Public Private Partnership in Road Projects in Ethiopia

Public Contracting and Administration of Road Projects and the Ethiopian Roads Authority

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Abbreviations

CCID  Construction Contract Implementation Division
EPA  Environmental Protection Authority
ERA  Ethiopian Roads Authority
ETB  Ethiopian Birr
GCC  General Condition of Contract
GOE  Government of Ethiopia
ICB  International Competitive Bidding
IDA  International Development Association
PPP  Public Private Partnership
RFP  Request for Proposal
ROW  Right of Way
RSDP  Road Sector Development Program
UNDP  United Nations Development Program
WDR  World Development Report
1 Introduction

1.1 Background

The role of transport in Ethiopia

Ethiopia is a land locked country, located in the eastern part of Africa, with a population estimate of more than 77 million, spread over a territory of 1.1 million km$^2$. Agriculture is the main economic activity and the backbone of the country's economy. About 80% of the population lives in rural areas and depend on agricultural activities for their livelihood. However, crop production is mostly subsistence and rain fed\(^1\). Due to dependency on rain majority of the farmers seasonally suffer from food shortage and are food aid dependant. Nevertheless, there is a high potential for increased agricultural production; and the economic growth of the country can be linked to this potential. Development efforts aiming to change the current socio-economic conditions would depend on the efficiency of the agricultural sector. Beside the subsistence production, the transport infrastructure and poor accessibility of the rural areas are additional bottlenecks for development. Hence, the provision of adequate road infrastructure service in terms of quality, coverage and organization, is essential for the economic and social development of Ethiopia.

Road transport accommodates presently 95% of passenger/freight movements in the country\(^2\); including import and distribution of petroleum products, fertilizers, relief food and collection and export of coffee from rural areas. However, the country is served by a limited road network, and an old railway line which runs from the Port of Djibouti to Addis Ababa and a fairly well functioning air transport system with two international airports. Complementarities between road, rail and air transport is not yet developed and air transport is very expensive to supplement the local transport demand while rail transport has barely adequate coverage. The country’s road network contains 36,500 km classified roads (see Table 1) out of which 87% are earth or gravel roads.

Two thirds of the network is in good and fair condition. The road network consists of 14% main tarmac roads, 36% main gravel roads and 50% regional roads. Road density is estimated to be 33.18 km per thousand km$^2$ for the entire classified road network. This density is below the regional average for the Sub-Saharan countries which is above 50 km per thousand km$^2$\(^3\).

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\(^1\) According to Ethiopian Statistical Abstract, 2004
\(^2\) RSDP II Mid term review report, December 2004
\(^3\) RSDP II Mid term review report, December 2004
Table 1: Classified road networks in Ethiopia

<table>
<thead>
<tr>
<th>Road classification</th>
<th>Paved (km)</th>
<th>Unpaved (km)</th>
<th>Total (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal roads</td>
<td>4,635</td>
<td>13,905</td>
<td>18,540</td>
</tr>
<tr>
<td>Regional roads</td>
<td>15,956</td>
<td>15,956</td>
<td>31,912</td>
</tr>
<tr>
<td>Local/Community roads</td>
<td>2,000</td>
<td>2,000</td>
<td>4,000</td>
</tr>
<tr>
<td>Total</td>
<td>4,635</td>
<td>31,861</td>
<td>36,496</td>
</tr>
</tbody>
</table>

Source: Ethiopian Roads Authority (2005)

Motorized transport accounts only for 30 percent of the travel and transport demand of the country, the balance, 70 percent, depends on traditional means such as walking, head loading, back loading, and use of pack animals.

Figure 1: Map of Ethiopia

Source: Ethiopian Roads Authority

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4 See: Document of The World Bank Report No. 17225-ET; Project Appraisal Document on a Proposed Credit in the Amount of US$309.2 million equivalent to the Federal Democratic Republic of Ethiopia for a Road Sector Development Program Support Project, December 18, 1997 Transport 1 Africa Region,
The Federal Democratic Republic of Ethiopia has placed increased emphasis on improving the quality and size of the road infrastructure. To overcome the transport and accessibility problems the Government through the Ethiopian Roads Authority has formulated a 10-year Road Sector Development Program (RSDP, 1997-2007). The first phase of the program (RSDP I, 1997-2002) was officially launched in September 1997, and has been completed in June 2002. This phase has focused on the restoration of the road network to an acceptable condition. The second phase (RSDP II) runs from July 2002 to 2007 and aims to consolidate the achievements of the first phase, increase the network connectivity and provide a sustainable road infrastructure to rural areas⁵.

However, many of the projects planned under this ten years sector program are not being completed within the prescribed time and budget and did not meet the quality standard. Consequently, the gap between plan and implementation resulting in poor access condition is hindering the effort for economic development of the country and together with the growing demand for road infrastructure are leading to frustration of the people living in the rural areas.

**Subject of the paper**

Despite the attention given to the road sector in the country, the provision of the road network in quality and quantity is observed to be not at the planned rate. Contracting authority, consultant and contractor are the three main stakeholders involved in the process of planning and implementation of road projects. In general, the reasons for a gap between plan and implementation can be i) lack of financial resource, ii) lack of participation of the beneficiaries during planning (plans do not reflect need of the community and actual condition) and iii) poor implementation capacity. In case of the RSDP sufficient financial resource has been secured prior to commencement of implementation and the need for improved transportation system is unquestionable. Poor implementation capacity seems to be an important issue for the programme.

Implementation capacity depends on a number of factors. Among the major problems contributing to the lower accomplishment of the projects under the RSDP might be the public contracting and administration system that is in practice in the country. The current contracting system is based on the traditional *design-bid-build* mechanism, which involves three parties (employer, contractor and consultant) and solicits selection of least cost offer for pro-

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⁵ RSDP II Mid term review report, December 2004
projects. A closer look at implemented road projects under the RSDP aims to uncover the reasons for the gap between the planned and actual quantity and quality of road projects.

Structure of the paper
This paper is divided into six chapters:

- the first chapter introduces into the topic and lines out the problem;
- the second chapter deals with a review on public private partnership issues and elaborates the conceptual framework;
- the third chapter presents the analysis of selected case studies,
- the fourth chapter summarises the findings,
- the fifth chapter discusses the findings, and
- the sixth chapter draws conclusions and proposes recommendations to improve implementation capacities of road projects.

The paper focuses on national road projects which are under the Ethiopian Roads Authority (ERA). Even though there are rural road projects having also a significant impact on the livelihood of the rural community those projects will not be discussed because they are not under the jurisdiction of ERA.

2 Conceptual Framework

2.1 Public Private Partnership and the Road Sector

2.1.1 Provision of Road Infrastructure and the State

In any country, the State, with varying degree of involvement, retains a distinctive role in providing public goods that promote economic and social development. Public goods are goods that are nominal and non-excludable - consumption by one user does not reduce the supply available for others and users cannot be prevented from consuming the good. Roads are a classical example of public good that demands the State’s intervention for its provision. The non-excludability nature of road infrastructure makes it difficult to apply and collect an economical user fee. Due to this reason, the private sector, which is dictated by market, lacks interest to provide the infrastructure. This situation is known as market failure. According to the World Development Report (1997), market failure refers to the set of conditions under

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6 World Development Report (1997), page 26
which a market economy fails to allocate resources efficiently. But the modern thinking of provision of public goods places lower responsibility to the State regarding its involvement in the provision of these goods and explores the utilization of the private sector.

In light of this, it maybe argued that the private sector can be entrusted to take full responsibility in the road infrastructure provision and get their returns in form of fees such as road user fee using for example a toll system. This kind of arrangement is becoming a common practice in the developed world and in transition countries (see Table 2). However, the tolling system is viable only under certain conditions like, availability of very high traffic volume and alternative routes. According to the International Road Federation (1996) as well as Estache, A./ Romero, M./ Strong, J. (2000) a minimum of 15,000 vehicles per day is a viable traffic volume for a tolling system.

Table 2: Toll roads in selected countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Toggled Length of road (km)</th>
<th>National</th>
<th>All public</th>
<th>Toggled roads as percentage of</th>
<th>National</th>
<th>All Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>9383</td>
<td>38484</td>
<td>305205</td>
<td>24.4</td>
<td>3.07</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>16300</td>
<td>156300</td>
<td>1400000</td>
<td>10.4</td>
<td>1.16</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>7803</td>
<td>27500</td>
<td>893500</td>
<td>27.6</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>3.54</td>
<td>29630</td>
<td>188203</td>
<td>1.2</td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>7.07</td>
<td>27357</td>
<td>342700</td>
<td>2.6</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>5593</td>
<td>46043</td>
<td>614678</td>
<td>12.1</td>
<td>0.85</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>9219</td>
<td>53628</td>
<td>1132207</td>
<td>17.2</td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td>1996</td>
<td>12447</td>
<td>86990</td>
<td>16.0</td>
<td>2.29</td>
<td></td>
</tr>
<tr>
<td>Malaysia</td>
<td>1425</td>
<td>16206</td>
<td>65877</td>
<td>8.8</td>
<td>2.16</td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>6526</td>
<td>48382</td>
<td>333840</td>
<td>13.5</td>
<td>1.95</td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>1907</td>
<td>20000</td>
<td>534111</td>
<td>9.5</td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>2820</td>
<td>24124</td>
<td>663795</td>
<td>9.6</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>7363</td>
<td>315000</td>
<td>6300000</td>
<td>2.3</td>
<td>0.12</td>
<td></td>
</tr>
</tbody>
</table>


Even under the availability of higher traffic volume, the high investment required and the slow return rate makes road projects unattractive to the private sector. Almost all roads in Ethiopia do not qualify for this criterion and continue to be public goods that should be provided by state involvement for the foreseeable future. Taking this into consideration, the Government of Ethiopia has laid huge investment projects in the road sector sourced by public money.

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7 World Development Report (1997), page 26
8 mentioned in Heggie(2003)
9 Estache, Romero, Strong (2000), page 2
this effect a ten year sector program, the Road Sector Development Program, has been formulated.

The Government of Ethiopia, currently implements road projects through the involvement of the private sector in planning as well as civil works. To this effect, the Ethiopian Roads Authority representing the Federal Government, implements road projects by contracting out projects to private contractors and consultants. This is done for different tasks and within different steps of the transport planning and implementation process. During the planning stage (option generation and decision) a service for design of road projects is procured from engineering design firms and based on the design a bid is floated for construction firms to construct roads that conform to its standards and technical specifications. During the implementation stage (construction of the roads) ERA hires consulting firms to supervise the works of contractors on its behalf and upon completion of the projects the Authority takes over the projects and manages and administers the roads. Due to stringent requirement of the donors’ community all major contracts are procured under international competitive bidding (ICB) procedures and the government has no choice but to use ICB. The general arrangement of procuring services and works from the private sector can be considered as one form of public private partnership and is briefly discussed in subsequent section.

2.1.2 Public Private Partnership

As indicated in the preceding section, the state utilizes the private sector as a means in delivering physical infrastructure. This arrangement is based on the philosophy that both, the public and the private sector having their own strengths and weaknesses, and by integrating the strengths of the public sector with that of the private, it is possible to create an efficient functioning system in the road infrastructure provision.

Public private partnerships (PPP) are arrangements between government and private sector entities for the purpose of providing public infrastructure, community facilities and related services\textsuperscript{10}. The partnership idea is based on utilizing the strengths of the partners. The public sector has strengths in areas such as legal authority, formulation of procurement policies, balancing competing needs of the public and capital resource. The strengths of the private sector can be found in areas such as management efficiency, innovations, working efficiency and cash flow management.

\textsuperscript{10} see British Columbia Ministry of Municipal Affairs (1999), p. 5
It is believed that both sides benefit from the arrangement by maximizing the use of each sector’s strength. The potential benefits for public sector can be such as improved efficiency, faster project delivery, improved service, improved cost effectiveness, better compliance with environmental requirement and risk shared environment. The potential benefits for the private sector will be investment opportunity and investment return with a risk shared environment. Those benefits might be achieved, since it is assumed that the private sector will do the job more efficiently than the public sector, which can lower overall project cost. The private sector gets reimbursed either by government or consumers for doing its work at a profit. Furthermore, Public Private Partnerships allow public bodies to retain the ownership of infrastructures while contracting the private sector to perform a specific function such as constructing, maintaining and/or operating the infrastructure. Likewise, the arrangement between Ethiopian Roads Authority and the private sector can be referred as one form of public private partnership whereby the public sector enters into an agreement with the private sector for the construction of road infrastructure. This is undertaken by contracting out projects to the private sector.

### 2.1.3 Contracts

A contract has been defined as an agreement which directly creates and contemplates an obligation. A simple contract consists of an agreement entered into by two or more parties, whereby one of the parties undertakes to do something in return for something to be undertaken by the other\(^{11}\). Accordingly, a public sector has to enter into a binding contract to implement a project through a private sector contractor. It is legally possible to have a binding contract without having a written agreement between parties entering into contract. However, almost all contracts of civil works are undertaken in writing and are accompanied by a voluminous contract document.

According to the World Bank\(^{12}\) the general content of the contract document normally comprises the following elements:

- the signed form of contract;
- The letter of acceptance;
- The General Condition of Contract (GCC);
- Special Condition of Contract;
- The bill of quantity;
- The technical specifications;

\(^{11}\) see Seeley (1994), p.5

\(^{12}\) ‘World Bank’s procurement guideline for projects financed by the Bank’: see: http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/PROCUREMENT/0,,pagePK:84271~theSitePK:84266,00.html
The book of drawings; and
Addendums issued during the procurement process if any.

The ‘general condition of contract’, as the name implies, is general and is applicable to all kinds of projects. It contains the following clauses:

- Clauses that establish the relationship between the employer and the contractor;
- Clauses that give protection against the various risks and allocation of them between the same parties;
- Clauses that enable to deal with unforeseen or planned changes during the implementation of the project;
- Clauses that deal with the breach of contracts by any party.

The ‘special condition of contract’ is the part that will include specific conditions by modifying the GCC to make it conveniently applicable for specific kinds of contracts.

### 2.1.4 Parties involved in Civil Work Contracts

In civil engineering contracts mainly two parties are involved, the employer and the contractor. The employer is also referred as the client or promoter (see Seeley (1994)).

The rules and regulations by which the two parties governed during the project execution and subsequent time as the case maybe is the contract agreement on which they put their signature.

Regarding the inclination of the two parties, the private sector operates under market force and hence, is profit oriented, makes decisions based on risk and reward analysis. The public sector is more of responsible to the public and tries to avoid risks at all cost, often uses its accountability and responsibility as an excuse for its slower decision making process it is engaged in.

In most cases the employer assigns a consulting firm to supervise the civil works. Even though these consulting firms are not considered as a third party in the civil engineering contract, the supervising consultant plays a crucial role.

### 2.1.5 Types of Contracts in Civil Works

There are several kinds of contractual arrangements that can be used in civil works projects. According to Seeley (1994) they are defined as seven types of contract: lump sum contracts, bill of quantities contracts, schedule contracts, cost reimbursement contracts, design and build contracts (all-in contracts), negotiated contracts and management contracts. Taking into account the relevance of the different kinds of contracts and their applicability to road
projects, the 'bill of quantities contract' and the 'design and build contract' are presented in detail while the rest are briefly defined.

**Bill of quantities contract**
This is a very common and traditional type of contract in practices worldwide. It follows a linear process for procurement. The overall procedure for realizing this contract can be divided into three stages: design, bid and build.

The first stage covers the **design** and related issues. Design stipulates each requirement of the project accompanied by a detailed quantity estimate, specifications and drawings and then put out to bid. The specifications and drawings are prepared by an engineering firm for a fee of more than 5% of the project cost. The design process is costly and time-consuming, typically taking a year or more to complete the related tasks.

The second stage covers the **bid** and **contract** and related issues. Once the design is completed, the required project documents are completed with standards, drawings and other contract documents. This large bundle of documents must be reproduced for each contractor competing for the project. After the completion of the bid packages the project is advertised and bids (or proposals) are solicited. After some predetermined period of time, the solicitation is closed and a contractor is selected based on a least cost offer. A contract can then be awarded and work can be started, which typically comes at a point about six months or more after the tender is floated. In this type of contract the contractor is required to give his offer based on a bill of quantities given by the employer specifying in detail the quality and quantity of work required\(^\text{13}\).

The third stage covers **implementation** and related issues. Once the contract is signed and the project is commenced the triangular relationship between the three parties involved (**employer**, **contractor** and **consultant**) will start. In this arrangement, the **employer** will exercise a strict quality control of the overall construction process through the consultant. Payments for quantity of work executed by the **contractor** and approved by the **consultant** will be made, and all or part of the completed work as the case maybe will be taken over by the employer. Payment is made to quantity of work executed irrespective of delivering a final product such as finished road section. The **contractor** has the responsibility of executing the works with due care and diligence and finishes the works within the stipulated contract period. It will be the entire responsibility of the **consultant** to oversee the project on behalf of the **employer** and make sure that work is being executed as per the design and specifications and certify

\(^{13}\) see Seeley (1994)
payment to be made to the contractor for work done in compliance with the requirements of the project. The consultant, though is hired by the employer, is required to act impartial while discharging his obligation under the contract. In turn the employer exercises a control over the consultant. The Ethiopian Roads Authority is currently adopting this method of contracting.

**Design - build contract**

‘Design-build’ is a method of project delivery in which an employer/promoter enters into a contract with a single contractor for design and construction services. The main feature of the method is its nature that puts responsibility to a single entity, design-build contractor, unlike the traditional contracting method which puts responsibility to a design team for the design and contractor for the construction. A number of benefits are expected from this type of contract. Reduction of the overall period required for realizing a project is one obvious benefit since the double procurement process in the traditional contracting method for the design and construction will be avoided. Furthermore, construction can be started before the completion of all the design works as the design process is included in the same organizational setup of the contractor. In general, in this method of contracting the employer/promoter role will focus much more on describing performance of the end product rather than on how to get that performance\(^\text{14}\). As a result, the role of the consultant is tremendously reduced as the design-builder is responsible for the overall design and construction, and the employer can apply a control by requiring the contractor to make sure his end product will meet the employer’s performance criterion rather than controlling each and every activity of the contractor. This situation also favours the contractor in introducing innovative techniques that will enable him utilize cost effective designs and working methods as far as the end product meets the performance criterion of the employer. In this kind of contract the employer can use a different payment method than the traditional contracting system. One common method of payment is paying for finished and opened road sections.

The design-build contract involves one contract for both the design and construction. The traditional method of contracting separates design and construction to create a system of checks and balances for quality and price. Although this separation creates checks and balances, it also seems to create a long delivery period and may result in an over-designed project and an adversarial and claims-oriented environment. Design-build contracts speed the delivery of projects and promote more constructability.

\(^{14}\) see Washington State Department of Transport (2000), p. 10
Lump Sum Contract
The ‘lump sum contract’ is the simplest type of contract in civil engineering work, wherein contractors undertake to carry out specified works for a fixed sum of money without any bill of quantity to base the total cost on. The employer will depict the nature and extent of works on drawings and the material and workmanship requirements in a specification; but no bill of quantities are provided to contractors and hence they have to come up with their own quantities to build their rates. Due to the uncertainty in the estimation of the quantity of work, the use of this form of contract is restricted to relatively small projects in which most of the work is above ground and certainly definable and hence can not be used in major road building projects\(^{15}\).

Scheduled Contracts
In this kind of contract the employer supplies a schedule of unit rates for each item of work likely to be encountered and the contractors are asked during tendering to state a percentage above or below these rates for which they are willing to undertake the works. Another alternative for this kind of contract is the employer, instead of supplying a rate ahead, seeks the contractors to give their rates for each item of the work without a predefined quantity or a small amount of quantity provided for the sake of comparison of prices. In this kind of contract it is extremely difficult to make comparisons of offers of contractors as a total some for the sake of comparison of offers can not be obtained\(^{16}\).

Cost Reimbursement Contracts
This kind of contract is whereby the employer pays to the contractor the actual cost of the work plus a management fee which will include the contractor’s overhead charges and profit. The management fee can be calculated in four different ways; namely, percentage of contract, fixed agreed sum, fluctuating sum or target cost. In the ‘percentage of contract’ case the management fee payable to the contractor is calculated as a percentage of the works cost, while in the ‘fixed agreed sum’ case a prior agreed fixed sum will be payable to the contractor. In the case of ‘fluctuating fee contract’ case the amount paid to the contractor as management fee fluctuates depending on the total cost of the work. The higher the works cost the lower the management fee and vice-versa creating an incentive and disincentive scheme for efficiency which is not part in the other two types referred above. The last variation under this type of contract, ‘target cost contract’, is whereby after a certain sum for management fee is agreed, this amount is adjusted for saving in the overall project cost. This

\(^{15}\) see Seeley (1994)

\(^{16}\) see Seeley (1994)
kind of contract lacks incentive for efficiency in the first two cases and is complicated for the other to variations to implement\textsuperscript{17}.

**Negotiated Contracts**

This kind of contract is used by the employer to invite and negotiate with a single contractor without any bidding process. The applicability is limited to cases where there are no other contractors to undertake the work due to technical and financial reasons or negotiation due to certain reasons found to be beneficial to the employer. The situations that benefit the employer could be, having an already established business relationship with contractor, in times when rapid start of project is required and the likes\textsuperscript{18}.

**Management Contractors**

The ‘management contract’ is a system whereby a main contractor is appointed, either by negotiation or competition and works closely with the employer’s professional advisors. The actual construction work will be service for all subcontractors including management. The applicability of this kind of contract is where complex projects with varying nature of work are going to be implemented\textsuperscript{19}.

### 2.2 Conceptual Approach

The success of road projects depends highly on the stakeholders involved, their interests, relations as well as the supporting environment. An appropriate tool to analyse the complex situation is to carry out a stakeholder analysis. According to the current system, the parties involved in the road project implementation are the Ethiopian Roads Authority representing the State, private contractors responsible for performing the actual work and consultants who work being entrusted by the state agency to supervise the work of the contractor.

The analysis will look into a number of case studies and put emphasis on the following aspects:

- The stakeholders’ strengths, weaknesses, interests and conflicts will be analysed;
- Furthermore, the procurement process for design, construction and supervision will be screened;
- The performance of the stakeholders in terms of meeting the project objective and discharging their respective obligations will be looked at;
- The achievements in terms of time, costs and quality will be elaborated;

\textsuperscript{17} see Seeley (1994)
\textsuperscript{18} see Seeley (1994)
\textsuperscript{19} see Seeley (1994)
The working environment will be examined considering aspects of legal framework, transparency and mutual trust which are also crucial for successful project implementation;

and finally the control mechanism being exercised to ensure proper quality cost and time elements of the projects will also be reviewed.

**Figure 2** shows the schematic representation of the conceptual approach with the logical linkages.

**Figure 2: Conceptual Approach**

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### 3 The analysis

The Ethiopian Roads Authority is a Federal Government body responsible for the expansion and maintenance of the road network, this objective is achieved through implementing road construction and maintenance projects in the country. Before the fall of the socialist regime, 1991, road construction and maintenance was being carried out by the Ethiopian Roads Authority’s Own Force Unit and the few state owned construction companies. This arrangement was not efficient for many reasons and had failed to provide the service required by the public. After the fall of the socialist regime, the country adopted a free market economic policy and as part of this reform the Ethiopian Roads Authority restructured to work with private partners rather than building roads by its own force account. Through this arrangement a much better improvement has been seen compared to the previous condition; however, the overall performance is not satisfactory enough in addressing the problem.
The chapter analyses the overall situation of the procurement process being exercised presently and the performance of the project implementation by reviewing selected projects undertaken in the recent past in the Authority. The analysis of the case studies is based on review of secondary data available on projects undertaken in Ethiopian Roads Authority. Internal reports such as project status reports and recorded project summaries in the Authority are used as a source of data. The information are complemented by the experiences made by one of the authors who worked as a Project Engineer for the last three years with ERA.

3.1 Characteristics of the stakeholders involved in the implementation of road projects

As already indicated earlier the parties involved in the project implementation are the public sector represented by the Ethiopian Roads Authority, the private sector contractors and consultants. To be able to closely study the roles and responsibilities of the different parties involved in the infrastructure provision, the planning stages involved in the transportation planning are reviewed. Table 3 summarises the planning steps, tasks and actors involved.

<table>
<thead>
<tr>
<th>Stages</th>
<th>Tasks</th>
<th>Public actors</th>
<th>Donor Agencies</th>
<th>Private actors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1:</td>
<td>Problem definition: Road Problem analysis: condition of existing roads, network coverage, access to social and physical infrastructure, target group identification, etc</td>
<td>ERA, Regional Governments</td>
<td>World Bank, African Development Bank, unilateral financers etc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Policy formulation and objective: a ten year road sector development program to increase quality and quantity of the road network</td>
<td>ERA, Ministry of Infrastructure</td>
<td></td>
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</tr>
<tr>
<td>Stage 2:</td>
<td>Feasibility study and preliminary design: selection and analysis of different roads to what level to be upgraded or rehabilitated or maintained; identification of new road requirements</td>
<td>ERA, Environmental Protection Authority, Regional Governments</td>
<td>Consultants</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Project estimation: Generation of alternatives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 3:</td>
<td>Option assessment: using multi-criteria and performance indicators</td>
<td>ERA</td>
<td></td>
<td>Consultants</td>
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<td></td>
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</tr>
<tr>
<td>Stage 4:</td>
<td>Decision making: Selection of projects to be implemented Agreement to proceed to subsequent step</td>
<td>ERA, Ministry of Infrastructure</td>
<td>World Bank, African Devt. Bank, unilateral financers etc</td>
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<tr>
<td>Stage 5:</td>
<td>Implementation Detailed design Construction Construction Supervision</td>
<td>ERA, Environmental Protection Authority</td>
<td>World Bank, African Devt. Bank, unilateral financers etc</td>
<td>Consultants</td>
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<tr>
<td>Stage 6:</td>
<td>Monitoring and evaluation Assessment of output in terms of technical aspects, economic benefit, social benefit, meeting its target objective, feedback for future policy.</td>
<td>ERA, EPA</td>
<td>Financers</td>
<td></td>
</tr>
</tbody>
</table>
3.1.1 The public sector

The Ethiopian Roads Authority is a public sector entity and its role is to provide safe, comfortable and adequate road infrastructure to support the socio-economic development of the nation and satisfy road users. This is planned to be achieved by improving the condition of existing roads and expanding the network. As a government entity the Authority operates under the realm of responsibility, accountability and social and environmental care. Furthermore, the need for and the priority put on the road sector has strengthened the position of ERA among other government institutions towards pursuing issues that need the involvement of politicians at higher level.

The Authority has been in the road business for the past fifty five years, being established in 1951 as Imperial Highway Authority by the late king. Later it was restructured by the successor of the Imperial monarchy, a Marxists government with a slight institutional change. During the two periods, which comprise about 40 years, the Authority was responsible for the design and implementation of road projects, making use of in-house design and own force unit for construction. After the fall of the Marxist government ERA underwent a radical restructuring process partly due to the pressure of the donor community and partly due to internal government initiative. As part of these changes, the in-house design preparation was discontinued and private consultants were entrusted the task. In addition the responsibility regarding the own force unit was minimized and most projects put for competitive bidding. Finally, the Road Fund Administration was established. Owing to this restructuring ERA succeeded in establishing a certain level of autonomy compared to the past.

Despite, the low rated achievement in road network expansion of the country even against the Sub-Saharan average, the Authority is reputed by the general public for the service it gave in the past. This good reputation has helped the Authority in easily recruiting professionals to work for it even paying lower salaries than the market rates.

The organizational arrangement of the Authority relevant to procurement and project implementation is shown in Figure 3. Out of the entire organization of the Authority the Construction Contract Implementation Division (CCID) is the one in charge of the project implementation while the Engineering Procurement, Design and Technical Support Division is responsible for procurement of works and engineering services. The Planning and Programming Division plays a key role in the early stages of project formulation and inception. Besides, at the later stage the annual budgeting and monitoring task vests upon it. As can be seen from the figure a clear hierarchical structure exists and decisions for different issues are made at different level. To this effect a decision matrix prepared by the Construction Implementation
Division showing the kind of decision that can be made at different levels within the Division and at higher levels for issues related to the Division is being used as a reference for working procedure.

In this hierarchical decision making structure, issues like approving contractor’s interim payment certificate can be finalized at the Branch level and can be considered relatively short as only three officers decision is needed, namely the Project Engineer, the Section Head and the Branch Head, prior to the Finance Division effecting the subject payment. This process takes one week on average. To the contrary issues like issuing a variation order and introducing a design change/modification that has a cost and time implication to the project completion needs the approval of the Board the initiation channelling from the Project Engineer through the hierarchy. This kind of issue drugs long, going back and forth most of the time taking several months to make a final decision.

Figure 3: Organisational arrangement of ERA relevant to procurement and project implementation

### 3.1.2 Contractors

The contractors co-operating with the Authority can be grouped in two groups, local contractors and international contractors. Local contractors are less experienced and rarely do meet the requirements to participate in donor financed projects. This situation has a negative impact on the development of the local construction industry. The second group, the international contractors, consists of foreign companies only and is well equipped to meet the re-
requirements to participate in donor financed projects. Contractors working with the Authority are mostly limited liability companies, operating under business laws and are profit driven. Contractors are willing to pay attractive salary for qualified personnel and hence are better staffed. In addition, they motivate employees by giving incentives during successful business years. Furthermore, by adopting a contractual agreement that is to their advantage can retain employees that are competent in their company and retrench those who are not competent. Their functional structure in relation to projects is simplified and is of fewer hierarchical levels. The contracting company after winning the contract will assign a project manager to the project and this project manager will be responsible for matters pertinent to the project during the entire project time, to this effect, most decisions are made by the Project Manager at the project level. Figure 4 shows the organizational arrangement of the contractors’ site team. Striking is that the number of hierarchy in the structure is lower compared to that of the Road Authority. This enables the contractor to make decisions faster and respond promptly for issues that require his involvement.

3.1.3 Consultants

Consultants share similar characteristics with contractors except for the service they give. Like contractors, consultants establish a task team for a design or supervision service they contracted to and the team will be entirely responsible for the service of the firm. Their functional structure in relation to projects is also similar to the contractor and is simplified; it is
also of fewer hierarchical levels. The resident engineer is responsible for matters pertinent to
the project during the entire project time. Figure 5 shows the organisational arrangement of
the consultants’ site team. Again, striking is that the number of hierarchy in the structure is
similar to that of the contractor and lower compared to that of the Road Authority.

Figure 5: Organisational arrangement of consultants’ site team

3.2 Procurement Process

The overall procurement process for projects used in the ERA is based on the traditional
design-bid-build approach. In this process the Authority, after identifying the need for a spe-
cific project, will undertake a feasibility study and decide whether to proceed with the project
or not. A feasibility study typically takes six months to finalize. If at this stage the project is
found out to be feasible a decision to proceed with the design will be made and the next
stage will be procurement of an engineering service to undertake the design of the project.
This process also takes on average six months. In the selection of consultants for design of
roads the Authority uses both subjective and objective evaluation criterion and is based on a
combination of cost and quality offer. This is achieved by setting a detail criterion in the re-
quest for proposal and soliciting separate technical and financial proposal, afterwards scoring
the technical and financial proposals of firms separately out of hundred and combining the
two with a commonly used weighting of 20% and 80% for financial and technical score re-
spectively. The firm reaching the highest combined score will be the potential winner and be
called for negotiation, if there are any deficiencies in its offer to correct prior to award and
subsequent award. Afterwards the firm will commence with the design work. Design period
for road projects commonly varies from 12 months to 18 months.

After the design is finalized, depending on the size of the project, requirements of the fi-
nancer and other relevant criteria, a two stage or one stage bidding process will be adopted
for the selection of contractors for the construction work. A two stage bidding is whereby; at first stage a prequalification application will be solicited from contractors to assess their financial capacity, past experience, equipment fleet, personnel and related matters. To compare financial offers at a second stage a bidding process will be undertaken inviting firms that passed the first stage. Unlike the procedure for selection of consultants which utilizes cost and quality based selection, this method uses a pass and fail criterion for the first stage and makes no differentiation in ranking, among the applicants who survived the first stage. The firm who gave the lowest offer will be the potential winner and will be called for negotiation and subsequent award. Selection of contractors based on this method takes about twelve months.

In contrast to the two-stage bidding, the one-stage-bidding is relatively simple and takes shorter time. It sets minor technical criteria that should be met by bidders and bidders who consider that they meet the stipulated criteria submit their financial offer directly and the bidder with the lowest will be the potential winner. This process takes about seven months to award a contractor.

Parallel to selection of contractors, selection of consultants will be performed to nominate a consultant who supervises the contractor’s work. The procedure for selection of supervision consultants is identical with the selection procedure for design consultants.

The overall process of selection of contractors and consultants for feasibility study, detailed design and subsequent project implementation takes from a minimum of two and half year up to more than three and half year.

**Figure 6** shows the procurement process for the different tasks and related stakeholders – design and design consultants, construction and one-stage and two stage bidding for contractors as well as supervision and supervision consultants.
3.3 Case studies - RSDP Road Projects

As part of the ten years Road Sector Development Program a number of road projects are being implemented in ERA. In this paper six road projects will be discussed in detail. All projects are procured through the linear design-bid-build method and projects awarded for least bidders after a prequalification screening out took place. The procurement process was based on international competitive bidding and no local contractor managed to pass the prequalification stage. All projects studied are jointly financed by the World Bank through International Development Association (IDA) credit and the Government of Ethiopia, a major proportion of the fund coming from IDA.
The following six road projects implemented under the RSDP will be analysed in detail (see Figure 7)\(^{20}\):

- **Modjo – Awash – Mille Road Rehabilitation Project** - Contract 1: Modjo – Awash Arba
- **Woldia – Adigrat – Zalambessa Road Upgrading Project** - Contract 1: Woldia – Alamata
- **Woldia – Adigrat – Zalambessa Road Upgrading Project** - Contract 2: Betmera – Wkro
- **Awash – Hirna – Kulubi – Dengego – Dire Dawa and Dengego – Harar Road Upgrading Project** - Contract 1: Awash – Hirna

Figure 7: Federal Road network in Ethiopia and selected road projects

Source: Prepared by Author

\(^{20}\) detailed information on the road projects such as construction period, costs, companies involved, construction details and problems are gathered from internal project documents; therefore this source will not be mentioned during the analysis.
### 3.3.1 Modjo – Awash – Mille Road Rehabilitation Project:

**Contract 1: Modjo – Awash Arba**

This road section is part of the main trunk road that connects the capital city, Addis Ababa, with the port of Djibouti. The total length of the project is 160.3km and is a two way single lane asphalt concrete road with a 7m carriage way and 1.5m gravel shoulder on both sides. The contractor was a Korean based company named Keagnam Enterprise Limited and the supervision consultant was carried out by Car Bro International, a Danish based company, in association with a local consultant. The commencement date of the project was April 01 1999 with a total contract duration of 36 months thereby establishing a completion date of April 01 2002. The original contract amount including contingency was ETB 227.45 million\(^2\). The project completed in December 2004 after 68 months of construction period against the planned 36 month construction period. The total project costs at completion increased to ETB 375.43 million. The boost was caused by accounts for variation orders issued ETB 43.97 million and additional 101 million due to price adjustment. In addition the contractor had submitted claims under various headings amounting to ETB 375.4 million and claims for extension of construction time to end of December 2004. Finally an extension to end of December and a monetary compensation to the contractor of ETB 25.15 million were agreed.

The factors that resulted in issuance of variation order and give rise to claim are the following.

**Variation order**
- Deterioration of existing pavement requiring different approach for reconstruction than specified in the design.
- Introduction of additional bridge which was not included in the original design.
- Request for modification of part of the road section by a regional government to conform to the city master plan.
- Drainage requirements in certain sections
- Mitigation of a settlement problem in certain section of the road.

**Factors give rise to claims**
- Delays and additional cost incurred due to Variation orders.
- Shortage of suitable quarry to produce aggregate for Asphalt work.
- Site security.
- Interruption of importation of construction materials due to Ethio-Eritrea war.
- Delays in possession of site.
- Late instruction.
- Delays in Engineer’s approval of contractor’s request for approval.

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\(^2\) 1USD was equivalent to about ETB 7.2 at the time of tender: unpublished contract document of the project
The consultant-contractor relationship had been harsh for most of the contract period but it was “relatively” better towards the completion of the project. The performance of the contractor was of low quality and there were many defects and re-works during the progress of works. Time has been extended for the contractor solely because he was suspended in Nazareth town for two years by ERA and due to the incompetence of the consultant’s representatives on site. There has been no close follow up from the consultant’s head office regarding the performance of its site team\textsuperscript{22}.

### 3.3.2 Woldia – Adigrat – Zalambessa Road Upgrading Project: Contract 2: Woldia - Alamata

This road section is part of the main trunk road that connects the capital city, Addis Ababa, with the northern part of the country. The total length of the project is 78.3km and is a two way single lane asphalt concrete road with a 7m carriage way and 1.5m gravel shoulder on both sides. The construction work was carried out by the Chinese company China Wanbao Engineering Corporation. The supervision consultant was Dar Al Handasah Shair and Partners (Lebanon). The commencement date of the project was April 04, 1999 with total contract duration of 36 months thereby establishing a completion date of April 03 2002. The original contract amount including contingency was ETB 150.3 million. The project completed in June 2004 after 62 months of construction period. The total project cost at completion increased to a total of ETB 230.9 million caused by variation orders issued ETB 21.8 million and additional 62.43 million due to price adjustment. Additionally, the contractor had submitted claims under various headings amounting to an extension of time of 1134 days. The contractor’s claim is settled through an amicable settlement by granting an extension of 352 days. The factors that resulted in issuance of variation order and give rise to claim are the following.

**Variation order**

- Errors in the estimation of the quantities of work in the bill of quantities.
- Collapse of existing bridge and requiring replacement which was not in the design.
- Heavy repair to another bridge which was not foreseen in during design of the project.
- Change in requirement of unlined ditch to lined ditch.
- Foundation protection work for a number of bridges.

**Factors give rise to claims**

- Increased scope of works
- Delayed possession of site

\textsuperscript{22} sources: Revised Project Implementation Plan; RSDP Support Projects cr-3032-ET
Late issue of drawing
Site conditions (unavailability of natural material for subbase)
Hand over of GPS points
Abnormal weather condition

The contractor’s performance for the first two years of the original three year contract period had been so poor that he could only achieve less than 20% of the total works with more than two third of the time elapsed. However, after taking all the appropriate measures towards change in management and additional resources the contractor has achieved tremendous progress and managed to complete the works within the extended period granted by ERA (June 30, 2004) due to additional works of great magnitude. The quality of the works is also in compliance with the technical specification requirements. There has only been a defect worth ETB15, 000 found after the defect liability period that has been deducted from the final certificate. The consultant-contractor relationship had been good.

3.3.3 Woldia – Adigrat – Zalambessa Road Upgrading Project: Contract 1: Betmera – Wkro

This road section is a continuation of the above mentioned project and part of the main trunk road that connects the capital city, Addis Ababa, with the northern part of the country. The total length of the project is 117.2km and is a two way single lane asphalt concrete road with a 7m carriage way and 1.5m gravel shoulder on both sides. The contractor was again the Chinese company China Wanbao Engineering Corporation but supervision work was carried out by the French company BECEOM. The commencement date of the project was April 04 1999 with total contract duration of 36 months thereby establishing a completion date of April 03 2002. The original contract amount including contingency was ETB 203.4 million (contract document of the project). The project completed in October 25 2004 after 67 months of construction period. The total project cost at completion increased to ETB 240.5 million. Variation orders amounting to ETB 1.36 million and 66.5 million for price adjustment is additionally paid to the contractor. Contrary to this a quantity over estimation in the original bill of quantity has resulted in a reduction of ETB 17.59 million. The contractor had submitted claims under various headings amounting to ETB 26.5 million and extension of time of 494 days. ERA is negotiating with the contractor to settle the claims amicably. The factors that resulted in issuance of variation order and give rise to claim are the following.

23 sources: Revised Project Implementation Plan; RSDP Support Projects cr-3032-ET
Variation order

- Requirement of lined ditches in different sections of the road which was not included in the original design.

Factors give rise to claims

- Delayed possession of site and access thereto
- Disruption to the work program caused by war
- Delayed supply of Engineer’s drawings or designs
- Failure by the Engineer to supply survey control points.
- Lack of complete possession of the site
- Changing of cut slope km 0+000 to 3+630
- Application of new rates in terms of clause 52
- Construction of new Bridge

The contractor’s performance was poor and there have been some specific problems related to quality predominantly due to the lack of competence on most of the consultant’s personnel including the senior staff. The consultant-contractor relationship was good towards the end of the project, but was harsh during the first one and half years.

3.3.4 Awash – Hirna – Kulubi – Dengego – Dire Dawa and Dengego – Harar Road Upgrading Project: Contract 1: Awash – Hirna

This road section is part of the main trunk road that connects the capital city, Addis Ababa, with the eastern part of the country. The total length of the project is 140.7km and is a two way single lane asphalt concrete road with a 7m carriage way and 1.5m gravel shoulder on both sides. The contractor was a Chinese company named China Road and Bridge Corporation and the supervision work was carried out by Consulting Engineering Services Ltd. (India). The commencement date of the project was June 08 1999 with total contract duration of 36 months thereby establishing a completion date of June 07 2002. The original contract amount including contingency was ETB 256.54 million (contract document of the project). The project completed in August 06 2004 after 62 months of construction period. The total project cost at completion amounted to ETB 311.5 million caused by variation orders issued ETB 8.25 million and additional 71.1 million due to price adjustment. Additionally the contractor had submitted claims under various headings amounting to ETB 91.72 million and extension of time of 572 days. The contractor’s claim is not yet settled. The factors that resulted in issuance of variation order and give rise to claim are the following.

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24 Source: Revised Project Implementation Plan; RSDP Support Projects cr-3032-ET
Variation order

- Additional work due to request of local administration through which the road passes.
- Due to masonry work which was missing in the bill of quantity.
- Additional work due to land slide.
- Provision of miscellaneous items required for the project but not included in the bill of quantity.

Factors give rise to claims

- Initial delays due to hand over of site and non-availability of Benchmarks.
- Increase in quantity of material pipe culverts, Earthwork and subbase.
- Variation orders.
- Possession of site (ROW)
- Interpretation of the specification.
- Plinth/Building area of Engineer’s establishment.
- Fill material to replace removed topsoil.
- Back fill to Culverts.
- Formation of shoulders.

The performance of the contractor was very poor, which was caused by poor planning, insufficient equipment fleet and lack of professional staffs. As far as quality of the works is concerned, the contractor has done what had been specified in the contract specification, but still there were some workmanship problems observed, caused by lack of supervision by the consultant firm. The relationship between the contractor and the consultant was fair.25

3.3.5 Awash – Hirna – Kulubi – Dengego – Dire Dawa and Dengego – Harar Road Upgrading Project: Contract 2: Hirna – Kulubi

This road section is part of the main trunk road that connects the capital city, Addis Ababa, with the eastern part of the country. The total length of the project is 91km and is a two way single lane asphalt concrete road with a 7m carriage way and 1.5m gravel shoulder on both sides. The construction work was carried out by a Korean based company named Keagnam Enterprise Limited and the supervision consultant was Scott Wilson Kirkpatrick & Co. Ltd (UK). The commencement date of the project was June 05 1999 with total contract duration of 30 months thereby establishing a completion date of December 04 2001. The original contract amount including contingency was ETB 188.08 million. The project completed in September 30 2004 after 64 months of construction period. The total project cost at completion increased to ETB 224.76 million caused by variation orders issued ETB 20.0 million and ad-
ditional 33.27 million due to price adjustment. Furthermore the contractor had submitted
claims under various headings amounting ETB 46.74 million and extension of time of 539
days. The contractor’s claim is not yet settled. The factors that resulted in issuance of vari-
tion order and give rise to claim are the following.

**Variation order**
- Additional work due to land slide.
- Provision of miscellaneous items required for the project but not included in the bill of
  quantity.

**Factors give rise to claims**
- Exceptionally Adverse Weather Condition.
- Employer’s Alleged Failure to give possession of site.
- Increased quantity of work and Additional work.
- Contractor’s disagreement with engineer’s measurement and valuation of works.
- Illegal labour strike.

Quality of the works was fair to good. The contractor managed to satisfy most of the re-
quirements under the contract specification except for the compaction requirements of the
wearing course on some locations. The relationship between the contractor and the consult-
ant was very poor due to the contractor’s attitude of not accepting the consultant’s advices
and instructions. Among other problems repetitive replacements of incompetent project man-
ger aggravated the poor relationship. Poor planning, insufficient equipment fleet and lack of
professional staffs coupled with the difficult terrain condition and earthwork slides, very much
limited the Contractor’s performance\(^{26}\).

### 3.3.6 Awash – Hirna – Kulubi – Dengego – Dire Dawa and Dengego – Harar
Road Upgrading Project: Contract 3: Kulubi – Dengego – Dire Dawa &
Dengego – Harar

This road section is part of the main trunk road that connects the capital city, Addis Ababa,
with the eastern part of the country. The total length of the project is 80km and is a two way
single lane asphalt concrete road with a 7m carriage way and 1.5m gravel shoulder on both
sides. The contractor was a Chinese company named China Road and Bridge Corporation
and the supervision consultant was Wilbur Smith Associates Inc. of USA. The commence-
ment date of the project was June 08 1999 with total contract duration of 30 months thereby
establishing a completion date of December 07 2001. The original contract amount including

\(^{26}\) Source: Revised Project Implementation Plan; RSDP Support Projects cr-3032-ET
contingency was ETB 162.18 million (contract document of the project). The project completed in September 18 2004 after 63 months of construction period. The total project cost at completion was ETB 220.5 million this increase only accounts for variation orders issued ETB 15.92 million and additional 48.0 million due to price adjustment. Apart from this the contractor had submitted claims under various headings amounting ETB 68.58 million and extension of time of 754 days. The contractor’s claim is not yet settled. The factors that resulted in issuance of variation order and give rise to claim are the following.

**Variation order**

- Errors in the estimation of the quantities of work in the bill of quantities.
- Additional length requirement of paved ditch than specified in the original design.
- Additional work required due to protection of road from erosion.
- Repair work for a bridge due to damage.
- Provision of miscellaneous items required for the project but not included in the bill of quantity.

**Factors give rise to claims**

- Delayed possession of site.
- Non-availability of Benchmarks.
- Increase in quantities (subbase, DBM AC Wearing Course, and Drainage Structures)
- Delay in providing design.
- Shortage of Cement.

The Contractor has done what had been specified in the contract specification, but still there were some workmanship problems observed. During the start of permanent works there was poor relation between the contractor and the consultant that was improved in the later stage of the contract. The performance of the contractor was very poor, which was caused by poor planning, insufficient equipment fleet and lack of professional staffs.

### 3.3.7 Summary

*Table 4* and *Table 5* summarise the reasons for changes in the investigated road projects. It is obvious that each project is unique and shaped by a certain set of problems. There are many factors influencing the performance and output of the road projects, but there are only a few factors relevant in a comprehensive way. Design factors such as drawings and specifications, bill of quantity and problems related to the possession of site are factors relevant for nearly all road projects.

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27 Source: Revised Project Implementation Plan; RSDP Support Projects cr-3032-ET
Table 4: Summary of road project related changes – factors given to claim

<table>
<thead>
<tr>
<th>Changes</th>
<th>Project/ Changes</th>
<th>Modjo-Awash</th>
<th>Woldia-Alamata</th>
<th>Betme-ra-Wkro</th>
<th>Awash-Hirna</th>
<th>Hirna-Kulubi</th>
<th>Kulubi-Denggo</th>
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<tbody>
<tr>
<td>Delays and additional cost due to VO</td>
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<td>Increased scope of work</td>
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<td>Changing of cut slope</td>
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<td>Delays in possession of site</td>
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<tr>
<td>Delays in Engineer’s approval</td>
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<td>Late instruction</td>
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<td>Late issue of design &amp; drawings</td>
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<td>Engineer’s failure to give survey points</td>
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<td>Non-availability of Benchmarks</td>
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<td>Abnormal weather condition</td>
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<td>Interruption of importation due to war</td>
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<td>Site security</td>
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<td>Interpretation of the specifications</td>
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<tr>
<td>Application of new rates</td>
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<tr>
<td>Illeagal labor strike</td>
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<tr>
<td>Shortage of suitable material</td>
<td></td>
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<tr>
<td>Shortage of cement in local market</td>
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Table 5: Summary of road project related changes – variation order

<table>
<thead>
<tr>
<th>Changes</th>
<th>Project/ Changes</th>
<th>Modjo-Awash</th>
<th>Woldia-Alamata</th>
<th>Betme-ra-Wkro</th>
<th>Awash-Hirna</th>
<th>Hirna-Kulubi</th>
<th>Kulubi-Denggo</th>
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</thead>
<tbody>
<tr>
<td>Deterioration of existing pavement</td>
<td></td>
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<tr>
<td>Introduction of new bridge</td>
<td></td>
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<tr>
<td>Heavy repair of existing bridge</td>
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<td>Foundation protection for bridges</td>
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<td>Additional minor drainage requirement</td>
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<tr>
<td>Change in requirement of drainage</td>
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<td>Request for design modification (LA)</td>
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<td>Additional work due to land slide</td>
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<td>Mitigation of road settlement</td>
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<tr>
<td>Additional erosion protection work</td>
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<tr>
<td>Errors in quantity estimation</td>
<td></td>
<td></td>
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<tr>
<td>Due to masonry item missing in BOQ</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Provision of miscellaneous items</td>
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</tr>
</tbody>
</table>

28 VO – Variation Order
29 LA – Local Administration
30 BOQ – Bill of quantity
In all the reviewed projects the **drawings** and the **specifications** prepared by design consultants being the foundation for project implementation were poor in quality containing inconsistencies, ambiguities, omissions and errors.

Additional work and purchase of miscellaneous items due to **incomplete bill of quantities** hindered the timely project implementation and keeping the budget line.

Besides, **clearances of obstructions** in time by the employer in all the contracts were among the reasons for delays by the respective contractors. Delays of more than one year are not uncommon and the delay in the clearance process will have a direct impact on the contractors' activities. The removal of obstruction in the Betmariam - Wokro Road Upgrading Project was not completed until February 2004 while the original project completion date was August 2002. Similarly, in Kulubi - Dengego - Diredawa & Dengego - Harar Road Upgrading Project the removal issue had dragged long beyond the original completion date, which was December 2002 while the removal of obstruction was not finalized until April 2003. Considering the situation in the Modjo – Awash Arba Road Upgrading project, obstruction clearance in Nazareth town had taken long time even after the original completion date of the project.

Despite the fact referred, ERA is legally entitled to use any land free of charge for road construction and activities related to same. However, ERA should pay the necessary compensation for private or public entities who have fixed property on the required land. The procedure being used for clearance of obstruction is time consuming. After the identification of obstructions in the road reserve or construction width of a project by the supervision consultant and contractor a list of obstructions will be forwarded to ERA who dispatches an officer to assess the cost of properties to subsequent payment. Due to lack of good working procedure, the right of way clearance work often commences after awarding the contract.

A result of the many factors influencing the implementation process of the road projects is the considerable increase in project costs and time. **Table 6** and **Table 7** highlight the changes in planned and actual costs and time.
Table 6: Summary of project costs - planned vs. actual

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Planned Project cost (ETB M)</th>
<th>Actual Project cost (ETB M)</th>
<th>Increase in percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Modjo-Awash Arba</td>
<td>227.45</td>
<td>375.43</td>
<td>65</td>
</tr>
<tr>
<td>2 Woldya-Alamata</td>
<td>150.30</td>
<td>230.90</td>
<td>54</td>
</tr>
<tr>
<td>3 Betmra - Wkro</td>
<td>203.40</td>
<td>240.50</td>
<td>18</td>
</tr>
<tr>
<td>4 Awash – Hirna</td>
<td>256.54</td>
<td>311.50</td>
<td>21</td>
</tr>
<tr>
<td>5 Hirna - Kulubi</td>
<td>188.08</td>
<td>224.76</td>
<td>20</td>
</tr>
<tr>
<td>6 Kulubi – Dengego - Dire</td>
<td>162.18</td>
<td>220.50</td>
<td>36</td>
</tr>
</tbody>
</table>

Table 7: Summary of project implementation time - planned vs. actual

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Planned Project Duration (Months)</th>
<th>Actual Project Duration (Months)</th>
<th>Increase in percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Modjo-Awash Arba</td>
<td>36</td>
<td>68</td>
<td>89</td>
</tr>
<tr>
<td>2 Woldya-Alamata</td>
<td>36</td>
<td>62</td>
<td>72</td>
</tr>
<tr>
<td>3 Betmra - Wkro</td>
<td>36</td>
<td>67</td>
<td>86</td>
</tr>
<tr>
<td>4 Awash – Hirna</td>
<td>36</td>
<td>62</td>
<td>72</td>
</tr>
<tr>
<td>5 Hirna - Kulubi</td>
<td>30</td>
<td>64</td>
<td>113</td>
</tr>
<tr>
<td>6 Kulubi – Dengego - Dire</td>
<td>30</td>
<td>63</td>
<td>110</td>
</tr>
</tbody>
</table>

4 Findings

In the following section the findings of the analysis will be presented. Firstly an overview on general findings will be given, followed by detailed findings on cost and time, quality, procurement and implementation issues. Finally some conclusions will be drawn.

4.1 General

The analysis of the road projects came to the following consolidated findings:

- From the overall assessment of the situation it has been seen that ERA has retained a tight control over the design and construction of road projects by providing contractors with detailed design, bill of quantity and specifications for bidding and subsequent im-

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31 Millions of Ethiopian Birr (currency of Ethiopia) 1 ETB equals approximately 0.1 euro
plementation of projects. Besides, ERA has put effort to closely control the contractors’ work by appointing supervision consultants on site.

- The only means employed for road provision is the lowest bid procurement method, whereby contractors submit their offer for the project based on design documents provided by ERA.

- The linear design-bid-build process that follows the low bid procurement method shows that it takes longer time in project delivery even under normal circumstances where processes are free of any technical, financial or political impediments.

- Contracts are based on processes rather than performance.

- Regarding implementation all road projects studied did not complete in time and within calculated budget.

- There have been numerous claims made by contractors in the process of project implementation.

- Poor contractor consultant relationships were prevalent on site negatively affecting the project progress.

- The organizational structure of ERA in relation to contract administration is seen to be very convoluted and this situation has resulted in slow decision making process.

- Failure of granting the road reserve and material sites by clearing obstructions were also among the reasons for delay in project progress and subsequent claim by contractors.

### 4.2 Cost and Time Related Issues

All the six reviewed projects did not complete in the planned time schedule and cost frame (see Figure 8). The cost and time overrun is considerable. Additional costs incurred by ERA due to contractors’ claims are not included here as most issues are pending and under negotiation between ERA and the respective contractors. Additional cost and time arising from the design and supervision consultants’ failure to meet their obligations is born by ERA as these firms are hired by ERA and considered to be ERA’s agent in the contract.
The reason for cost and time overrun of projects were various. However, the major reasons can be grouped into the following three categories:

- problems related to ERA;
- problems related to consultants; and
- problems related to contractors.

**Problems related to Ethiopian Roads Authority:**

- Delay in granting of the road reserve and material sites
- Slow decision making
- Lack of qualified personnel
- Loss of Benchmarks and survey data
- Shortage of construction material in the local market (e.g. cement)
- Additional work (variation orders due to request from local administrations where the roads pass through)
- Delay/inconvenience due to war

**Problems related to design and supervision consultants:**

- Errors in design document
- Delay in providing design and drawings to the contractors
- Loss and/or inaccurate survey data
- Increase in quantity of work due to poor design
- Ambiguity in the interpretation of specifications
- Variations (due to poor/insufficient design)
- Delay in approval of works
Problems related to contractors:
- Poor contractor consultant relationship
- Inadequate resource on site (plant and equipment)
- Lack of professional staff on site
- Planning and management problem

4.3 Quality Related Issues

As seen in the analysis of the road projects the quality of work was good in one road project only (Woldya – Alamata project) while the remaining projects rated from fair to poor performance. In this regard the assessment of the Modjo – Awash Arba project has shown that the quality of the final product was poor, and a considerable rework was necessary to rectify the defects during the progress of the works. In Betemera – Wkro project quality of work was low, attributed to lack of competence from the supervision consultant side. The quality of work in Awash – Hirna project was more or less good but due to lack of good supervision by the consultant some problems were observed. In Hirna - Kulubi project quality level was acceptable except for minor incidents caused by poor workmanship. In Kulubi – Dengego – Dire Dawa and Dengego – Harar project the contractor performed according to the contract specification, but still there were some workmanship problems observed.

In summary the following factors were identified as causes for problems related to quality.
- Poor design and technical specification.
- Lack of competence of contractors and their site team.
- Lack of competence of consultants’ site team.
- The nature of the least cost procurement itself led to under quoted offers by contractors to win projects, subsequently forcing contractors to compromise quality to make profit.
- Ready made designs and specifications provided by ERA for the work, limiting the contractors from using their own innovative methods in construction.
- Lack of incentive for quality in the selection of contractors.

4.4 Details on Findings

The findings highlighted earlier are discussed in detail hereunder. For the sake of clarity the findings are categorized in to two groups namely the procurement and implementation stages. However, some issues are crosscutting and appear in both stages of the projects.
4.4.1 Procurement Related Issues

- The least cost offering bidder selection approach has the potential to put the contractor's best monetary interest at odds with providing quality end product and exercising extra environmental protection measures. Hence; contractors enter into the bidding process by determining the cost to meet ERA's responsive parameters for cost of materials, quality control, time allowed, risk (to contractor), and profit. Placing additional emphasis on any of these parameters puts a contractor at a competitive disadvantage. Under competitive guidelines, a contractor who puts additional money into a bid for better quality beyond what is specified in the contract would be at a competitive disadvantage.

- The linear design-bid-build procedure consumes a considerable period of time. As shown in the procurement process, the selection of consultants for performing feasibility study and detail design, followed by selection of contractors for execution of projects takes from a minimum of two and half year up to more than three and half year. This condition has a serious impact on the timely provision of roads. In addition the changing future conditions in the process contribute to the poor plan implementation.

- The least cost selection method coupled with poor design and contract documents formulated by ERA were among the major reasons for contractors' claims. These attendant circumstances caused the loss of significant amount of money and time for ERA.

4.4.2 Implementation Related Issues

- The analysis of road projects disclosed that design errors and poor specification are decisive causes for cost and time overrun of projects. The procedure whereby ERA retains a tight control over the design and construction of projects put the administration in a position to take responsibility for the quality of the work done by contractors, by assuming responsibility for the accuracy of the design and specification provided to them. Designs are prepared by appointed design consultants and contractors carry out the construction work based on the design input. Consequently ERA is responsible for all the shortcomings, errors, omissions and ambiguities in the design document, although mistakes are produced by the design consultant.

- Contracts are based on process rather than on final outcome. Payment to the contractor takes place for the amount of work executed regardless of providing finished end product in a certain period of time (e.g. quantity of excavation or backfill or the likes), but not on delivering a finished road segment. This process does not encourage con-
tractors to open section of completed roads to traffic. Moreover, this process based system pauses cash-flow problem on ERA due to cost based reimbursement and uncertainty of interim payment amounts to the contractors.

- ERA has taken the responsibility of setting standards for quality control, construction time allowed, environmental and social aspects of the project during implementation. Furthermore ERA is applying control mechanisms to monitor the fulfilment of these conditions. However, the procedures and mechanisms are evidently not effective to ensure fast and cost effective delivery of projects, leading to failure to meet the RSDP objective. On certain projects there may be a faster way to perform the work that has a slightly higher cost increment. Nevertheless, ERA during the tender process fixes the contract duration, resulting in no encouragement to contractors for early completion as there is no bounce for early completion. However, if a road can be opened for traffic a certain period earlier than the planned time the benefit gained in doing so might justify the extra costs incurred to finish earlier. For projects procured under the traditional bidding mechanisms, contractors cannot use these methods during construction as there is no mechanism to compensate them. And hence, ERA is not getting the benefit of these alternatives. In addition, ERA has published standards and technical specifications that should be used for design and construction of road projects and contractors and consultants are required to base their work on these standards. However, there is no guarantee that these standards and technical specification are adequate to achieve the required project objective. Besides, contractors may have a different or even better way of doing the work but the system gives no room for these kinds of contractors’ experience to be utilized in ERA’s projects.

- In many projects the contractor consultant relationship played a crucial role resulting in poor project performance. This is due to the nature of the traditional contracting system that applies a strict control mechanism on the contractors’ working process. This process oriented control mechanism also may lead to misconduct by the supervision consultant as approval of the work at each stage is under his discussion.

- The organizational structure of ERA related to contract administration is seen to be very lengthy resulting in slow decision making process. Co-operation and partnership relations suffer from this set-up. Claim issues are pending for years after project completion and partnership issues are affected hindering the private sector from taking actions promptly on issues that require ERA’s consent. In addition this lengthy bureaucratic structure does not match with the partners’ organizational structure which is simple, less bureaucratic and characterized by faster decision making.
Right of way clearance was not always finalized in time prior to commencement of the works. However, due to various institutional barriers the obstruction identification and removal is often done by ERA parallel to the project work. This situation has been seen to disrupt the progress of the work in numerous occasions.

### 4.5 Conclusion

The case studies pointed out that the traditional contracting system which is being practiced in Ethiopian Roads Authority has failed to fully address the need for sufficient and better quality road infrastructure. In order to improve the provision of road infrastructure quantity- and quality-related burning problems need immediate attention. The most urgent aspects that need prompt intervention in addressing the problem are as follows:

- The growing need for infrastructure;
- Quality end product;
- Slow project delivery and undue delay;
- Cost overrun;
- Lack of innovation in project implementation;

### 5 Recommendations

The traditional least cost bidding method for selection of contractors has been seen ineffective. This situation inevitably calls for an alternative means of procurement. In this regard a combination of cost plus quality based selection approach is recommended. In fact this approach is not new for ERA - it has been exercised for selection of design and supervision consultants and the already experiences made and system developed can be used with slight modification. This method can be exercised by soliciting technical and financial proposals from contractors simultaneously during bidding and assigning weights for the financial and technical value of contractors’ proposal and evaluating the proposals accordingly. Employing best-value techniques in the selection of contractors, benefits by adding value through quality or innovation.32

32 Best value technique is defined as “The most advantageous balance of price, quality, and performance achieved through competitive procurement methods in accordance with stated selection criteria.” See: http://architecture.mt.gov/DesignConstruction/HJR28BestValueStudy/Best_Value_Definition.pdf
• However, this has to be exercised with great care to create a transparent selection system to have mutual trust between ERA and the private sector. One important point in this regard is formulation of a clear objective evaluation criteria and use of same for evaluation and selection of contractors.

• The linear design-bid-build approach provided evidence to take to much time in the process of selection of consultants and contractors. What’s more it has been seen that different problems are arising during implementation. A design and build approach which is currently in practice in United States and Europe has the advantage of shorting the period required for the procurement process. This can be exercised by using a pilot project first as it is a completely new system to ERA.

• Poor design and contract specifications contributed as well to delay and additional cost in the project implementation. Utilizing a design and build approach and awarding both design and construction to a single entity, ERA can shift the risk of poor design and specification to the contractors. This will enable ERA to create single point accountability in the overall project implementation process.

• Consideration for utilization of innovations must be taken into account in project implementation. To this end, the design-build approach allows the contractor to use innovative techniques during construction ultimately reducing project costs. However, in utilizing a design and build approach a precaution has to be made in creating a control mechanism, as the contractor is given more freedom in the method of construction. Appropriate performance criteria and indicators have to be established to assess whether the work meets ERA’s requirement. This also can contribute to slim the decision set-up within ERA by reducing the efforts required to control the overall construction process and providing the option to concentrate on key issues like whether the final road meets its requirement. In addition this method helps in avoiding the poor contractor consultant relationship which was prevalent in the study.

• Awarding construction and maintenance contracts at the same time for a single contractor also can put more responsibility in the contractor’s hand as lower quality in construction will incur him higher cost for maintenance, creating a self-control mechanism and insure quality during implementation.

• Activities related to obstruction clearance have to be given equal importance as the other work during the planning process. To this effect it is advisable to incorporate the obstruction clearance work into the permanent project work and pass the responsibility to contractors.
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