7	11.3
Other African	9.7	184	5.3	22.7	8.4
Others	2.9	91	6.4		

Cost per km by geographical groups of contractors

The African firms have a cost advantage over the Chinese and European firms in the sample. They are in a tight competition with the Chinese firms with almost the same cost to implement road works of similar nature. The average cost of road works carried out by the European contractors is considerably higher (Table 3.8). This is perhaps a result of their higher initial management and overhead costs.

Table 3.8: Cost per km of a 2-lane road by geographical group and type of work (2007 US$)

	Rehabilitation and reconstruction		Re-gravel	Upgrade to paved		Periodic maintenance
	Inter-urban	Urban	Inter-urban	Inter-urban	Rural Access	Inter-urban
Local	333,003	1,632,225	59,473		105,587	
China	357,866			361,167		98,414
OECD	568,817			398,681		137,152
Other African			28,216	285,868		

Unit costs by geographical groups

The rates for different types of unit costs vary without a particular trend with regards to the geographical group of contractors. The Chinese contractors have among the cheapest rates for asphalt concrete, which is comparatively very expensive in the works inputs of the local firms. The contractors other than from Africa, China, and Europe have consistently lower costs across the selected units of road works (Table 3.9).

Table 3.9: Average unit costs by geographical groups of contractors (2007 US$)

	Asphalt concrete ($/m^3)	***Portland cement concrete ($/m^3)***
Local	249.0	144.3
China	158.5	170.1
OECD	174.3	159.6
Other African	179.9	263.8
Others	129.0	168.7
	Base gravel ($/m^3)	***Base crushed stone ($/m^3)***
Local	10.6	44.6
China	11.9	34.4
OECD	7.6	50.7
Other African		28.3
Others		27.1
	Subbase gravel ($/m^3)	***Subbase crushed stone ($/m^3)***
Local	10.5	18.5
China	11.8	19.7
OECD	7.5	28.0
Other African	16.6	
Others	10.1	
	Soft earthworks ($/m^3)	***Hard earthworks ($/m^3)***
Local	5.7	14.4
China	5.0	17.8
OECD	5.3	27.7
Other African	4.3	

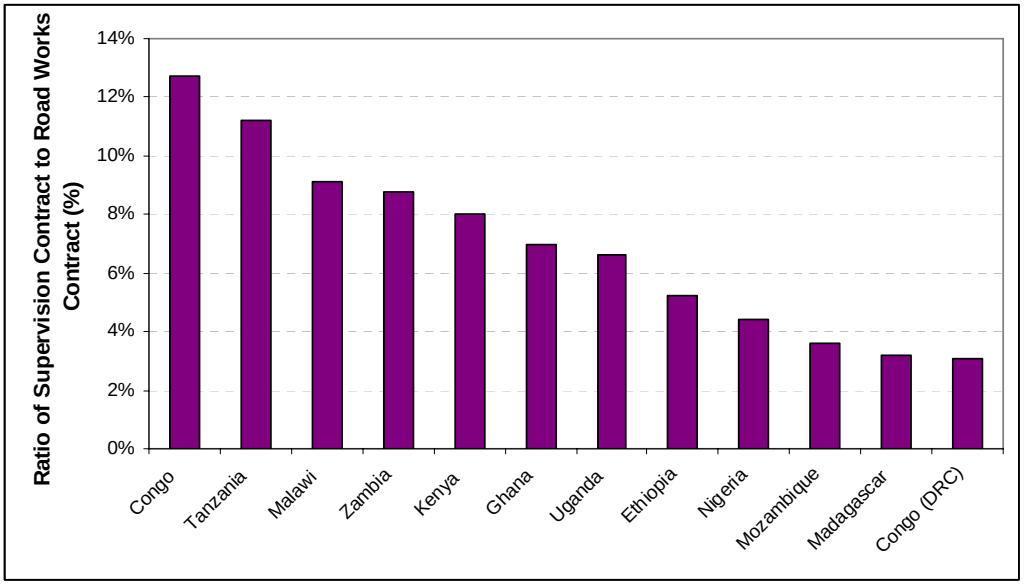
Others	3.4	
	Double surface treatment ($/m²)	***Single surface treatment ($/m²)***
Local	4.3	4.2
China	4.5	3.7
OECD	4.7	2.2
Other African		1.6
Others		

Supervision costs

Supervision contract values

The ratios of supervision contract values are within 3-13 percent range of their relevant road works contract values in the reviewed countries. The lowest ratios of less than 4 percent are observed in the DRC, Madagascar, and Mozambique. The ratios of more than 10 percent are in the Republic of Congo and Tanzania (Figure 3.10).

Figure 3.10: Ratio of supervision contract value to road works contract value



Supervision cost of road construction

There is a wide range of average cost of supervision per kilometer of similar road works across the countries. The cost to supervise a kilometer of the rehabilitation and reconstruction works on an inter-urban road is US$15,422 in Ghana and US$28,153 in Kenya. In Nigeria, the average cost of supervision per kilometer of an urban road is US$38,024 (Table 3.10)

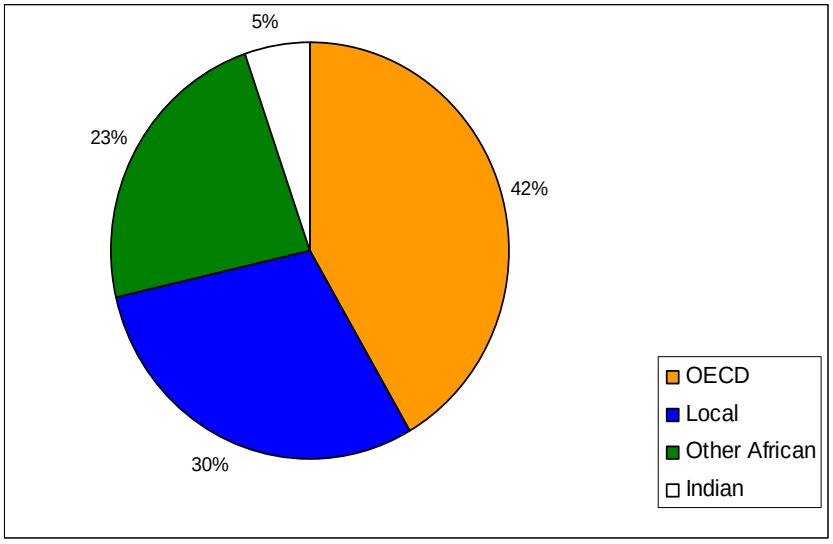
Table 3.10: Average cost of supervision per km of a 2-lane road by country (2007 US$)

	Type of work	Type of road	Cost per km(US$/km)
Congo	Re-gravel	Inter-urban	7,820
Congo (DRC)	Re-gravel	Inter-urban	1,063
Ethiopia	Rehabilitation and reconstruction	Inter-urban	15,741
	Upgrade to paved	Inter-urban	18,076
Tanzania	Upgrade to paved	Inter-urban	14,456
Ghana	Rehabilitation and reconstruction	Inter-urban	15,422
Kenya	Rehabilitation and reconstruction	Inter-urban	28,153
Malawi	Upgrade to paved	Rural Access	2,255
Mozambique	Rehabilitation and reconstruction	Inter-urban	9,701
	Periodic maintenance	Inter-urban	7,006
Nigeria	Rehabilitation and reconstruction	Inter-urban	16,458
		Urban	38,024
Uganda	Upgrade to paved	Inter-urban	22,076

Geographical groups of supervision contractors

The supervision consultancy firms in the sample are mostly from Africa and Europe. The local firms and firms from other African countries share half of the supervision consultancy services (53 percent) with the European firms (42 percent). These also include joint ventures registered in the country. The remaining 5 percent in the sample are from India (Figure 3.11).

Figure 3.11: Percentage of supervision contracts by geographical group



The leading consultancy firms in the reviewed sample are; BCEOM Societe Francaise D'Ingenierie "France", GAUFF Ingenieure "Germany", and the BKS Global Ltd "South Africa". They were awarded the highest number of supervision consultancy contracts (Table 3.11).

Table 3.11: Leading supervision consultants

Name of supervision contractor	Nationality	Number of contracts
BCEOM Societe Francaise D'Ingenierie	France	6
GAUFF Ingenieure	Germany	5
BKS Global Ltd	South Africa	4

3.3 EXAMINATION OF 'RED FLAGS'

This section looks at the "red flags," or alert indicators of the potential entry points of corrupt activities in the procurement of road sector projects. The examples of red flags are compiled from various sources.

Overview of red flags in procurement of road sector contracts

The red flags in the procurement of road sector contracts are applicable to the procurement processes in general. The integrity of the procurement process could be undermined by certain schemes that are similar across countries and across different sectors. These include bribes and kickbacks, bid rigging, using front or shell companies, misrepresentation of facts, as well as embezzlement and misuse of public assets.[12] Some of the patterns or red flags that signal the potential existence of these schemes in some way are detailed below**:**

Bribes and kickbacks:

- Existence of "local agents" that provide generic services and add no obvious value to the performance of the contrac;t
- Close personal relations between the parties involved in procurement or contract execution;
- Bidding irregularities in favor of a small group of contractors.

Bid rigging:

- All bids submitted are substantially higher than the unit costs estimates or contract cost estimate;
- Unreasonable prequalification requirements;
- A winning bidder subcontracts part of the contracted works to a losing bidder;
- There is a wide gap between a winning bid and other bids, or bid prices vary one from another by the same increment;
- Qualified bidders do not bid while applying to pre-qualify (a potential sign of coercion).

Use of front or shell companies

- New or unknown companies serve as subcontractors on a project;
- The subcontractor have opaque ownership structure and lacks visible corporate facilities;
- Frequent visits of government officials at company headquarters.

[12] Ware, G. T., S. Moss, J. E. Campos, and G. P. Noone. 2007. *Corruption in Public Procurement: A Perennial Challenge*.. In The Many Faces of Corruption: Tracking Vulnerabilities at the Sector Level. Ed. J. Edgardo Campos and Sanjay Pradhan, 295-334. Washington, DC: World Bank. http://go.worldbank.org/OZLE95YA50

The examples of patterns or red flags identified for each stage of the project cycle are presented below:[13]

Project Identification and Design:

- Overestimated goods and services and over-dimensioned project components;
- Manipulated project design tailored to benefit a particular provider;
- Inflated cost estimates.

Bidding Stage

- Improper or insufficiently advertised tender;
- Directed or biased technical specifications;
- Unreasonable delays in evaluating the bids and selecting the winner;
- Same bidders repeatedly participate, or same bidder repeatedly wins;
- Weak explanations of disqualification of the lowest bidder;
- Unit prices in competing bids are identical, proportional, or vary substantially.

Implementation and Supervision

- Contract specifications or scope of work are altered after the award of the contract;
- Delays in the delivery of goods and services;
- Lower than specified quality or quantity;
- High number of change orders to the contract;
- Cost overruns inadequately explained or justified.

Box 3.1 contains a number of red flags developed by the Federal Highway Administration of the U.S. Department of Transportation to detect collusive practices and bid rigging in highway construction contracts.

[13] Paterson, W. D. O., and P. Chaudhuri. 2007. "Making Inroads on Corruption in the Transport Sector through Control and Prevention." In *The Many Faces of Corruption: Tracking Vulnerabilities at the Sector Level*, ed. J. Edgardo Campos and Sanjay Pradhan, 159-189. Washington, DC: World Bank.
http://go.worldbank.org/OZLE95YA50
World Bank.2007. Corruption Warning Signs: Is Your Project at Risk? Good Practices in Latin America and the Caribbean. Washington, DC

Box 3.1: Detection of collusion and bid rigging in highway construction contracts

In an effort to detect and prevent contract bid rigging in highway construction contracts, the Federal Highway Administration of the U.S. Department of Transportation identifies the following bidding patterns that indicated collusion in the past:

- Failure of qualified bidders to bid;
- Certain contractors repeatedly bid against one another or, conversely, certain contractors do not bid against one another;
- The successful bidder repeatedly subcontracts work to companies that submitted higher bids on the same projects or that picked up bid packages but did not submit bids;
- Different groups of contractors appear to specialize in federal, state, or local jobs exclusively;
- An unusual disparity in front-end or lump sum payment items among the bidders;
- A particular contractor always winning in a certain geographical area;
- Contractors who bid frequently, but never win;
- Identical bid amounts on a contract line item by two or more contractors. Some instances of identical line item bids are explainable, as suppliers often quote the same prices to several bidders. But a large number of identical bids, or identical bids on any service-related item, should be viewed critically;
- Contractors previously convicted of bid rigging in other states who are operating in the state under review;
- Joint venture bids where either contractor could have bid individually as a prime;
- Failure of original bidders to re-bid, or an identical ranking of the same bidders upon re-bidding, where original bids were rejected for being too far over estimate;
- Discrepancies in similar line items bid by a given firm on different projects in the same general area at the same letting or on comparable projects at different lettings within a relatively short time period.

Source: U.S. Department of Transportation. Suggestions for the Detection and Prevention of Construction Contract Bid Rigging. The Interdepartmental Bid Rigging Investigations Coordinating Committee, Federal Highway Administration, http://www.fhwa.dot.gov/programadmin/contracts/dotjbid.cfm

Selection of red flags for the analysis

The data is examined using a number of "red flags," that is, alert indicators of potential presence of fraud and corruption at various stages of the project cycle or. The benchmarks for the selected indicators have been proposed by the team and jointly reviewed with the World Bank's Procurement Policy and Services Group (OPCPR).

Types of red flags for the analysis

The following selected red flags are examined in the newly generated dataset of the road works contracts in Sub-Saharan Africa:

- **Period between bid opening and contract signing dates is more than seven months;**
- **Cost increases by more than 20 percent during implementation;**
- **Time overrun is more than 30 percent of the originally contracted period;**
- **Contract value is more than 20 percent above its engineer's estimate;**
- **Half or more firms buying bidding documents do not bid;**
- **20 percent or more of pre-qualified firms do not bid;**
- **Difference between winning bid and next lowest bid is within 2 percent;**

- **Difference between contract price and read-out bidding price is more than 10 percent;**

- **Winning bid is not the lowest bid accepted for detailed examination;**

- **Only one or two bidders;**

- **Cost per km for similar work is higher than the 75th percentile.** For the four types of work included in the study (rehabilitation/reconstruction, upgrade to paved, re-graveling, and periodic maintenance) a statistical distribution was computed to determine the number of contracts with cost per km above the 75th percentile.

- **Unit road work costs are higher than the 75th percentile.** For the unit costs included in the study a statistical distribution was computed to determine the number of contracts with unit costs above the 75th percentile (asphalt concrete, Portland cement concrete, gravel subbase, gravel base, crushed stone base, soft and hard earthworks).

3.4 COMPARATIVE ANALYSIS

An inventory of risks is performed for each road works contract using a checklist of red flags. The frequency of the different types of red flags is revealed for each country in the database as well as for the whole set of the reviewed contracts. The data are examined if a pattern of indicators consistent with the presence of allegations of corruption or fraud emerges in the sample by comparing the road works contracts with complaints received by the Bank's Department of Institutional Integrity (INT) and other road works contracts.[14]

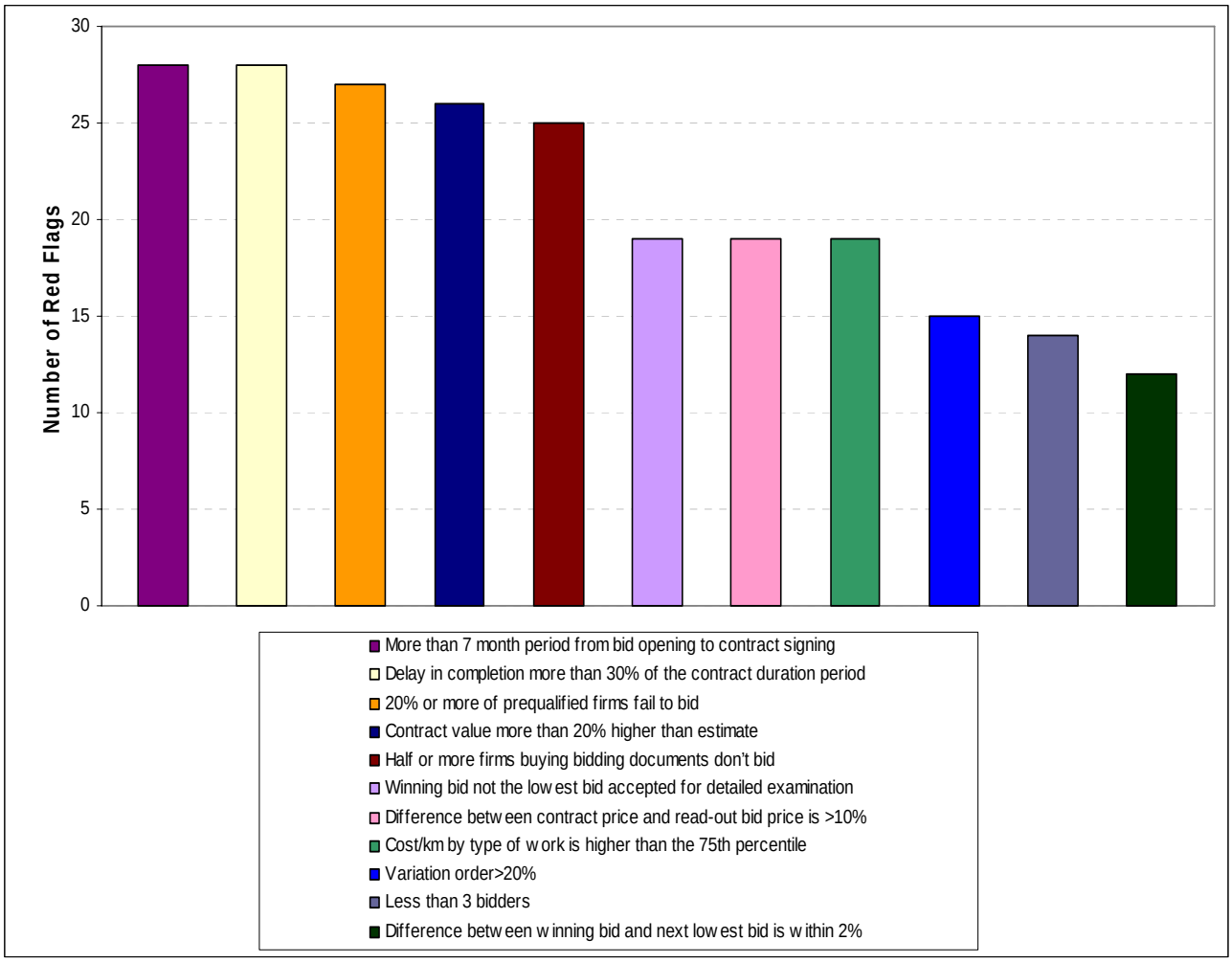
The presence of red flags does not prove that corrupt or fraudulent practices take place in the procurement and implementation of a contract. Rather, it is a warning signal of a potential procurement and implementation problem that may justify further investigation. At the same time, the absence of red flags does not imply that fraud or corruption did not occur.

Frequency of red flags in the reviewed road works contracts

The most frequent appearances of red flags reflect the overall trends in the procurement and implementation processes in the reviewed countries. The red flags with the highest frequency in the road works contracts are: (i) period between bid opening and contract signing dates is more than 7 months; (ii) time overrun is more than 30 percent of the originally contracted period; (iii) 20 percent or more of pre-qualified firms do not bid; and (iv) contract value is more than 20 percent above its engineer's estimate (Figure 3.12).The "red flag" of half or more firms buying bidding documents do not bid in the contracts without pre-qualification also occurs often largely reflecting the trends observed only in DRC, Madagascar, Mozambique, Zambia, and Malawi as shown in Figure 3.5.

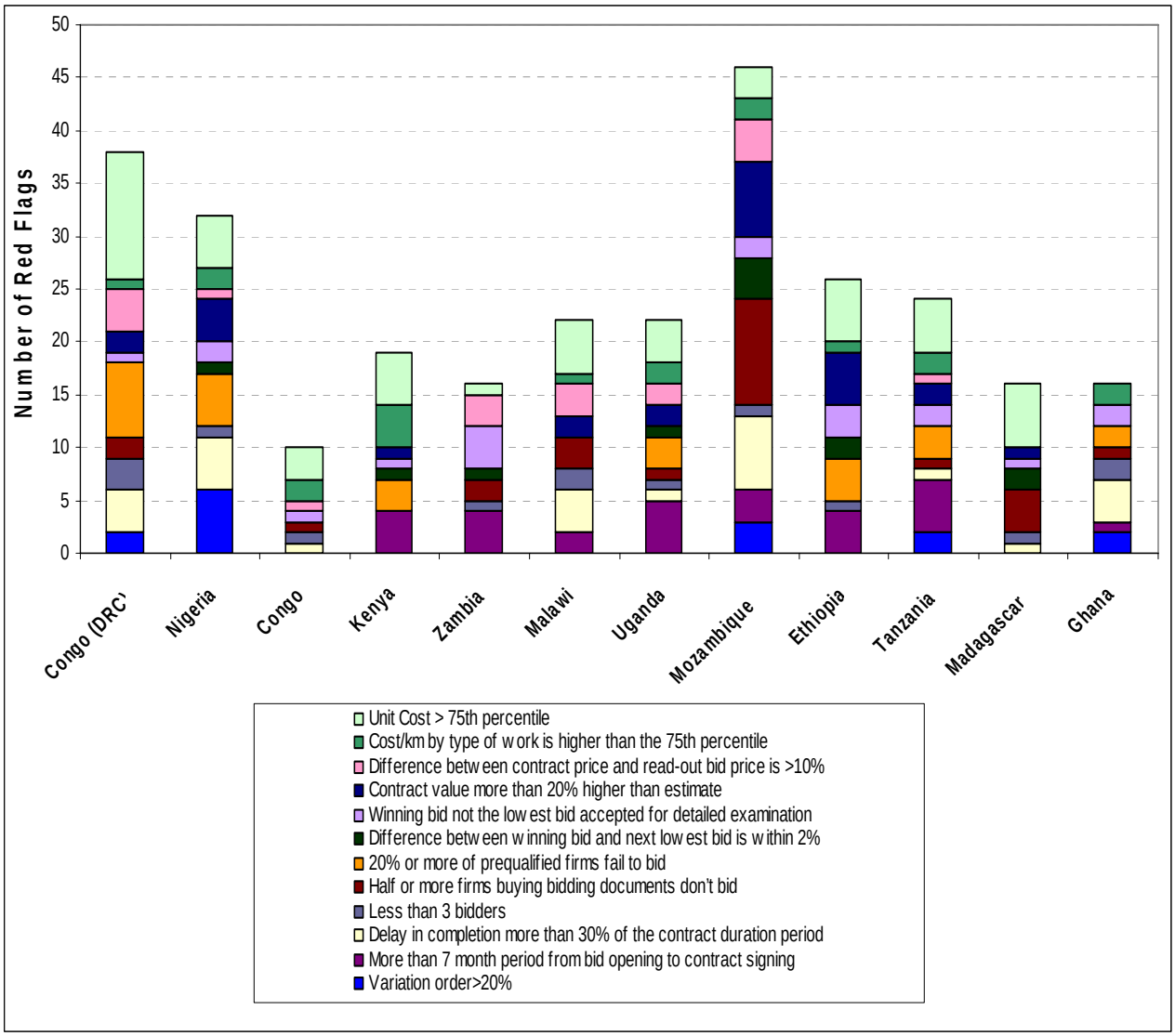
[14] The comparative analysis builds upon the methodology used by the Department of Institutional Integrity (INT) in the Detailed Implementation Review: India Health Sector, 2006-2007.

Figure 3.12: Frequency of different types of red flags in the sample (109 contracts)



The red flags are distributed unevenly across the reviewed countries. Each type of the "red flag" may signal some procurement and implementation irregularities as well as inefficiency or weak implementation capacity. Figure 3.13 presents the most commonly observed weaknesses in the procurement and implementation processes in the reviewed countries. The number of road works contracts for each country in the sample is as follows: Nigeria (14); Ethiopia (11); Mozambique, Ghana, Tanzania, DRC (10); Congo, Zambia (8); Uganda, Malawi, Madagascar (7), and Kenya (4).

Figure 3.13: Frequency of types of red flags, by country

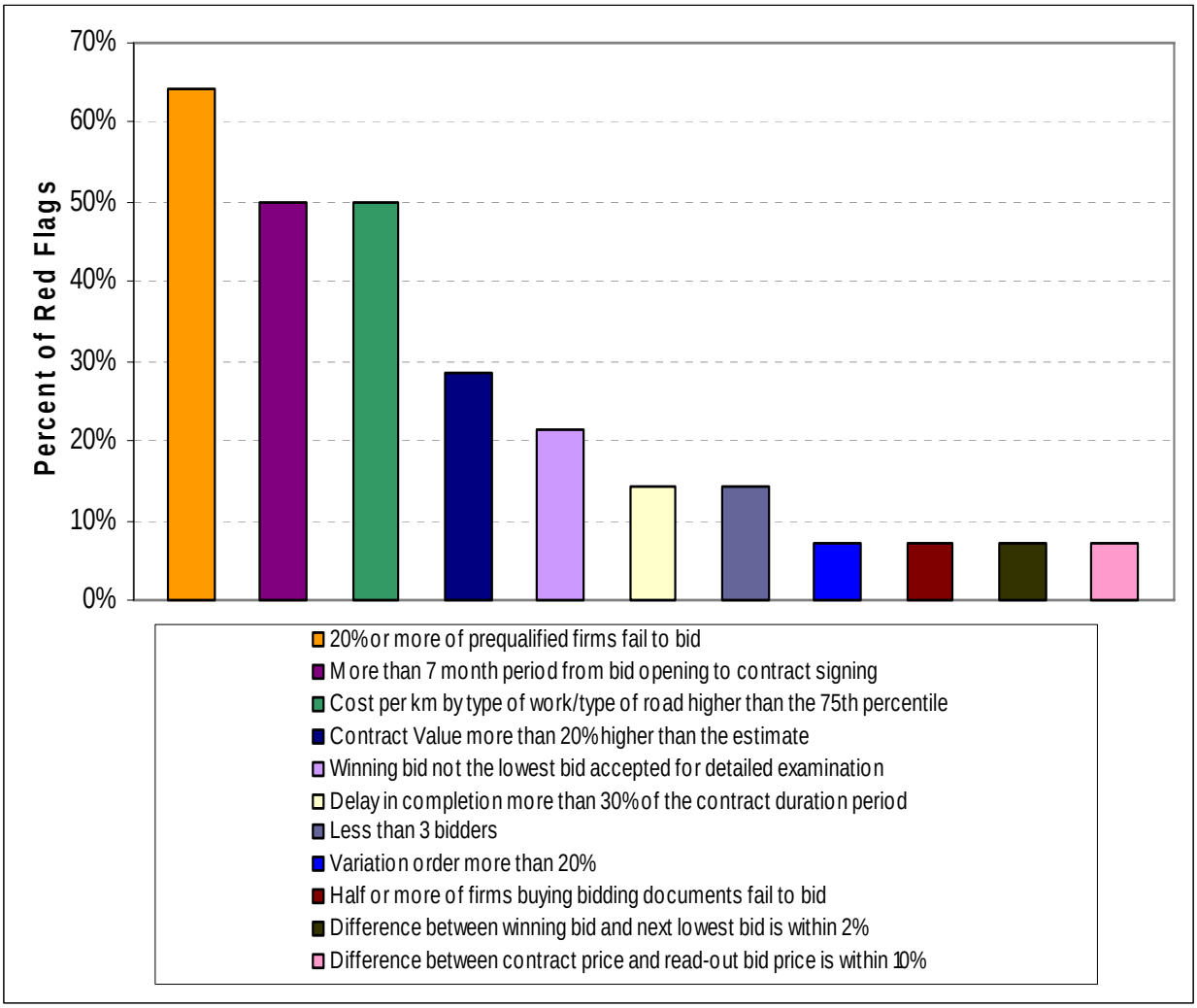


Pattern of red flags in the contracts with complaints received by INT

The Department of Institutional Integrity (INT) received complaints on 14 contracts from the sample of 109 road works contracts (13 percent of total). The nature of complaints was mainly related to allegations of bidder collusion or bid rigging, paying bribes, and bidding irregularities.

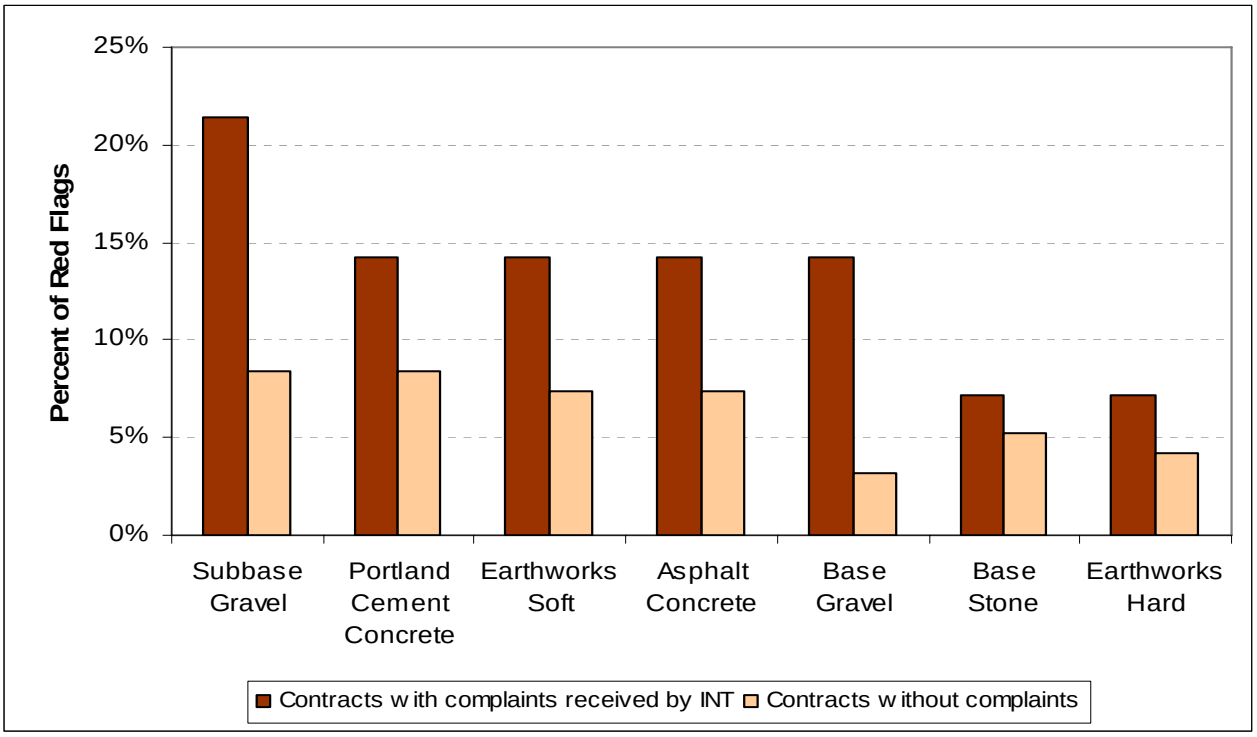
The pattern of red flags in the contracts with complaints received by the INT slightly differs from the overall pattern observed across all the contracts in the sample. The most frequent red flags in the contracts with complaints received by the INT are (i) 20 percent or more of prequalified firms do not bid; (ii) period between bid opening and contract signing dates is more than 7 months; (iii) cost per kilometer for similar work is higher than the 75th percentile; and (iv) contract value is more than 20 percent above its engineer's estimate. The frequency of the "red flag" of time overrun of more than 30 percent from the originally contracted period is lower in the contracts with complaints received by the INT (Figure 3.14).

Figure 3.14: Pattern of types of red flags in the contracts with complaints received by INT



In comparison to other contracts in the sample, there appears to be a high number of red flags related to gravel among the road works unit costs in the contracts with complaints received by the INT. Other unit costs seem to repeat the trend observed across the road works contracts in the sample (Figure 3.15).

Figure 3.15: Frequency of red flags for unit costs in the contracts with complaints received by INT in comparison with other contracts in the sample



WBI Governance Indicators: index for control of corruption

The red flags capture potential weak governance environment and risks to integrity. They may also reflect the inefficiency of the procurement and implementation processes. Figure 3.16 presents the number of red flags assigned to each country normalized by the number of contracts reviewed (in each country). Figure 3.16 also includes the WBI governance index for control of corruption.[15]

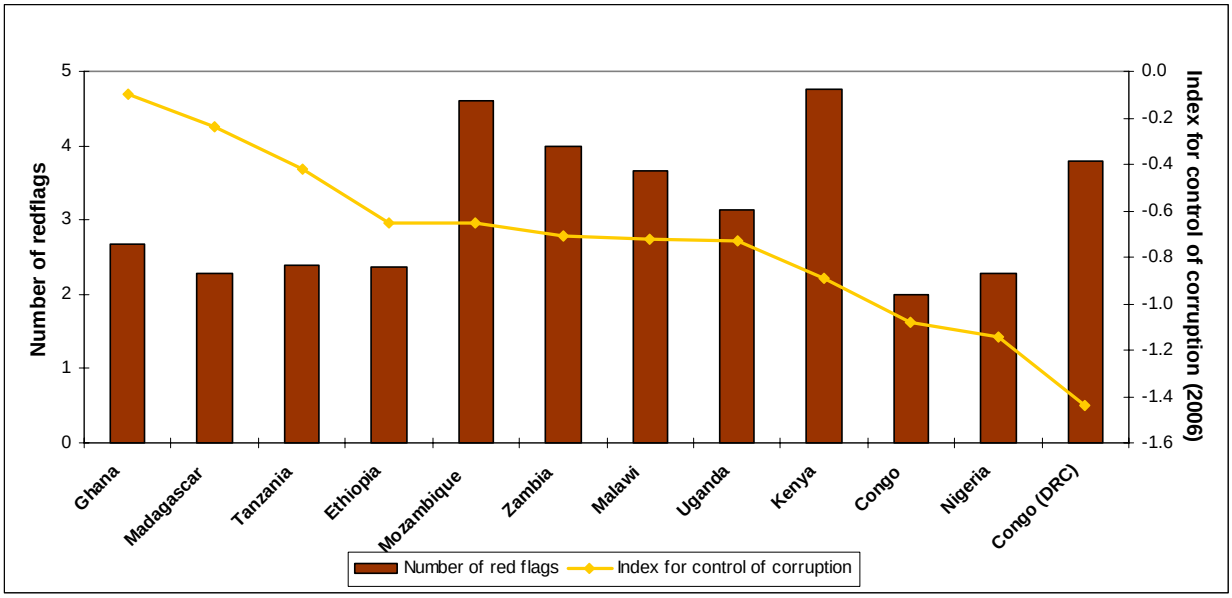
The WBI Control of Corruption Index measures the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.[16]

Probably due to the limited size of the sample of contracts reviewed, no correlation between the normalized number of red flags and the WBI Index was observed at this stage.

[15] World Bank. The Worldwide Governance Indicators, 1996-2006. http://info.worldbank.org/governance/wgi2007/

[16] Governance Matters 2008: http://info.worldbank.org/governance/wgi/pdf/WBI_GovInd08-5a.pdf

Figure 3.16: Control of Corruption Index and number of red flags normalized by number of reviewed contracts per country



3.5 COSTS ANALYSIS

This section summarizes an attempt to identify parameters that may influence unit costs outside of the project. We investigate possible relationships between unit cost and the quality of governance in the country as well as other indicators such as GDP and fuel costs. For this we use a simple OLS regression model expressed as follows:

$$Y = a_0 + a_1 GDP\ per\ capita + a_2\ Fuel\ Cost + a_3\ Governance\ Index + e$$

where Y represents the dependent variable (unit cost of selected road work type), a_i's are the coefficients of independent variables and *e* is the error term, that is, the part left out unexplained by the independent variables.

The dependent variable in the analysis is the unit cost of selected road work type. The work activities selected from the sample on the basis of available data, and studied here, are:

- Asphalt concrete;
- Portland cement concrete;
- Gravel subbase;
- Earthworks soft material

The explanatory variables that were used in the model are:

- GDP per capita in 2006 (constant 2000 US$)[17] is expected to provide a general idea about the current economic state of a country;

[17] Source: World Bank data (WDI Indicators)

- Fuel costs (price of diesel oil in 2006 in the United States of America in cents per liter) [18] is expected to explain a large part of project cost in road projects (for example, transport and bitumen costs);
- World Bank's Governance Indices (Control of Corruption 2006)[19] is an estimate of governance measured on a scale from approximately -2.5 to 2.5. Higher values correspond to better governance;
- Transparency International's Corruption Perceptions Index (CPI)[20] relates to perceptions of the degree of corruption as seen by business people and country analysts, and ranges between 10 (highly clean) and 0 (highly corrupt).

The overall effects of the regression have been summed up in Table 3.12. More details are given in Annex C.

Table 3.12: Factors influencing unit costs - summary of results

	Asphalt concrete	**Portland cement concrete**	**Gravel subbase**	**Soft earthworks**
GDP per capita	Significant (positive)		Significant (negative)	
Fuel price 2007				Significant (positive)
Control of Corruption	Significant (negative)		Significant (negative)	
TI Corruption Perceptions Index	Significant (negative)	Significant (negative)	Significant (negative)	

The quality of governance is shown to be a significant factor on the unit costs for asphalt concrete, Portland cement concrete and gravel subbase. The effect is not significant for earthworks (soft materials). The limited sample size does not allow for a more sophisticated analysis using more parameters. The overall results of the model might come out more significant if we increase the sample size and include more countries (within Africa as well as other regions) and contracts in the analysis.

[18] Source: http://www.gtz.de/de/dokumente/en-international-fuelprices-final2007.pdf

[19] Source: http://info.worldbank.org/governance/wgi2007/

[20] Source: http://www.transparency.org/policy_research/surveys_indices/cpi/2007

4 WHAT DRIVES ROAD CONSTRUCTION COSTS: ISSUES ADDRESSED BY PROJECT IMPLEMENTING AGENCIES

This chapter looks at selected issues, such as high bid rates, low response to invitation to bid, and cost overruns as they were addressed by the agencies administering contracts under the reviewed roads projects. While the implementing agencies are responsible for the procurement, award, administration and implementation of Bank-financed contracts, the Bank's role is to ensure that the procurement process is carried out in accordance with the agreed procedures. The Bank's requirements are generally guided by four considerations: economy and efficiency, open competition, development of domestic contracting and manufacturing industries, and transparency in the procurement process.[21] While ensuring that established detailed procedures and procurement rules are followed in the implementation of a project, the Bank aims to ensure that contracts are procured and executed diligently and efficiently. In this respect, if there are issues that could affect adversely the fulfillment of these objectives, the Bank requests the project implementing agency to address them before giving the 'no objection.'

4.1 REASONS FOR HIGH BIDS

Some contracts have a particularly high difference between the estimated costs of road works and prices offered by the lowest evaluated bidders. While many cost estimates have been revised and updated by the implementing agencies for comparison with the lowest evaluated price, some differences still remained high for several contracts. The implementing agencies have addressed this issue in the bid evaluation reports. Possible reasons that could explain high bids observed across the reviewed countries of Sub-Saharan Africa include:

- **The effect of increase in prices of fuel, power, materials, and equipment on major cost items of contracts**. Primarily as a result of oil price increases, prices for diesel, bitumen, and other key items are rising significantly. An example of evaluation of such effect on a contract's cost items is contained in Box 4.1.
- **A fixed price contract that is not subject to price adjustment.** As the contracts are fixed sum contracts that do not allow for variation, it is possible that the bidders make projections for any increase in price.[22] In a contract in Mozambique, a major effect on the bid rates was the bidders' provision for instability of the Brent oil price, as a part of the contract value (7.7 percent) consisted of asphalt.[23]
- **Supply and demand effect**. Providers and suppliers of plant, equipment, and materials, in particular cement and bitumen, may respond with increased prices due the increase in a number of major works let at the same time.[24] The simultaneous award of the projects results in significant increases, in particular when the supply is limited and when some contractors have monopoly on the supply of certain materials, for example, crushed stone in Mozambique.[25]

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[21] World Bank. 2006. Guidelines: Procurement under IBRD Loans and IDA Credits, Section I, Para 1.11.Washington, DC. http://go.worldbank.org/RPHUY0RFI0

[22] Revised Bid Evaluation Report.2005. 2nd Year Rehabilitation Works Contracts for 5 Lots. Lagos Urban Transport Project, Nigeria

[23] Bid Evaluation Report.2003. The Rehabilitation of the Road EN1 between Muxungue and Inchope. Roads and Bridges Management and Maintenance Program, Mozambique

[24] Bid Evaluation Report. 2003. Periodic Maintenance of the Road EN1 between Marracuene to Manhica. Roads and Bridges Management and Maintenance Program, Mozambique

[25] Bid Evaluation Report.2003. Periodic Maintenance of the Road EN1 between Zandamela and Maxixe, Roads and Bridges Management and Maintenance Program, Mozambique

Box 4.1: Evaluation of the effect of price increase on contract major works items

The effect of price increase for fuel, power, materials (for example bitumen, cement) and equipment was evaluated as one of possible reasons that account for a 36 percent difference between the winning bid price and the engineer's estimate (80 percent difference from the original estimate dating back three years). The cost analysis measures this effect on two major cost works items of a road-upgrading contract: earthworks (65 percent) and bituminous surfacing works (12 percent), as follows:

- Fuel accounts for up to 40 percent of the earthworks cost;
- Power (electricity) accounts for up to 5 percent of the cost of earthworks (crusher operation) and bituminous works (bitumen heating);
- Bitumen accounts for up to 35 percent of the cost of bituminous works;
- Cement accounts for up to 22 percent of the cost of earthworks;
- Power outage level is estimated at 50 percent;
- The increase in equipment costs is estimated as 15 percent against foreign currency and as 25 percent of the earthworks and bituminous works costs;
- Price escalation is assumed at 10 percent for the period of nine months between the revised estimate and the time of commencement of work.

Source: Revised Bid Evaluation Report, Annex 11, Contract C010: Upgrading of the Soroti-Dokolo Road. 2007. Road Development Program Phase 3. Uganda

- **Potential collusion by bidders.** Bidders can collude to agree on prices and inflate costs. The possibility of collusion of bidders having the benefit of limited competition, was evaluated and dismissed in one of the contracts in Uganda. The bidders ranked two and three were European contractors and their bid amounts were very close to each other, "being only 1–2 percent of each other. This is taken as a confirmation of serious competition for the works by the bidders".[26]

- **Inadequate prediction of major market forces by the engineer's estimate.** In Uganda, the bids of similar road works in 2007 showed an emerging trend with median bid prices being 40–50 percent higher than the engineer's estimates.[27] In Mozambique, in a contract which was 56 percent higher than the revised estimate, the examination of the engineer's estimates showed that the rates were low for significant items, for example, fixed obligations, gravel deviations, de-mining, surfacing, spoil, and sand sub-base. More realistic rates for these estimates would add US$ 4.7 million to the estimate.[28]

- **Miscellaneous perceived risks incorporated by bidders in their bid rates.** These include provisions of extended contract procurement cycle time associated with price inflation risks, security, delayed payment by client, delayed recovery of input VAT refund, pre-financing costs for securities/guarantees, increased insurance premiums.[29] In Mozambique, among such risks is also the current method of payment by VAT with a paper transfer (TITULO) that results in under recovery of the input VAT payable by the main contractor to subcontractor/suppliers. [30] Other perceived risks could be attributable to the individual assessment of the situation in the

[26] Contract.2007. Section II- Bid Evaluation Report. Upgrading of Soroti-Dokolo Road (62.6km) to Paved (Bituminous) Standard. Road Development Program Phase 3. Uganda

[27] Revised Bid Evaluation Report, Section II, Contract C010: Upgrading of the Soroti-Dokolo Road. 2007. Road Development Program Phase 3, Uganda

[28] Bid Evaluation Report.2003. The Periodic Maintenance of the Road EN1 between Zandamela and Maxixe, Roads and Bridges Management and Maintenance Program, Mozambique

[29] Revised Bid Evaluation Report, Annex 11, Contract C010: Upgrading of the Soroti-Dokolo Road. 2007. Road Development Program Phase 3, Uganda

[30] Bid Evaluation Report.2003. The Rehabilitation of the Road EN1 between Muxungue and Inchope. Roads and Bridges Management and Maintenance Program, Mozambique

country. In Uganda, among such risks is "a delayed delivery of goods through Mombasa Port due to congestion and transport problems in Uganda, loss of fuel through pilfering (the cost of fuel is estimated to be 40 percent of the total earthworks budget), political instability in the project area and the high cost of input taxes."[31]

- **Other factors.** In Mozambique the high unit rates of stabilized sand sub-base could have contributed to high bid unit rates. As occurred in a number of projects, it was hard to achieve the end specification for this compacted material (absence of natural gravel materials in the area, layer works are constructed from natural sands, cement stabilized- up to 6 percent cement content).[32] In the DRC, some significant differences between bids and cost estimates could be attributable to insecurity and post-conflict country environment. The mobilization cost in one of the contracts signed in 2004 was about US$3 million above its estimate. [33]

4.2 REASONS FOR LOW RESPONSE TO INVITATION TO BID

Only about half of pre-qualified firms generally bid in contracts with pre-qualification in the reviewed countries. Possible reasons for the relatively low response to the invitation for bids include:

- **Increased demand for contractors' services**. Responding to an inquiry initiated by the implementing agencies to identify the reasons for not bidding, pre-qualified firms attributed them to their full commitment of equipment and personnel to other on-going projects in the country[34] and new contractual commitments.[35] Box 4.2 describes the situation in Uganda.

- **Insecure areas in a post-conflict country.** In a contract in the Democratic Republic of Congo (DRC) where only two bids were received from six pre-qualified bidders, the road section was located in the region which was insecure.[36]

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[31] Letter from Director of Road Agency Formation Union (RAFU) of April 3, 2007, Contract C010: Upgrading of the Soroti-Dokolo. Road Development Program Phase 3, Uganda

[32] Bid Evaluation Report.2003. The Rehabilitation of the Road EN1 between Muxungue and Inchope. Roads and Bridges Management and Maintenance Program, Mozambique

[33] OPRC Case Recommendation and Review Report.2004. Contract of Rehabilitation of RN4, Section Nia-Nia-Beni. Emergency Economic and Social Reunification Support Project, DRC

[34] Revised Bid Evaluation Report. Letter of Transmittal. 2005. 2nd Year Rehabilitation Works Contracts – Contracts for 5 Lots. Lagos Urban Transport Project. Nigeria

[35] Revised Bid Evaluation Report, Section II. 2007. Contract C010: Upgrading of the Soroti-Dokolo Road.. Road Development Program Phase 3, Uganda.

Contract 3: Gashena_Woldia. 2006. Section II: Additional Assessment to the original Bid Evaluation Report. Woreta-Woldiya Road Upgrading Project, Ethiopia

Bid Evaluation Report.2003. Periodic Maintenance of the Road EN1 between Zandamela and Maxixe, Roads and Bridges Management and Maintenance Program, Mozambique

[36] OPRC Case Recommendation and Review Report. 2004. Contract of Rehabilitation of RN4, Section Nia-Nia-Beni. Emergency Economic and Social Reunification Support Project, DRC

Box 4.2: Increases in Workload among Contractors in East and Southern Africa

The implementing agency describes the situation in the construction industry in the East and Southern African regions in 2007, which was a decline with slumps in government, commercial and aid spending for large projects two years earlier. This situation has changed dramatically as a result of the HIPIC initiative, increases in aid spending resulting from the Millennium Development Initiatives and huge increases in commercial and government-funded projects arising from large increases in revenue from the mining and commodities sectors. This general economic upturn has left a set of contractors in the region who have full order books, are choosier about what work they will take on and are insisting on higher margins and lower risk from new projects.

Source: Revised Bid Evaluation Report, Section II. 2007. Contract C010: Upgrading of the Soroti-Dokolo Road. Road Development Program Phase III*, Uganda*

4.3 REASONS FOR COST OVERRUNS AND TIME EXTENSIONS

Some contracts have particularly high cost overruns and extensions of completion time. Proposing to revise a contract amount, supervision consultants evaluate the reasons and provide a detailed analysis of increase in prices for selected items of work. Some of the factors leading to contract price review might include:

- **Global trend of rising oil prices.** Its effect on domestic diesel prices is forcing prices of materials, haulage, and transportation to go up. As evaluated in a number of contracts in Nigeria between 2004 and 2005, the prices for bitumen went up by 78.57 percent; cement by 88 percent; crushed stone by57.24 percent; and diesel by 240 percent.[37]
- **Labor cost increase and impact of other regulatory measures (taxation).** The examples are the increase in wages introduced by the government legislation in Nigeria[38], and a new taxation regime on new contractors in Madagascar[39].
- **Unsatisfactory contractor performance.** Misjudgment on qualifications of a contracted firm can lead to delays in implementation of works and associated cost increases. These generally include cost of extended use of time-related general items in the bill of quantities. Box 4.3 describes a contract in Madagascar, which was terminated due to non-performance of the contractor who incurred costs overruns and was behind the works schedule.

Box 4.3: Termination of contracts due to non-performance of the contractor

In Madagascar, the implementing agency decided to terminate three contracts commenced in September 2004 for a total value of US$ 61.6 million due to non-performance. An independent technical audit found the contractor's works to be of an unacceptable quality; the works were terminated in February 2006. The client decided not to re-bid the contracts as it could result in lower participation, higher prices, and delayed implementation. The contracts were awarded to the second lowest evaluated bidder applying a price adjustment of 36.5 percent reflecting the increase of the price of fuel, labor and cement concrete since the initial bid in May 2004.

Source: OPRC Case Recommendation and Review Report, Transport Infrastructure Investment, Madagascar, 2006

[37] Letter of AIM Consultants of October 21, 2005. Contracts of construction of roads, drains and footpaths (sidewalk) in Ogbe community and Aduduwa community. Community-Based Urban Development Project. Nigeria

[38] Letter of AIM Consultants of October 21, 2005. Contracts of construction of roads, drains and footpaths (sidewalk) in Ogbe community and Aduduwa community. Community-Based Urban Development Project. Nigeria

[39] OPRC Case Recommendation and Review Report, 2006, Transport Infrastructure Investment, Madagascar

- **Time lag between design and contract execution dates.** This factor may result in revision of the quantities of work items. For example, in several contracts signed in 2005 and 2006 in Nigeria, the supervision consultant requested the increase in quantities substantiating this by the fact that due to such time lag of four years "some ecological factors like erosion and environmental dilapidation have affected the roads thereby necessitating massive earthwork to be executed on the site".[40]

- **Time extensions.** They incur contract extension costs. For example, the contractor's indirect costs (time-related costs) that are essentially the site and head office overhead expenditures, and cost of extended use of time-related general items in the bill of quantities. Box 4.5 presents the reasons of delays as described in one of the road works contracts in Tanzania.

Box 4.4: Reasons for the Extension of Time to Complete Road Works

In a contract in Tanzania, the request to extend the time of nine months to complete road works puts forward the following reasons for the delay:

- Delay caused by late issuing of drawings and centerline coordinates of Road A;
- Delay caused by wrong design of alignment of the Road A section;
- Delay and or/disruptions caused by obstructions within the construction corridor;
- Delays in issuing control points for Road B;
- Delays caused by adverse ground conditions on Road B;
- Delay caused by varied (increased) quantities;
- Delay caused by exceptionally adverse weather condition;
- Delay caused by late payment of interim certificate;
- Critical concrete works.

Source: Letter from Spencon Services Ltd of June 13, 2007.Uprading and Reconstruction of Zanzibar Three Main Roads- Package 1, Central Transport Corridor Project, Tanzania

[40] Letter of AIM Consultants of October 21, 2005, Contracts of construction of roads, drains and footpaths (sidewalk) in Ogbe community and Aduduwa community, Nigeria; Letter of August 28,2006, Contract on construction of roads and drains in Oku/ Ibiaku community. Community-Based Urban Development Project. Nigeria

5 ENHANCING ACCOUNTABILITY AND CONTROL OF CORRUPTION IN WORLD BANK-FINANCED PROJECTS IN THE ROAD SECTOR IN SUB-SAHARAN AFRICA

This chapter comments on the results of the analysis and the main trends observed in the procurement and implementation processes of the road sector contracts reviewed in the study. It provides selected recommendations to enhance accountability and control of corruption in Bank-financed projects in the road sector in Sub-Saharan Africa. In conclusion, it puts forward next steps to sustain the platform fostering governance and integrity in the procurement and implementation of road sector contracts financed by the Bank.

The road sector contracting of the Bank-financed projects in the reviewed countries is characterized by a limited number of firms dominating large-scale road works contracts. The market is split between the African firms and mainly the Chinese and European contractors. The largest projects are generally awarded to the international contractors, in particular those from China. The overall rate of the pre-qualified firms to bid for large works appears to be competitive (more than six firms on average), however, the actual participation in tenders is quite low—only about half of the pre-qualified firms bid.

The procurement procedures to commence works are lengthy across a number of the reviewed countries. A delayed process of contract start up could be to some extent a result of weak roads management capacity, regulatory environment, and administrative burdens. However, this underlying inefficiency is also exacerbated by weak governance.

The bid prices sometimes exceed the engineer's estimates by an excessive margin. The values of a quarter of the road works contracts in the sample are higher by 30 percent or more than their engineer's estimates. These high bid rates are observed in each country in the sample, except Ghana. The contract values in Ghana are consistently lower than their estimated costs.

5.1 RECOMMENDED ACTIONS

The following selected recommendations are geared towards enhancing accountability and attaining a higher degree of control of corruption in Bank-financed projects in the road sector in Sub-Saharan Africa:

- **Consider establishing a tighter timeframe for contract signing.** The extensions of bid validity period within which the contract should be awarded, should be less flexible. A stricter adherence to the World Bank's procurement guidelines should be observed. They provide for an extension of bid validity "if justified by exceptional circumstances" that could be requested for the minimum period required to complete evaluation, obtain the necessary approvals, and award the contract.[41]. A delayed bid evaluation process may provide opportunities for corrupt practices and back-door negotiations.

- **Allow using a selection procedure of post-qualification in bidding for large works instead of pre-qualification.** Knowledge of other pre-qualified firms carries a potential risk of collusion. Also, other firms may choose not to bid due to a potential collusion of well-connected companies. This results in unfair competition and market manipulation. In order to

[41] World Bank. 2006. Guidelines: Procurement under IBRD Loans and IDA Credits, Section II, Para 2.57.Washington, DC. http://go.worldbank.org/RPHUY0RFI0

facilitate bidder competition and avoid collusion, the proposal of road agencies to use post-qualification for contracts above the pre-qualification threshold values could be endorsed.

- **Create a system to monitor and assess the performance of contractors and consultants and associated costs.** Tracking of information on prime contractors and consultants in the road industry in the region could mitigate risks of misjudging on qualifications of firms as well as ensure due diligence on poor performers. The system could include a firm's profile, the number and values of contract awards, unit cost of works, satisfactory completion of the job, completion within the schedule, quality of works, and so on. This database could assist local road agencies in being more efficient in completing evaluations. The rankings of major contractors and consultants could identify strong performers who could be encouraged to bid or hired through direct contracting in case of emergencies. This registry would provide performance incentives as well as facilitate accountability.

- **Strengthen monitoring of the procurement and implementation processes to enhance detection of the risks to integrity.** A detailed record and information, if available in the World Bank system could reduce incentives for firms and other entities to participate in collusion, bid rigging, and other corrupt practices. It is important to generate the data to increase accountability. This study could be replicated in other regions where the World Bank operates as it provides benchmarks and references against which individual projects performance or outcomes can be compared. It also establishes thresholds above which there may be causes for concerns or for further investigations.

5.2 CONCLUSIONS

It is critical to continue collecting data on the procurement and implementation processes of the road sector contracts to allow comparison of cost trends, bidding competition, and performance in the road sector. A standard framework (including a template) has been developed within this study to provide the platform for monitoring and evaluation of prices, bidding data, and contractor's information to help improve governance.

Capturing costs and unit price information of road works is important for evaluation of the trends across countries and regions. The availability of systematic cost data facilitates monitoring and comparison of the value of road works and bid price trends. Empirical evidence could be built on such indicators as price increases relative to the engineer's estimates, cost increases, and key roads input costs to investigate the sources of increased costs and possible factors behind the increase in bid prices. It is essential to have timely and accurate data for the analysis of construction costs.

Assessing bidding behavior is essential for measuring the level of competition and road works activity financed by the Bank. Verifying the extent of a competitive bidding environment is an important tool for the procurement decisions. This may allow to better plan and determine the size of contracts in a particular area. It is important to correctly evaluate the factors behind a declining number of bidders, the causes of bidding trends, and their potential influence on bid rates for contracts. Detailed bidding data could facilitate measuring if the procurement process is affected by collusion and bid rigging through detection of patterns and red flags in the structure of bids and firms. It is useful to look separately at contracts with pre-qualification and without a pre-qualification requirement.

Measuring performance more consistently would help to address inefficiencies that arise in the current procurement and implementation practices. This would ensure that irregularities are properly captured in the observed trends in a specific country or area. This would also help to distinguish if the trends are subject to potential corruption and fraud or rather stem from a weak

procurement environment and low capacity. It is important to link the performance measures to contractors and consultants as well as project implementing agencies for accountability.

Close monitoring of the procurement and implementation of road works contracts provides the basis for identifying early warnings of potential fiduciary problems and the information to address them. This is critical for enhancing the integrity of the procurement and implementation processes of the road works contracts and strengthening of the overall governance environment in the road sector.

ANNEX A: List of red flags

LIST OF RED FLAGS BY TYPE OF REDFLAG

Table 1: Variation order >20% (15 out of 109 contracts or 13.7%)

	Country	Contract ID	Year	Contract amount (2007 US $)	No of variation orders	Amount of variation orders (2007 US $)	Percent of variation
1	Congo (DRC)	1248681	2004	8,239,794	4	2,912,905	35.35%
2	Congo (DRC)	1235364	2003	9,211,974	1	3,180,001	34.52%
3	Ghana	1227250	2002	28,500,000	1	24,400,000	85.61%
4	Ghana	1227923	2002	9,539,185	1	3,476,683	36.45%
5	Mozambique	1237400	2004	24,300,000	1	11,900,000	48.97%
6	Mozambique	1245218	2004	9,933,107	1	2,768,437	27.87%
7	Mozambique	1237396	2004	29,300,000	4	9,081,348	30.99%
8	Nigeria	1247996	2005	2,074,666	1	642,812	30.98%
9	Nigeria	1243279	2004	1,751,586	2	777,138	44.37%
10	Nigeria	1243278	2004	1,327,938	2	530,919	39.98%
11	Nigeria	1247425	2004	962,896	2	477,065	49.54%
12	Nigeria	1248440	2004	2,506,454	2	1,130,842	45.12%
13	Nigeria	1248443	2004	3,273,496	2	1,834,016	56.03%
14	Tanzania	1249871	2005	13,300,000	2	5,672,856	42.65%
15	Tanzania	1220241	2002	2,579,366	3	5,439,608	210.89%

6 TABLE 2: DELAYS - CONTRACT SIGNING DATE MORE THAN 7 MONTHS AFTER ORIGINAL BID OPENING (32.1% OF ALL CONTRACTS)*

	Country	Contract ID	Year	Bid opening date	Contract signing date	No. of days between bid opening & contract signing	No. of months between bid opening & contract signing
1	Ethiopia	1216927	2001	23-Jan-01	10-Oct-01	260	8.7
2	Ethiopia	1246958	2005	18-Mar-04	21-Jan-05	309	10.3
3	Ethiopia	1262535	2006	30-Aug-05	27-Jul-06	331	11.0
4	Ethiopia	1260195	2006	30-Aug-05	4-Jul-06	308	10.3
5	Zambia	1216195	2001	12-Jan-01	14-Aug-01	214	7.1
6	Zambia	1207212	2000	10-Dec-99	5-Sep-00	270	9.0
7	Zambia	1207016	2000	10-Dec-99	5-Sep-00	270	9.0
8	Zambia	1207015	2000	10-Dec-99	5-Sep-00	270	9.0
9	Ghana	1237217	2003	20-Mar-03	15-Dec-03	270	9.0
10	Malawi	1239532	2004	12-Mar-03	28-Apr-04	413	13.8
11	Malawi	1213251	2001	10-Nov-00	27-Jun-01	229	7.6
12	Mozambique	1244436	2004	3-Nov-03	11-Oct-04	343	11.4
13	Mozambique	1244464	2004	3-Nov-03	11-Oct-04	343	11.4
14	Mozambique	1245218	2004	16-Feb-04	11-Nov-04	269	9.0
15	Kenya	1263943	2006	15-Sep-05	29-Aug-06	348	11.6
16	Kenya	1263914	2006	15-Sep-05	29-Aug-06	348	11.6
17	Kenya	1263934	2006	15-Sep-05	29-Aug-06	348	11.6
18	Kenya	1263935	2006	15-Sep-05	29-Aug-06	348	11.6
19	Tanzania	1250519	2005	1-Jul-03	24-Jan-05	573	19.1
20	Tanzania	1222383	2002	30-Apr-01	7-May-02	372	12.4
21	Tanzania	1219975	2002	30-Apr-01	26-Mar-02	330	11.0
22	Tanzania	1217745	2001	30-Apr-01	7-Dec-01	221	7.4
23	Tanzania	1121617	2000	2-Jun-99	14-Jan-00	226	7.5
24	Uganda	1270314	2007	5-Dec-06	13-Sep-07	282	9.4
25	Uganda	1243438	2004	10-Jun-03	21-Jun-04	377	12.6
26	Uganda	1241220	2004	10-Jun-03	21-Jun-04	377	12.6
27	Uganda	1240049	2004	22-Oct-02	25-Mar-04	520	17.3
28	Uganda	1235957	2003	22-Oct-02	19-Nov-03	393	13.1

*Assuming bid validity of 3 months for all contracts.

Table 3: Delays - More than 30% delay in completion date (28 contracts or 25.7%)

	Country	6.1 Contract ID	Year	Planned work duration (months)	Delays (months)	Delays as a % of duration of the original contracted period
1	Congo	1249152	2005	12	4	33%
2	Congo (DRC)	1248681	2004	16	12	75%
3	Congo (DRC)	1248476	2005	22	8	36%
4	Congo (DRC)	1244615	2004	24	24	100%
5	Congo (DRC)	1244617	2004	24	21	88%
6	Ghana	1237217	2003	24	8	33%
7	Ghana	1227250	2002	32	23.6	74%
8	Ghana	1227923	2002	24	9	38%
9	Ghana	1226700	2002	24	12	50%
10	Mozambique	1237417	2004	15	12	80%
11	Mozambique	1237400	2004	15	14	93%
12	Mozambique	1237364	2004	14	14	100%
13	Mozambique	1245218	2004	12	10	83%
14	Mozambique	1237396	2004	14	14	100%
15	Mozambique	1237371	2004	14	16	114%
16	Mozambique	1237344	2004	15	15	100%
17	Malawi	1239532	2004	6	10	167%
18	Malawi	1239555	2004	6	10	167%
19	Malawi	1213251	2001	9	3	33%
20	Malawi	1240987	2004	6	10	167%
21	Nigeria	1247253	2005	12	12	100%
22	Nigeria	1247996	2005	12	14	117%
23	Nigeria	1243279	2004	12	20	167%
24	Nigeria	1243278	2004	12	20	167%
25	Nigeria	1247425	2004	12	25	208%
26	Tanzania	1253712	2005	18	8	44%
27	Uganda	1243438	2004	24	21	88%
28	Madagascar	1265304	2007	4	8	202%

Table 4: Only one or two bidders (14 out of 109 contracts or 12.8% of all contracts)

	Country	Contract ID	Year	No. of firms that bought bidding documents	No. of Bidders
1	Congo	1241248	2004	8	2
2	Congo (DRC)	1248475	2005	1	1
3	Congo (DRC)	1244617	2004	6	2
4	Congo (DRC)	1244616	2004	6	2
5	Ethiopia	1246958	2005		2
6	Ghana	1227250	2002	6	2
7	Ghana	1264688	2006	2	2
8	Mozambique	1257614	2006	20	1
9	Malawi	1239532	2004	6	2
10	Malawi	1253795	2005	6	2
11	Nigeria	1254042	2005	7	2
12	Uganda	1235957	2003		1
13	Zambia	1207015	2000	11	2
14	Madagascar	1265304	2007	8	2

Table 5: Half or more of the firms buying bidding documents fail to bid (24 out of 109 contractors or 22%)

	Country	Contract ID	Year	Number of firms buying bidding documents	Number of bidders	No. of firms failed to bid	% of firms failed to bid
1	Congo	1241248	2004	8	2	6	75%
2	Congo (DRC)	1262209	2006	12	6	6	50%
3	Congo (DRC)	1235364	2003	13	3	10	77%
4	Madagascar	1244600	2004	23	7	16	70%
5	Madagascar	1244546	2004	23	7	16	70%
6	Madagascar	1244513	2004	23	7	16	70%
7	Madagascar	1265304	2007	8	2	6	75%
8	Mozambique	1244436	2004	25	8	17	68%
9	Mozambique	1244464	2004	25	9	16	64%
10	Mozambique	1237417	2004	22	8	14	64%
11	Mozambique	1237400	2004	20	7	13	65%
12	Mozambique	1237364	2004	15	4	11	73%
13	Mozambique	1245218	2004	14	4	10	71%
14	Mozambique	1257614	2006	20	1	19	95%
15	Mozambique	1237396	2004	21	10	11	52%
16	Mozambique	1237371	2004	20	6	14	70%
17	Mozambique	1237344	2004	20	5	15	75%
18	Malawi	1239532	2004	6	2	4	67%
19	Malawi	1253795	2005	6	2	4	67%
20	Malawi	1213251	2001	9	4	5	56%
21	Tanzania	1253695	2005	12	4	8	67%
22	Uganda	1228449	2002	14	4	10	71%
23	Zambia	1207016	2000	12	6	6	50%
24	Zambia	1207015	2000	11	2	9	82%

Table 6: 20% or more of the pre-qualified firms failed to bid (27 out of the 32 contracts where there was pre-qualification or 84%)

	Country	Contract ID	Year	Number of firms that were pre-qualified	Number of bidders	No. of pre-qualified firms failed to bid
1	Congo (DRC)	1248474	2005	8	4	50%
2	Congo (DRC)	1248476	2005	7	3	57%
3	Congo (DRC)	1248475	2005	4	1	75%
4	Congo (DRC)	1244615	2004	8	4	50%
5	Congo (DRC)	1244617	2004	8	2	75%
6	Congo (DRC)	1244616	2004	8	2	75%
7	Congo (DRC)	1251263	2005	8	3	63%
8	Ethiopia	1242074	2004	5	4	20%
9	Ethiopia	1242065	2004	7	3	57%
10	Ethiopia	1262535	2006	8	5	38%
11	Ethiopia	1260195	2006	10	3	70%
12	Ghana	1237217	2003	14	7	50%
13	Ghana	1227250	2002	6	2	67%
14	Kenya	1263943	2006	9	5	44%
15	Kenya	1263934	2006	7	3	57%
16	Kenya	1263935	2006	6	3	50%
17	Nigeria	1254033	2005	13	3	77%
18	Nigeria	1254034	2005	13	4	69%
19	Nigeria	1254295	2005	13	3	77%
20	Nigeria	1254042	2005	13	2	85%
21	Nigeria	1254610	2005	13	3	77%
22	Tanzania	1249871	2005	6	3	50%
23	Tanzania	1251319	2005	7	4	43%
24	Tanzania	1250519	2005	7	3	57%
25	Uganda	1243438	2004	8	4	50%
26	Uganda	1241220	2004	8	4	50%
27	Uganda	1239486	2004	4	3	25%

Table 7: Unusual bid patterns: Difference between winning bid and next lowest bid is within 2% (12 out of 109 contracts or 11%)

	Country	Contract ID	Year	Bid amount of winning bid (2007 US $)	difference between winning bid and the next lowest bid amount
1	Ethiopia	1028911	1999	36,588,654	-0.30%
2	Ethiopia	1028908	1999	25,883,409	-1.33%
3	Kenya	1263943	2006	41,205,666	-1.02%
4	Madagascar	1244600	2004	36,309,286	-0.83%
5	Madagascar	1244546	2004	4,053,832	-1.82%
6	Mozambique	1244436	2004	28,298,484	0.55%
7	Mozambique	1244464	2004	26,713,721	0.60%
8	Mozambique	1237400	2004	24,325,846	-0.37%
9	Mozambique	1237344	2004	9,099,246	-1.28%
10	Nigeria	1254610	2005	6,420,532	-0.66%
11	Uganda	1243438	2004	13,525,464	-0.75%
12	Zambia	1216195	2001	1,824,540	-1.56%

Table 8: Unusual bid patterns: Winning bid not the lowest bid accepted for detailed examination (20 out of 109 contracts or 18.3%)

	Country	Contract ID	Year	Bid amount of winning bid (2007 US $)	Minimum bid amount (2007 US $)
1	Congo	1241250	2004	558,416	384,040
2	Congo (DRC)	1248474	2005	27,017,880	25,073,083
3	Ethiopia	1258217	2006	22,930,716	19,516,042
4	Ethiopia	1028911	1999	36,480,007	35,162,938
5	Ethiopia	1262535	2006	44,337,069	42,501,201
6	Ghana	1237217	2003	25,837,268	20,166,314
7	Ghana	1264092	2006	1,305,191	944,140
8	Kenya	1263935	2006	63,305,988	61,568,666
9	Madagascar	1244546	2004	3,981,543	2,548,504
10	Mozambique	1237400	2004	24,235,232	24,212,793
11	Mozambique	1244464	2006	26,874,946	24,749,270
12	Mauritania	1250249	2005	4,282,898	2,811,596
13	Nigeria	1247996	2005	2,194,049	2,103,591
14	Nigeria	1263174	2006	6,359,546	4,566,938
15	Tanzania	1121617	2000	1,520,082	984,563
16	Tanzania	1217745	2001	7,831,384	5,783,222
17	Zambia	1207016	2000	1,575,312	1,312,012
18	Zambia	1207015	2000	1,374,165	839,258
19	Zambia	1207212	2000	1,614,678	1,123,982
20	Zambia	1216195	2001	1,796,525	1,261,775

Table 9: Contract value more than 20 % higher than engineer's estimate (26 out of 109 contracts or 23.9%)

	Country	Contract ID	Year	Estimate Amount (2007 US $)	Contract Amount (2007 US $)	Percent increase in contract amount
1	Congo (DRC)	1248474	2005	22,683,998	33,793,964	49.0%
2	Congo (DRC)	1244617	2004	23,540,002	31,807,410	35.1%
3	Ethiopia	1258217	2006	14,206,174	23,412,262	64.8%
4	Ethiopia	1258212	2006	14,332,577	19,787,644	38.1%
5	Ethiopia	1246958	2005	27,219,680	34,320,824	26.1%
6	Ethiopia	1262535	2006	27,488,784	42,936,548	56.2%
7	Ethiopia	1260195	2006	21,296,196	26,502,572	24.4%
8	Kenya	1263934	2006	28,097,190	39,616,412	41.0%
9	Mozambique	1244436	2004	11,908,244	22,489,160	88.9%
10	Mozambique	1244464	2004	11,261,770	19,315,852	71.5%
11	Mozambique	1237417	2004	22,196,040	27,159,710	22.4%
12	Mozambique	1237400	2004	14,521,077	24,310,020	67.4%
13	Mozambique	1237364	2004	8,714,285	17,371,390	99.3%
14	Mozambique	1257614	2006	6,451,201	8,535,337	32.3%
15	Mozambique	1237396	2004	20,015,344	29,252,576	46.2%
16	Malawi	1239532	2004	1,518,382	2,061,287	35.8%
17	Malawi	1239555	2004	1,076,276	1,501,791	39.5%
18	Nigeria	1248440	2004	1,769,486	2,506,454	41.6%
19	Nigeria	1248443	2004	2,602,537	3,273,496	25.8%
20	Nigeria	1254042	2005	3,445,710	4,628,808	34.3%
21	Nigeria	1254610	2005	5,423,610	7,031,490	29.6%
22	Tanzania	1217745	2001	6,658,607	8,927,778	34.1%
23	Tanzania	1121617	2000	1,082,577	1,839,299	69.9%
24	Uganda	1243438	2004	12,084,518	14,516,666	20.1%
25	Uganda	1235957	2003	12,157,228	19,091,146	57.0%
26	Madagascar	1261127	2006	4,064,000	5,338,808	31.4%

Table 10: The difference between contract price and read-out bidding price is more than 10% (19 out of 109 contracts or 17.43%)

	Country	Contract ID	Year	Contract Value (2007 US$)	Winning Bid Amount (2007 US$)	Percent change
1	Congo	1247489	2005	8,613,700	11,773,195	-26.84%
2	Congo (DRC)	1248474	2005	33,793,964	28,638,952	18.00%
3	Congo (DRC)	1248476	2005	32,091,168	27,238,306	17.82%
4	Congo (DRC)	1262209	2006	16,576,219	14,047,643	18.00%
5	Congo (DRC)	1244617	2004	31,807,410	35,341,568	-10.00%
6	Mozambique	1244436	2004	22,489,160	30,505,090	-26.28%
7	Mozambique	1244464	2004	19,315,852	28,809,942	-32.95%
8	Mozambique	1245218	2004	9,933,107	8,873,699	11.94%
9	Mozambique	1237371	2004	15,420,337	17,806,958	-13.40%
10	Malawi	1239555	2004	1,501,791	1,311,559	14.50%
11	Malawi	1253795	2005	2,737,096	5,042,655	-45.72%
12	Malawi	1253820	2005	1,181,461	1,912,534	-38.23%
13	Nigeria	1247996	2005	2,074,666	2,334,468	-11.13%
14	Tanzania	1220241	2002	2,914,684	2,643,361	10.26%
15	Uganda	1240049	2004	15,905,719	14,145,430	12.44%
16	Uganda	1235957	2003	19,091,146	17,033,610	12.08%
17	Zambia	1207212	2000	1,587,419	1,905,320	-16.68%
18	Zambia	1207016	2000	1,546,950	1,858,868	-16.78%
19	Zambia	1207015	2000	1,273,521	1,621,515	-21.46%

RED FLAGS FOR COSTS

Table 11: Cost per km higher than the 75th percentile by type of work and type of road

	Country	Contract ID	Year	Cost per km (US$/km)
1	Congo	1238691	2004	146,956
2	Congo	1247489	2005	2,392,695
3	Congo (DRC)	1244617	2004	90,516
4	Ethiopia	1242074	2004	205,835
5	Ghana	1237217	2003	577,280
6	Ghana	1264092	2006	234,934
7	Kenya	1263935	2006	571,786
8	Kenya	1263934	2006	1,277,949
9	Kenya	1263943	2006	737,849
10	Kenya	1263914	2006	1,235,437
11	Malawi	1239555	2004	644,546
12	Mozambique	1237344	2004	196,578
13	Mozambique	1237371	2004	223,580
14	Nigeria	1247425	2004	598,072
15	Nigeria	1254295	2005	2,075,801
16	Tanzania	1249871	2005	421,884
17	Tanzania	1250519	2005	431,366
18	Uganda	1270314	2007	720,320
19	Uganda	1235957	2003	489,015

Table 12: Unit Cost of Asphalt Concrete is higher than the 75th percentile (75th percentile=$230/m3)

	Country	Contract ID	Year	Unit Cost of Asphalt Concrete (US$/m3)
1	Congo	1247489	2005	332.3
2	Congo (DRC)	1248474	2005	290.7
3	Congo (DRC)	1235364	2003	311.9
4	Kenya	1263934	2006	234.3
5	Malawi	1253820	2005	247.7
6	Malawi	1240987	2004	270.7
7	Nigeria	1263174	2006	282.3
8	Nigeria	1243279	2004	351.7
9	Nigeria	1247425	2004	335.1

Table 13: Unit Cost of Portland Cement Concrete is higher than the 75th percentile (75th percentile=$203/m3)

	Country	Contract ID	Year	Unit Cost of Portland Cement Concrete (US$/m3)
1	Congo (DRC)	1244616	2004	340.2
2	Ethiopia	1246958	2005	228.2
3	Ethiopia	1028908	1999	206.4
4	Kenya	1263934	2006	216.7
5	Madagascar	1261393	2006	270.0
6	Madagascar	1261127	2006	232.9
7	Mozambique	1237396	2004	230.7
8	Tanzania	1253712	2005	220.6
9	Uganda	1239486	2004	211.3
10	Zambia	1216195	2001	207.0

Table 14: Unit Cost of Gravel Subbase is higher than the 75th percentile (75th percentile=$12/m3)

	Country	Contract ID	Year	Unit Cost of Gravel Subbase (US$/m3)
1	Congo (DRC)	1248474	2005	15.6
2	Congo (DRC)	1248475	2005	21.1
3	Congo (DRC)	1235364	2003	49.5
4	Ethiopia	1246958	2005	13.5
5	Ethiopia	1242072	2004	13.6
6	Ethiopia	1262535	2006	27.5
7	Ethiopia	1260195	2006	25.2
8	Madagascar	1244513	2004	16.7
9	Nigeria	1247995	2005	13.4
10	Tanzania	1253695	2005	25.8

Table 15: Unit Cost of Gravel Base is higher than the 75th percentile (75th percentile=$12/m3)

	Country	Contract ID	Year	Unit Cost of Gravel Base (US$/m3)
1	Congo (DRC)	1235364	2003	51.9
2	Congo (DRC)	1244616	2004	56.3
3	Mozambique	1244436	2004	19.2
4	Nigeria	1247995	2005	13.4
5	Uganda	1243438	2004	13.4

Table 16: Unit Cost of Crushed Stone Base is higher than the 75th percentile (75th percentile=$46/m3)

	Country	Contract ID	Year	Unit Cost of Crushed Stone Base (US$/m3)
1	Congo	1247489	2005	55.4
2	Congo	1249152	2005	79.8
3	Congo (DRC)	1248681	2004	71.3
4	Congo (DRC)	1248475	2005	53.9
5	Tanzania	1220241	2002	85.4
6	Uganda	1270314	2007	76.3

Table 17: Unit Cost of Earthworks Soft is higher than the 85th percentile (85th percentile=$7.85m3)

	Country	Contract ID	Year	Unit Cost of Earthworks Soft (US$/m3)
1	Kenya	1263935	2006	11.27
2	Madagascar	1271614	2007	7.91
3	Malawi	1253820	2005	17.93
4	Malawi	1239532	2004	8.46
5	Malawi	1253795	2005	11.32
6	Kenya	1263934	2006	9.47
7	Congo (DRC)	1248474	2005	8.21
8	Madagascar	1261393	2006	8.38
9	Uganda	1239486	2004	8.91

Table 18: Unit Cost of Earthworks Hard is higher than the 75th percentile (75th percentile=$26m3)

	Country	Contract ID	Year	Unit Cost of Earthworks Hard (US$/m3)
1	Congo (DRC)	1248474	2005	78.7
2	Kenya	1263934	2006	28.3
3	Madagascar	1271614	2007	39.2
4	Tanzania	1253712	2005	31.6
5	Tanzania	1220241	2002	31.4

Table 19: Total Number of Red Flags by Contract

	Country	Contract ID	Year	Number of Red Flags
1	Congo	1241248	2004	2
2	Congo	1238691	2004	1
3	Congo	1238687	2004	0
4	Congo	1238865	2004	0
5	Congo	1238863	2004	0
6	Congo	1247489	2005	4
7	Congo	1249152	2005	2
8	Congo	1241250	2004	1
9	Congo (DRC)	1248681	2004	3
10	Congo (DRC)	1248474	2005	9
11	Congo (DRC)	1248476	2005	4
12	Congo (DRC)	1248475	2005	4
13	Congo (DRC)	1262209	2006	2
14	Congo (DRC)	1235364	2003	5
15	Congo (DRC)	1244615	2004	2
16	Congo (DRC)	1244617	2004	7
17	Congo (DRC)	1244616	2004	5
18	Congo (DRC)	1251263	2005	1
19	Ethiopia	1258217	2006	2
20	Ethiopia	1216927	2001	1
21	Ethiopia	1258212	2006	1
22	Ethiopia	1246958	2005	5
23	Ethiopia	1242074	2004	2
24	Ethiopia	1242072	2004	1
25	Ethiopia	1242065	2004	1
26	Ethiopia	1028911	1999	2
27	Ethiopia	1028908	1999	2
28	Ethiopia	1262535	2006	5
29	Ethiopia	1260195	2006	4
30	Ghana	1210549	2000	0
31	Ghana	1237217	2003	5
32	Ghana	1264092	2006	2
33	Ghana	1264389	2006	0
34	Ghana	1227250	2002	5
35	Ghana	1227923	2002	2
36	Ghana	1230703	2003	0
37	Ghana	1264688	2006	1
38	Ghana	1226700	2002	1
39	Ghana	1245560	2004	0
40	Kenya	1263943	2006	4
41	Kenya	1263914	2006	2
42	Kenya	1263934	2006	8
43	Kenya	1263935	2006	5
44	Madagascar	1244600	2004	2
45	Madagascar	1244546	2004	3

	Country	Contract ID	Year	Number of Red Flags
46	Madagascar	1244513	2004	2
47	Madagascar	1261393	2006	2
48	Madagascar	1261127	2006	2
49	Madagascar	1271614	2007	2
50	Madagascar	1265304	2007	3
51	Mozambique	1244436	2004	6
52	Mozambique	1244464	2004	6
53	Mozambique	1237417	2004	3
54	Mozambique	1237400	2004	6
55	Mozambique	1237364	2004	3
56	Mozambique	1245218	2004	5
57	Mozambique	1257614	2006	3
58	Mozambique	1237396	2004	5
59	Mozambique	1237371	2004	4
60	Mozambique	1237344	2004	5
61	Mauritania	1250249	2005	1
62	Mauritania	1260156	2006	0
63	Mauritania	1233356	2003	0
64	Malawi	1239532	2004	6
65	Malawi	1239555	2004	4
66	Malawi	1253795	2005	4
67	Malawi	1253820	2005	3
68	Malawi	1207890	2000	0
69	Malawi	1213251	2001	3
70	Malawi	1240987	2004	2
71	Nigeria	1263174	2006	2
72	Nigeria	1247253	2005	1
73	Nigeria	1247996	2005	4
74	Nigeria	1247995	2005	2
75	Nigeria	1243279	2004	3
76	Nigeria	1243278	2004	2
77	Nigeria	1247425	2004	4
78	Nigeria	1248440	2004	2
79	Nigeria	1248443	2004	2
80	Nigeria	1254033	2005	2
81	Nigeria	1254034	2005	1
82	Nigeria	1254295	2005	3
83	Nigeria	1254042	2005	4
84	Nigeria	1254610	2005	4
85	Tanzania	1249871	2005	3
86	Tanzania	1251319	2005	1
87	Tanzania	1250519	2005	3
88	Tanzania	1253712	2005	3
89	Tanzania	1253695	2005	2
90	Tanzania	1220241	2002	4
91	Tanzania	1222383	2002	1
92	Tanzania	1219975	2002	1

	Country	Contract ID	Year	Number of Red Flags
93	Tanzania	1217745	2001	3
94	Tanzania	1121617	2000	3
95	Uganda	1228449	2002	1
96	Uganda	1270314	2007	3
97	Uganda	1243438	2004	6
98	Uganda	1241220	2004	2
99	Uganda	1239486	2004	3
100	Uganda	1240049	2004	2
101	Uganda	1235957	2003	5
102	Zambia	1236060	2003	0
103	Zambia	1236103	2003	0
104	Zambia	1236064	2003	0
105	Zambia	1216195	2001	4
106	Zambia	1207212	2000	3
107	Zambia	1207016	2000	4
108	Zambia	1207015	2000	5
109	Zambia	1119368	1999	0

ANNEX B: Comparison of Unit Costs and their Estimates

Country	Year	Contract ID	Unit Cost (US$/m3)	Engineer's Estimate of Unit Cost (US$/m3)
Asphalt concrete(US$/m3)				
Ghana	2003	1237217	133.5	172.5
Kenya	2006	1263943	139.9	152.5
Kenya	2006	1263914	175.5	152.5
Kenya	2006	1263934	234.3	177.6
Kenya	2006	1263935	170.2	177.6
Nigeria	2006	1263174	282.3	282.3
Portland Cement concrete(US$/m3)				
Ghana	2003	1237217	106.0	121.4
Kenya	2006	1263943	199.0	165.0
Kenya	2006	1263914	137.2	138.9
Kenya	2006	1263934	216.7	186.2
Kenya	2006	1263935	129.9	186.2
Mozambique	2004	1237417	157.8	121.0
Tanzania	2005	1249871	174.4	189.0
Uganda	2004	1239486	211.3	245.3

Country	Year	Contract ID	Unit Cost (US$/m3)	Engineer's Estimate of Unit Cost (US$/m3)
Earthworks Soft(US$/m3)				
Ethiopia	2006	1258217	6.05	4.45
Ethiopia	2006	1258212	3.47	4.45
Ethiopia	2004	1242074	2.76	3.48
Ethiopia	2006	1260195	2.93	4.44
Kenya	2006	1263943	5.35	4.54
Kenya	2006	1263914	4.78	4.54
Kenya	2006	1263934	9.47	3.19
Kenya	2006	1263935	11.27	3.19
Tanzania	2005	1249871	4.05	5.81
Uganda	2004	1239486	8.91	2.73
Earthworks Hard(US$/m3)				
Ethiopia	2006	1258217	16.15	4.69
Ethiopia	2006	1258212	12.74	4.69
Ethiopia	2004	1242074	10.18	12.86
Ethiopia	2006	1260195	9.10	4.67
Kenya	2006	1263943	17.81	26.69
Kenya	2006	1263914	6.97	26.69
Kenya	2006	1263934	28.33	12.75

Country	Year	Contract ID	Unit Cost (US$/m3)	Engineer's Estimate of Unit Cost (US$/m3)
Kenya	2006	1263935	10.41	12.75
Mozambique	2004	1237417	26.34	4.68
Tanzania	2005	1249871	16.81	31.45
Gravel Subbase (US$/m3)				
Ethiopia	2006	1258217	10.8	11.7
Ethiopia	2006	1258212	10.8	11.7
Ethiopia	2006	1260195	25.2	11.7
Ghana	2003	1237217	7.1	7.0
Kenya	2006	1263934	11.1	10.0
Kenya	2006	1263935	7.0	10.0
Mozambique	2004	1237417	5.4	2.7
Nigeria	2006	1263174	5.1	9.4
Uganda	2004	1239486	9.6	6.5
Gravel Base (US$/m3)				
Mozambique	2004	1237417	5.4	2.7
Nigeria	2006	1263174	5.5	11.8
Uganda	2004	1239486	9.6	6.5

ANNEX C: Cost Analysis

Table C 1. Regression Results for Unit Costs (US$/m3) by Types of Road Work

	Asphalt Concrete		Portland Cement Concrete		Gravel Subbase		Earthworks Soft	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
GDP per capita	0.07*	0.1*	-0.08	-0.08	-0.02**	-0.02*	-0.0001	0.001
	(0.09)	(0.06)	(0.33)	(0.30)	(0.01)	(0.05)	(0.61)	(0.58)
Fuel price	0.212	0.44	0.47	0.47	0.01	0.02	0.56**	0.058**
2007	(0.52)	(0.28)	(0.24)	(0.21)	(0.79)	(0.64)	(0.001)	(0)
Control of Corruption (WBI)	-118.9**		-44.9		-5.50**		-1.20	
	(0)		(0.15)		(0.04)		(0.19)	
TI Corruption Perceptions Index		-56.7**		-34.9*		-4.36**		-0.91
		(0.01)		(0.05)		(0.04)		(0.13)
Constant	67.37	276.1	123.8	249.9	11.6	25.35	-0.07	3.18
	(0.031)	(0)	(0.001)	(0.001)	(0.012)	(0.001)	(0.96)	(0.18)
F value	13.2	4.7	2.44	3.16	3.26	3.41	6.72	7.0
	(0)	(0.007)	(0.08)	(0.04)	(0.03)	(0.02)	(0.006)	(0.0005)
No of Obs	39	39	38	38	50	50	58	58
Adjusted R-squared	0.49	0.225	0.104	0.15	0.12	0.13	0.231	0.24

** Significant at the 5 percent level; * Significant at the 10 percent level

Source: Authors' analysis based on our database

Note: Numbers in parenthesis are the p-values (level of significance)

Equation (1): Using WBI Control of Corruption Index
Equation (2): Using Transparency International's Corruption Perceptions Index

Table C1 summarizes the estimation results for the unit costs of different work types. We find that there is a significant effect of the Governance Indices on the unit cost of Asphalt Concrete and Gravel Subbase. The coefficient is negative as expected meaning that the worse the governance index (lower value of the index), the higher is the unit cost. GDP per capita is also significant for both Asphalt Concrete and Gravel Subbase but the effect is positive for Asphalt Concrete and negative for Gravel Subbase. The reason for the latter cannot be explained at this stage. Fuel price has a positive and significant effect on the unit cost of Earthworks (Soft Material).

ANNEX D: Data on bidding information

This Annex is available electronically (as an MS Excel spreadsheet). Data is presented with the following categories:

Classification		Group
1. Project Information	1.1	Country
	1.2	Region
	1.3	Project ID
	1.4	Project Title
	1.5	Contract No. (SAP)
	1.6	Contract Title
	1.7	Road section
	1.8	Year
	1.9	Implementing Agency
2. Bidding	2.1	Method of Procurement (ICB, NCB)
	2.2	Prequalification (yes/no)
	2.3	If prequalification, number of applicants
	2.4	If prequalification, number of firms pre-qualified
	2.5	Number of firms bought bidding documents
	2.6	Number of bidders
	2.7	Number of bidders passed preliminary exam (Bidders passed detailed examination)
	2.8	Name of winning bidder
	2.9	Nationality of winning bidder
	2.10	Bid amounts in USD
	2.11	Names of bidders (for each bid amount)
	2.12	Nationality of bidders
	2.13	Dummy for winning bidder
	2.14	Dummy for Qualified bidder (passed prelim exam)
3. Dates	3.1	Bid opening date
	3.2	Contract signing date
	3.3	Days between bid opening & contract signing
	3.4	Contracted completion date
	3.5	Planned work duration (months)
	3.6	Delays (months)

ANNEX E: Data on cost information

This Annex is available electronically (as an MS Excel spreadsheet). Data is presented with the following categories:

Classification		Group
1. Project Information	1.1	Country
	1.2	Region
	1.3	Project ID
	1.4	Project Title
	1.5	Contract No. (SAP)
	1.6	Contract Title
	1.7	Road section
	1.8	Year
	1.9	Implementing Agency
	2	2007 CPI FACTOR = 1
3. Works Contract Costing	3.1	Estimate (US$)
	3.2	Works Contract Value (US$)
	3.3	Actual Value of Works Contract (US$)
	3.4	Total Value of Works Contract (US$) (from SAP)
	3.5	No. of variation Orders
	3.6	Variation Orders Amount (US$)
	3.7	Road work component with the highest cost
	3.8	The highest road work cost component as % of contract value (US$ or as %)
4. Size Descriptors	4.1	Road length (contract) km
	4.2	Pavement width (m)
	4.3	Number of lanes
	4.4	Road Length - 2 lane equivalent, 7m wide (km)
5. Unit Costs	5.1	Earthworks (Soft) (US$/m3)
	5.2	Earthworks (soft) Engineers Estimate (US$/m3)
	5.6	Earthworks (Hard) (US$/m3)
	5.4	Earthworks (hard) Engineers Estimate (US$/m3)
	5.5	Subbase (Graded crushed stone) (US$/m3)
	5.6	Subbase (Graded crushed stone) Engineers Estimate (US$/m3)
	5.7	Gravel Subbase (US$/m3)
	5.8	Gravel Subbase Engineers Estimate (US$/m3)
	5.9	Subbase (Sand) (US$/m3)
	5.10	Gravel Base (US$/m3)
	5.11	Gravel Base Engineers Estimate (US$/m3)
	5.12	Base (Sand) (US$/m3)

	5.13	Crushed stone Base (US$/m3)
	5.14	Crushed stone Base Engineers Estimate (US$/m3)
	5.15	Bituminous Base (US$/m3)
	5.16	Bituminous Base Engineers Estimate (US$/m3)
	5.17	Portland Cement Concrete (US$/m3)
	5.18	Portland Cement Concrete Engineers Estimate (US$/m3)
	5.19	Asphalt Concrete (US$/m3)
	5.20	Asphalt Concrete Engineers Estimate (US$/m3)
	5.21	Gravel wearing course (US$/m3)
	5.22	Gravel wearing course Engineers Estimate (US$/m3)
	5.23	Double Surface Treatment(US$/m2)
	5.24	Double Surface Treatment Engneers Estimate (US$/m2)
	5.25	Single surface treatment (US$/m2)
	5.26	Single surface treatment Engineers Estimate (US$/m2)
	5.27	Cobble stone for sidewalks
	5.28	Patching potholes
6. Type	6.1	Road Type
	6.2	Road Surface (Paved/Unpaved)
	6.3	Surface Type
	6.4	Base material
	6.5	Terrain type
7. Activity	7.1	Work type/ Activity

ANNEX F: Data on supervision consultancy contracts

This Annex is available electronically (as an MS Excel spreadsheet). Data is presented with the following categories:

Classification		Group
1. Project Information	1.1	Country
	1.2	Region
	1.3	Project ID
	1.4	Project Title
	1.5	Contract No. (SAP)
	1.6	Contract Title
	1.7	Road section
	1.8	Year
	1.9	Implementing Agency
	2	2007 CPI FACTOR = 1
3. Supervision Consultant	3.1	Name of supervision consultant
	3.2	Nationality of supervision consultant
	3.3	Contract signing date
	3.4	Consultancy Contract value (US$)
	3.5	Amount of variation orders (US$)
	3.6	Actual value (US$)
	3.7	Procurement method
	3.8	Contract No.
	3.9	Works Contract Value (If more than 1 lot)
	3.10	Works Contract Actual Value (If more than 1 lot)
	3.11	Total Amount of works supervised

ANNEX F: Data on bridge works contracts

This Annex is available electronically (as an MS Excel spreadsheet). Data is presented with the following categories:

Country
Contract No
Description
Bridge
Length (m)
Width (m)
Bridge Height (m)
Type of Foundation
Depth of Foundation (m)
Cost of Structures (local)
Estimate cost of structures (US$)
Total Cost (local)
Estimate total cost (US$)
Exchange rate
Total Bridges Cost for a Contract (local)
Estimate of Total Bridges Cost for a Contract (US$)

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