MANAGEMENT CONTROL OF PROJECTS IN CONSTRUCTION INDUSTRY

Ethiopian Context

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Acronyms

1.	GTP	–	Growth and transformation plan
2.	PASDEP	-	Plan for accelerated and sustained developments to end poverty
3.	GDP	-	Gross domestic product
4.	MoFED	-	Ministry of Finance & Economic Development
5.	MoWUD	–	Ministry of Works & Urban Development
6.	MoUDC	-	Ministry of Urban Development and Construction
7.	WBS	-	Work break down structures
8.	CBS	-	Cost break down structures
9.	SPSS	-	Statistical product and service solution
10.	CPM	-	Critical path method
11.	PERT	-	Project evaluation & review techniques
12.	OECD	-	Organization for economic cooperation & development
13.	IMF	-	International monetary, Fund
14.	TI	-	Transparency International
15.	GERT	-	Graphical evaluation and review techniques
16.	ANOVA	-	Analysis of Variations

CERTIFICATE OF ORGINALITY

This is to certify that the project titled ***Management Control of Projects in Construction Industry in Ethiopian Context*** *is an original work of the student and is being submitted in partial fulfillment for the award of the Master's Degree in Business Administration of Indira Gandihi National Open University. This Report has not been submitted earlier either to this university or to any other university/Institution for the fulfillment of the requirement of a course of study.*

Signature of Supervisor

Place: Addis Ababa

Ethiopia

Signature of Student

Place: Addis Ababa

Ethiopia

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Abstract

Construction sector is a booming sector globally. Innovations and of new technologies result the productivities in terms of short time delivery and cost. It is common that effective project management and control benefit the project owner above all the contractor. Construction contract management capacity limitation is a key challenge in Ethiopian construction sector. The progressive growth of the Ethiopian economy demands new construction demands from year to year. It is time to think in holistic the important parts of construction process, the actors like contractor , consultants, material suppliers. As the size of construction grows the administration and management capacity towards of implementing entity must be built. It is an opportunity for the companies to remain in a very healthy competitive environment.

The objectives of the study is to identify management control problems of construction industry in Ethiopia. The research problem it is approached by conducting survey on key actors of industry. Sufficient primary and secondary data were collected and analyzed. SPSS application program used for analysis using descriptive statistics

The key challenges identified within the industry , shortage of skilled and unskilled manpower, machineries and tools, absence of appropriate standards and guidelines, lack of strong institutional capacity to oversee the construction industry, lack of construction project management and control skills were some of the many. These challenges has contributed to poor performance level of the industry indicated by delay, cost overrun , poor quality delivery. The presence level of Corruption and unethical acts between the key actors within the industry are the known constraints that emanates from low implementation capacity. Hence ,the main challenges be summarized as low implementation capacity with respect to manpower, material and machinery supply , organizational and systemic issues.

Though project management and control failures is the manifestation of the above listed constraints it is dealt separately and found the practices not yet exercised to a level that bring incremental project management success. These specific problem continued throughout each

stakeholders .Some common manifestation identified, poor planning culture, skill gap of appropriate planning technique applications, absence of construction project management skills and personnel's.

The research tried to conclude that a lot has to be done towards building the local capacity. As the current growing demand of construction it is an opportunity that needs a number of interventions to improve further. Moreover, in conclusion the absence of clear construction industry policy framework was the major source of all challenges to be.

Lastly the researcher put some recommendations based on the findings that help policy makers action. Some of it ,build the local domestic construction contractors and consulting companies capacity, improve the capacity and performance of the public sector and the private sector clients to effective implementation and construction management control, ensuring the application of cost effective and innovative technologies and practices to support socio economic development activities of major infrastructural projects , improve the industry performance to export standard level , introduce institution in charge of construction industry capacity building and prepare and implement national construction industry framework .

CHAPTER ONE

THE PROBLEM AND ITS APPROACH

1.1. Background of the study

Ethiopia has embarked on a long-term development strategy which aims at achieving sustainable human development with all pre-requisites for a middle income country by the year 2025 E.C **(Source: GTP,2010 & PASDEP,2000).**This envisages creation of a strong, diversified, resilient and competitive economy that can effectively cope with the challenges of development and that can easily adapt to the changing market and technological conditions in the regional and global economy. The priorities identified as the essential catalyst for the attainment of the Vision 2025 objective include development of infrastructure as an important ingredient towards attainment of faster economic growth.

The construction industry in Ethiopia is the major sector where public and private sectors are investing huge amount of fund. The percentage share of the construction sector to GDP at constant basic price has increased from 4.3 % in 1999/2000 to 5.8% by 2011/12 **(source: National Bank of Ethiopia 2011/12 Fiscal year series Vol 28 .**Expansion of economic infrastructure (railways, roads, telecom, power, irrigation) being critical towards achieving the country's Growth and Transformation Plan (GTP). Significant amount of the country's budget is allocated to economic development through financing infrastructures for development of educational and power projects, construction of railways and road projects which increased road network density, construction of health projects, access for water and Sanitation infrastructure.

The private sector is investing its capital for acquisition of various fixed assets such as acquiring new machinery and equipment and construction of new buildings and building maintenance activities. The construction industry of Ethiopia has contributed much in reduction of poverty, in increasing employment expansion through small and medium enterprise development and job creation through the construction of low cost houses in Addis Ababa which was subsequently replicated to other regional states.

(Source :MoWUD annual progress report 2010/11)

The construction industry is a fundamental economic sector which permeates most of the other sectors as it transforms various resources into constructed physical economic and social infrastructure necessary for socio-economic development. It embraces the process by which the physical infrastructure are planned, designed, procured, constructed or produced, altered, repaired, maintained, and demolished. The construction industry has important contributions to the Ethiopian economy, as demonstrated by its share in the GDP. The sector has registered a remarkable growth, over the last 11 years there has been increased investment on the development and expansion of various infrastructure projects. **(Source: Annual Progress report, Ethiopian Federal House of parliament,2011/12)**

The realization of Vision 2025 partly depends on the existence of a reliable and competitive local construction industry that is capable of delivering quality services and value for money in the development and maintenance of the physical infrastructure. Since 2005 there have been a number of initiatives geared towards fostering the local construction industry. Despite such interventions, the state of the local construction industry has remained poor. Performance constraints include inadequate capacity of local contractors and consultants, inadequate public sector delivery capacity, corruption, erratic work opportunities, use of outdated technologies and practices, lack of effective supporting policies and poor state of the economy.

Thus, the construction industry of Ethiopia in general suffers from poor project management and control with the highlights given above, and the study focuses on investigating the key challenges regarding the project management control and construction industry development in Ethiopian context.

1.2. Statement of the problem

The inefficient and deteriorated state of the construction industry with poor performance has detrimental effects to the development of the industry. Some anecdotal and government sources indicate weaknesses, problems and constraints hampering the performance and development of the industry which include:

- Low capacity and capability of the local contractors and consultants due to weak resource base and inadequate experience.

- Inadequate and erratic work opportunities, inappropriate contract packaging of works which favor foreign firms in donor funded projects, low public investment in infrastructure projects and over dependence on donor funding.
- Inefficient and non - transparent procurement Systems.
- Corruption and financial mismanagement in public/private sectors.
- Lack of supportive institutional mechanisms in terms of financial credit facilities, equipment for hire and professional development.
- Unfavorable donor conditionality's which tend to marginalize local construction enterprises.
- Poor working environment, including low standards of safety and occupational hazards on construction sites
- Weak and non-facilitative policies and regulatory framework.
- Low productivity and quality
- Low technological base.

Hence, the research was carried out to identify the key challenges and causes that led the construction industry for low performance and delivery that resulted from problems of the management control of projects within the industry.

1.3. Research questions

The following questions raised and responded through a detailed analysis that was conducted in research process.

- What are the project control mechanisms that employed in the process of construction initiation to implementation practices in Ethiopian construction industry?
- What are the key challenges that affect all actors to cope up with the rapid growth and fast changing construction environment?
- How the roles of each stakeholder are defined in regulatory frameworks of the construction sector?
- What are the key challenges that hamper the construction industry growth in Ethiopia?

- What are the control problems related with poor planning, material management, poor workmanship, project administration & contract management failure?

1.4. Objectives of the study

As long as the construction industry development is a deliberate and managed process to improve the capacity and effectiveness of the construction industry to meet the national economic demand for buildings and other physical infrastructure facilities, and to support sustainable national economic and social development objectives, this particular research has the objectives to identify project control problems of construction industry in Ethiopia. Moreover the research has the following specific objectives.

The specific objective now is the detail of the research title.

- To identify what mechanism the owner uses to control projects.
- To identify loopholes in the control of projects in Ethiopia.
- To study financial control problems of construction sector in Ethiopia.
- To identify operational control problems in construction sector of Ethiopia.
- To identify causes of project delay in construction sector of Ethiopia.
- To identify different types of control problems in construction sector of Ethiopia.
- To indicate consultant contractor & owner relation problems.
- To identify the organizational challenges of the industry.
- To study the impact of norms, standards, procedures to the sector
- To study the building up of the sector through market competition.
- To study the relationship problems between the actors and limitations in delivering project timely, in acceptable quality and cost.

1.5. Methodology

1.5.1. Research Design

The research is descriptive survey that deploys both qualitative and quantitative research approach.

1.5.2. Methods of data collection and sources of data

In statistical investigations, collection of data occupies the important place and the data collected are the foundation of the whole structure. The whole statistical analysis is based on the way the data have been collected or obtained, because the data provide a raw material to statistical analysis and interpretation. For this research two types of data were gathered and used. The first is the primary data, the data which are obtained for the first time for the statistical investigation, collected in a specialized way. The second one is secondary data were made available for statistical investigation. The primary data for this study is gathered using questionnaire from all key actors contractors, consultants, construction professionals and design professionals, employers.

On the basis of registration confirmation on the year 2012/13 at Ministry of Urban development & construction 60 firms are purposively and sixty (60) Questionnaires were distributed to all of the actors. Out of these 45(75%) were returned.

Besides, secondary data sources like construction contractor registration, reports, procedures, guidelines, procurement proclamations and other related materials were used in this study. Mainly SPSS software applications were used to sort and analyze the data.

1.5.3. Sample size and sampling technique

The total population size of Ethiopian contractors is about 3270 that includes grade 1 to 10 and 189 for consultant's .Out of these numbers the total class one contractor number is about 101 and of consultants 105 from class one to three. In this project the scope is limited to class one contractor and class one to three consultants since it is this portion of the firms that exist in major construction project undertaking. The estimated coverage by class one contractor is more than 75 % of the projects.

Sample size of 101 class one contractors 20 of them (20%) and of 105 class one consultants 40 of them (38%) are selected as sample size totaling 60 (29%) of the

total population. However , the study was able to collect fully 45 of which 28 of them are consultants and 17 of them are contractors of the distributed questionnaires i.e 75% response rate for analysis The sampling technique is a random selection from the data base of Ministry of Urban Development and Construction register. The same approach is followed for consultants too.

1.5.4. Data analysis

Both quantitative and qualitative data analysis are deployed for the analysis of data collected from both primary and secondary data sources like frequency tables, mean and standard deviations, correlation, regression analysis ,r2 and F test for the research variables identified in the study.

1.6. Significance of the study

The research is expected to deliver the following contributions to construction industry of Ethiopia.

- The study might help policy makers to make good decisions and be aware of the challenges that hamper the construction industry from continuous growth.
- The study would provide formulated information for stakeholders about key challenges that exist in business environment.
- The study may help some researchers as resource for whom are interested to make further research on similar subject matter.

1.7. Limitation of study

Due to shortage of time the data collection will be limited to Federal authorities since most mega projects are handled by these institution . As a result, the expected research findings might not reflect the actual scenario of states and further research might be needed for inclusion of regional states.

1.8. Organization of study

The research is organized in such a way that to include all relevant titles in body. In general Chapter one dealt with problems and its approaches ,Chapter two dealt with empirical and theoretical review of related literatures on construction projects ,Chapter

three is about the analysis of the data collected , and the fourth chapter summary of major findings, conclusion and recommendations.

CHAPTER TWO

Review of the Related Literature

2.1. Project Control Organization and Operations

Project controls is a major function on a construction project that is equal with engineering, business management, procurement, and quality control. As the eyes and ears of management, it should be placed organizationally to respond directly to the field project manager. By no means should it be an element under accounting or data processing. Placing it under project engineering, while not illogical, is not recommended because that operation already has enough responsibilities to fully absorb the attention of the project engineer. This approach also opens the possibility of restricting or prohibiting the flow of control information to other interested parties. The project controls staff functions most effectively when in an independent mode. **(Project control for construction , 1987)**

Project controls personnel should be individuals familiar with field operations. Project controls work provides experience in cost, schedule, and materials management, and is a logical step on the career ladder for project management. The project controls function is a key element of proactive project management. As such, its staff should be represented in all work planning. It is the guardian of the Control Budget and Control Schedule, thus it must be organized to advise and assist in any matter involving either. **(Project control for construction , 1987)**

2.2. Baselines for control

The Cost breakdown structure (CBS) is a breakdown of all cost elements within a total project, both direct and indirect. The Work breakdown structure (WBS) is a part of the CBS, but includes only those CBS elements against which progress is tracked. Once engineering design is complete, major equipment and bulk material quantities will have been established so cost control in the field concentrates on control of field labor unit

costs, labor productivity, and overheads. Schedule control, however, considers all material items since their timely delivery is essential to avoid schedule delays and productivity problems associated with material shortages. **(Project control for construction , 1987)**

2.2.1. Cost Control : Cost control is obviously important on any project. It is Cost control should be approached as an application of Pareto's Law, which essentially states that 80 percent of the outcome of a project is determined by only 20 percent of the included elements. Thus in establishing a cost control system, the idea is to isolate and control in detail those elements with the greatest potential impact on final cost, with only summary level control on the remaining elements. The greatest variable in the final cost of a construction project is usually the labor cost. Most of the other cost elements in the project (materials, equipment, and overhead) can be predicted or established with reasonable accuracy if the project is properly planned and estimated. Labor cost is a function of worker hourly cost, worker productivity, and use of overtime. The hourly rates are relatively easy to predict; it is productivity that is the real variable. Thus, a contractor will want to monitor worker hours expended and productivity as major elements in the cost control program. Of course, quantity control will be an included element as a basis for progress reporting as well as estimate verification. **(Project control for construction , 1987)**

2.2.2. Budget Baselines. The budget baselines for a project are generated through the estimating process. Whether or not the design documents are complete, planners must develop a cost estimate for the project. If the project has yet to be fully defined, this estimate is approximate and subject to some variation. As the project becomes better defined, the estimates are updated to reflect the new information. For a fixed-price project, good estimating is critical because the estimate establishes the costs of all direct work as well as the total contract price which incorporates all elements of direct cost plus field overhead, contingency, general overhead, and a reasonable profit. The estimate also provides all quantity,

cost, and productivity targets to be used for detailed control**. (Project control for construction , 1987)**

2.3. Control vs. Working Schedule.

A number of schedules will be utilized over the life of the project. When the project is first planned, the Original Control Schedule is developed. When a owner approved change is received which changes the schedule, the Original Control Schedule is modified to create the Current Control Schedule. (A copy of the Original Control Schedule will be maintained for historical purposes.) The Current Control Schedule subsequently will be modified with each owner approved change. **(Project control for construction , 1987)**

Recognizing the field performance probably will differ from that planned , the project control engineer also will maintain working schedules. One of these is a Look-Ahead Schedule of from three to six months duration. It is based initially on the Original Control Schedule, but is modified at least monthly to reflect actual past performance and a more current look at the future. Thus it can differ significantly from the Current Control Schedule, although the latter schedule remains the objective. Working schedules are at levels more detailed than that of the Control Schedule. **(Project control for construction , 1987)**

2.4. The Project Control Cycle

Construction is a dynamic process and no two projects are ever alike. Even if you have years of experience, every job presents a new set of circumstances and challenges no matter how good a job you do preparing during the pre-construction stage. The project manager and superintendent work together to come up with the best plan they can, trying to anticipate every obstruction and difficulty that might impede progress and jeopardize the successful completion of the project, but they still can't foresee every contingency.

(J.Jackson , 2002)

Even with all of this expert planning, the project must be monitored from beginning to end to ensure that all of the targets for time, cost, and quality are met. The whole process must be properly managed through a project control system that utilizes the

plans, specs, estimate, and schedule. All of these documents taken together establish the road map for getting from the start of construction to the final completion of the project. Using this road map, the project manager and superintendent must man oeuvre all of the resources in the right direction, making adjustments as they go, to keep the project on track and on target. Project control requires continuous monitoring and evaluation of actual performance relative to the estimated performance for all aspects of the job that have an impact on cost, time, and quality. The project control cycle begins with the project plan and ends with the final project debriefing and evaluation. There are seven fundamental steps to the process: Develop the project plan ,Establish the project benchmarks, Monitor the project performance, Identify performance deviations, Evaluate corrective options, Make adjustments as needed, Document, report, and evaluate results. **(J.Jackson , 2002)**

2.5. Factors Impacting Project Performance

Controlling project time and costs requires a heads-up kind of attitude. The ability to anticipate and ward off potential project disruptions is a basic characteristic of the successful construction manager. However, even when the project team applies all of the tools and techniques available to them, most projects will still be derailed somewhere along the way. Practically every job will experience time delays, cost overruns, or quality failures during the course of construction. **(J.Jackson , 2002)**

As hard as we try to make a perfect plan, it is virtually impossible to predict and anticipate every possible occurrence that could cause a hiccup in our scheme. So hiccups are inevitable. Therefore, it is a good idea to know in advance where these glitches might come from. There are a number of factors that can influence our job performance. Some of them are beyond our control, and some of them are a result of poor management or lack of foresight. The factors listed below and explain how they can influence project performance. **(J.Jackson , 2002)**

2.5.1. Weather conditions

Weather is probably the most common and most obvious reason for work slowdown resulting in cost overruns. Work proceeds much more slowly under

adverse weather conditions, and such conditions can impact the quality of the work as well. **(J.Jackson , 2002)**

2.5.2. Quality of the workforce

As a general contractor who hires subcontractors, you don't really have any control over the subcontractor's workforce. Therefore you have to trust that your subcontractors will provide experienced workers on your job. This is why, in my opinion, all subcontractors should be pre-qualified. The risks associated with poor work quality are significant. If there is a problem , the poor quality will result in rework, and rework slows down job progress and can impact safety. The potential losses due to poor quality can put the entire project in a tailspin, and if this occurs, the project manager must take immediate steps to mitigate the situation. **(J.Jackson , 2002)**

2.5.3. Quality of the supervision

Obviously, if you don't have proper supervision on the job, there are going to be problems. Many issues have to be addressed every single day on the job, and everyone looks to the superintendent for direction and clarification regarding those issues. If you have an inexperienced superintendent who is not up to speed on the project, the type of work, or the systems in place to manage the project, you are going to have a disaster, plain and simple. **(J.Jackson , 2002)**

2.5.4. Incorrect sequencing of work

Unfortunately, there are times when pressure from an owner or from the main office can cause a superintendent to schedule work out of sequence and before it is ready, just to appease some unrealistic demand for action. But no one knows better than the superintendent and the field personnel how the work needs to be scheduled to keep things on track. Sometimes a work activity is initiated just to give the appearance of making progress when in reality these artificial starts just

waste time and cause all kinds of havoc on the job. If this occurs too often, the inefficiencies will eventually show up and expose the real story. **(J.Jackson , 2002)**

2.5.5. Change orders

Change orders can be one of the most insidious factors influencing project performance. A little change here or there often seems like no big deal. Many contractors fail to ask for additional time when they process the cost of the change, thinking that they can wiggle the extra work into the existing schedule. Then all of a sudden, these seven or eight little change orders are causing the job to run two weeks behind, and then it is a big deal. **(J.Jackson , 2002)**

2.5.6. Overcrowded job site

One of the things that can actually hinder work productivity is having too many people on the job. I have heard more than one subcontractor complain about packing too many workers in tight quarters trying to get a job done. They end up getting in each other's way and tempers can flare. It becomes so counterproductive that it actually slows down the job instead of speeding it up as planned. **(J.Jackson , 2002)**

2.5.7. Defective materials

Discovering that the material or equipment that you were planning to install is defective is a real problem. It is certainly one that can be avoided with proper quality control. But in some cases, this defective material is not discovered until the workers are on the job ready to start the project. By this time, it is way too late. The time has already been wasted and it will take time to reorder the material and reschedule the crews to install it. **(J.Jackson , 2002)**

2.5.8. Inadequate tools and equipment

Having the right tools and equipment on a construction job may seem like a no-brainer. But again, when so much of the work of the contract is passed on to subcontractors, you don't always have control over even these simple aspects of the job. **(J.Jackson , 2002)**

2.5.9. Late deliveries

Late deliveries are probably one of the most frustrating causes of schedule delays and cost growth in construction. Once again, the contractor has very little influence or control over the manufacturing or fabrication processes involved in the making of many of the products or equipment used on the project. However, the stakes can be very high for the project if items arrive late. That's why on projects with critical lead-time items, it is best to assign someone to do nothing but expedite deliveries and stay on top of the project buyout schedule. **(J.Jackson , 2002)**

No matter how well you had planned, estimated, and scheduled your job to go a certain direction, these are just a few of the things that can easily impact your project's outcome in a negative way. Some of them seem trivial and yet they are exactly the kinds of things that can get your cost, time, and quality off track in a hurry. As a construction manager, you must be forever vigilant and on the lookout for disruptions and inefficiencies that will derail your plans. You can never avoid all of the potential problems, but having some idea about how different factors can affect the job will give you a head start when trying to correct course after a problem does hit. **(J.Jackson , 2002)**

2.6. Contracting Party Viewpoints and Interests

Each of the contracting parties owner, engineer, consultant, main contractors, and subcontractors are interested in project controls. In establishing any project controls system, the following interests must be accounted for;

2.6.1. **Owner:** The owner seeks assurance that the project will be delivered on schedule, within budget, and be of the desired quality. The owner also has the right to know what is being paid for with each request for payment. Thus, the project control system must be designed to provide the owner with the planned schedule and regular updates of actual schedule performance. If the contract is fixed-price, an agreement must be established for measurement of work in place so that invoices for periodic payments are non-controversial. **(Project control for construction , 1987)**

Under the fixed-price mode, the owner should not request detailed contractor cost information except as required to validate periodic payments. If the contract is reimbursable, the contractor must share all schedule, cost, and work-hour information with the client. In fact, the owner may provide part of the staff for the project controls operation. On all contracts, the owner should receive summary cost and schedule information on the project for historical purposes. This can include work hour expenditures. On most contracts the owner will establish scheduling guidance. The simplest guidance is the required date for completion and required contractor mobilization date. More likely, additional guidance in the form of a summary schedule or listing of milestone dates will be provided to correspond with expected delivery dates of owner- furnished items, coordination points with other contractors or operations, or key dates in start-up sequences. The owner may maintain a staff on site to protect owner interests and to expedite any owner review or approval responsibilities. **(Project control for construction , 1987)**

2.6.2. **Engineer**: The involvement and interest of the engineer in project controls will be related to the level of completion of the design at the time construction commences. If engineering and construction are overlapping, the engineering activities must be closely linked with construction and procurement and become part of the Control Schedule. Obviously, if design drawings and specifications are complete for the contract, engineering work will not be part of the schedule. **(Project control for construction , 1987)**

2.6.3. **Consultant:** The consultant is an agent of the owner, thus his interests will be the same as that of the owner for each of the contract forms. **(Project control for construction , 1987)**

2.6.4. **Main Contractor:** Every contractor is interested in detailed control of the contract, whatever the contract form. On a fixed-price contract, such control best assures realization of profit and achievement of the benefits of any included incentive provisions of the contract. On all contracts, the contractor wants to accumulate as much information as possible for inclusion in the historical

database so that subsequent projects can have the benefit of more complete planning data. Finally, a contractor wants to perform well since this is the best way to impress clients and assure continued work. **(Project control for construction , 1987)**

2.7. Guidelines for Project Control

Any control procedure has to balance effectiveness with efficiency; this is not always easy. Your project is intended to move along at a healthy pace, with phases completed on time and within budget. That itself is a sign of effective leadership and control on your part. However, although effective control looks easy from the outside, it requires careful planning and leadership. Some guidelines to remember:

- Define the criteria for the completion of each phase. A lot of focus is placed on phases and their completion. This is important, of course, but what are your criteria for completion?
- Define successful completion for each of your phases. For example, if a phase involves designing an improved process, is it really an improvement? Is it faster, easier, better controlled?
- How do you know the project is moving in a positive direction? Your overall project goal may be clearly defined, but each phase should also be subjected to this standard.
- Execute controls in manageable units. Control is a concept that often cannot be achieved because the overall demand is overwhelming.

2.7.1. You do not expect to accomplish all of your control steps in a single effort, so define the overall control expectation with a series of phase-specific steps. This makes the job easier and success much more likely. Hold regular (but short) meetings to check project status and to update everyone. Meetings can kill any project, so they have to be kept brief and effective. Control cannot take place in a project manager's efforts alone; the whole team has to be involved. Whether you hold special meetings just to go over progress in control-related areas or incorporate this idea as an agenda item in your periodic team meetings, it is

essential to spend time reviewing and planning the control aspects of the process. **(Project control for construction , 1987)**

Build control into the quality aspect of the project. Control and quality are really not separate efforts. It is a mistake to attempt to break projects out into three different areas of work: process (input through output), quality (reduction of defects), and control (budgeting and scheduling, labor oversight, reduction of losses from theft or carelessness ,for example). It's really one overall chain of events and the process, quality, and control issues are attributes of the whole effort. **(Project control for construction , 1987)**

Anticipate problems to avoid them. Control cannot be only a responsive matter. If you take steps to correct problems only after they occur, you miss the opportunity to prevent the same problems in the first place. Remember, too, that many problems are expensive in terms of profit and loss, customer relations, branding, and morale. **(Project control for construction , 1987)**

2.8. Project management

Construction, national or international, stands or falls by the quality of its project management. A project that is not properly managed can quickly head for disaster. So important indeed is the subject of project management that hundreds of books have been written about it, from almost all possible angles. When we dealt with the subject, rather than deal with the mechanics of project management, we sought to provide the prospective owner with a 'cradle to the grave' view of the important considerations that he has to face and cope with at each stage of project development. We did this because, whilst it is the owner who has the greatest financial stake in any and every project, very little of the literature is directed towards him and his needs. The project manager is there to 'manage' and a vital part of project management is cost control.

2.8.1. Project management is cost control

Yes, effective project cost control is only possible with effective project management. But it is equally true - dare we say it –that effective project management is only possible with effective project cost control. Yet, despite its crucial importance, cost control remains a much neglected subject, in that it is preached far more than it is practiced. More often than not cost monitoring is accepted and passed off as cost control and that exercise only starts in earnest after construction starts on site, which is far too late. Cost control should start with the conception of the project, since from then on, as the project takes shape, the ability to control costs steadily diminishes - although the actual cost of exercising that control steadily increases. The relationship of cost to time in the project might perhaps be illustrated by a simple analogy. If we liken our project to a taxi and project cost to the sum on the taxi meter, we can say that once a project is approved the taxi is hired and the meter set in motion. **(O.P. Kharbada ,1985)**

Thereafter, until you reach your final destination, costs climb, whether the taxi is in motion or standing still at traffic lights. So with our project. Even if no progress is being made, costs will still be incurred, possibly unseen, but inexorably. The key to proper project management is therefore a sound approach to project cost : the control of cost, rather than the monitoring of cost. To manage, one must look ahead. But if the project team fails to look ahead, the consequences are most unpleasant. While the project team are physically constructing each deliverable, the project manager undertakes a series of management processes to monitor and control the activities being undertaken. An overview of each management process follows. **(Westland,2006)**

2.8.1.1. Perform time management

The time management process is the method by which time spent by staff undertaking project tasks is recorded against the project. Recording the actual time spent by staff on a project has various purposes. It is used to:

- calculate the total time spent undertaking each task as well as the total staff cost of undertaking each task in the project;
- enable the project manager to control the level of resource allocated to each task; identify the percentage of each task completed as well as the amount of outstanding work required to complete each task in its entirety.
- Time management is undertaken through the completion and approval of timesheets. A timesheet is a document which records an allocation of time against a set of project activities listed on the project plan. Timesheets are typically completed weekly, by all members of the project. This includes project staff, contractors and often suppliers. If timesheets are not recorded, then it may be difficult to accurately assess the amount of time spent undertaking project activities, and therefore become impossible to manage the project constraints of time, cost and quality. **(Westland,2006)**

Although the time management process is usually initiated after the project plan has been formally documented and the project is under way (in other words, during the execution phase of the project), timesheets may be completed at any phase of the project if requested by the project manager. For instance, it may be necessary to record timesheets throughout the entire project to ensure that the full costs of the project are captured. **(Westland,2006)**

2.8.1.2. Perform Cost Management

A cost management process is a method by which costs or expenses incurred on the project are formally identified, approved and paid. Examples of cost types are:

- labor costs (for staff, external suppliers, contractors and consultants);
- equipment costs (for example computers, furniture, building facilities, machinery and vehicles);
- material costs (such as stationery, consumables, building materials, water and power);
- Administration costs (such as legal, insurance, lending and accounting fees).

The purpose of the cost management process is to accurately record the actual costs / expenses which accrue during the project life cycle.

Cost management is undertaken through the completion and approval of expense forms. Regardless of the number of expenses incurred, payment will not be made to the payee until a completed expense form has been approved by the project manager. **(Westland,2006)**

Expense forms should be completed for all project expenses, including contractor, supplier, equipment, materials and administration expenses. Staff salary expenses are exempt as total salary expenses can be calculated from the timesheet information provided to the project manager on a regular basis. Summarized expense information is also entered into the project plan to record the actual spend against the planned spend. Although expense forms are typically completed during the execution phase of the project, it may be requested that they be completed during any project phase to ensure that the full costs of the project are captured. **(Westland,2006)**

2.8.1.3. Perform Quality Management

A quality management process is a method by which the quality of the deliverables and management processes are assured and controlled during a project. The process involves undertaking a variety of reviews to assess and improve the level of quality of project deliverables and processes. **(Westland,2006)**

2.8.1.4. Perform Change Management

A change management process is a method by which changes to the project scope, deliverables, timescales or resources are identified, evaluated and approved prior to implementation. The process entails completing a variety of control procedures to ensure that if implemented, the change will cause minimal impact to the project.

This process is undertaken during the execution phase of the project, once the project has been formally defined and planned. In theory, any change to the project during the execution phase will need to be formally managed as part of the change

process. Without a formal change process in place, the ability of the project manager to effectively manage the scope of the project may be compromised. The change management process is terminated only when the execution phase of the project is complete. **(Westland,2006)**

2.8.1.5. Perform Risk Management

A risk management process is a method by which risks to the project are formally identified, quantified and managed during the execution of the project. The process entails completing a number of actions to reduce the likelihood of occurrence and the severity of impact of each risk. A risk process is used to ensure that every risk is formally identified, quantified, monitored, avoided, transferred and/or mitigated. **(Westland,2006)**

Although a risk process is undertaken during the execution phase of the project, risks may be identified at any stage of the project life cycle. In theory, any risk identified during the life of the project will need to be formally managed as part of the risk management process. Without a risk management process in place, unforeseen risks may impact the ability of the project to meet its objectives. The risk management process is terminated only when the execution phase of the project is completed. **(Westland,2006)**

2.8.1.6. Perform Issue Management

An issue management process is a method by which issues that are currently affecting the ability of the project to produce the required deliverables are formally managed. The process entails completing a variety of review methods to assess the level of impact that the issue is having on the project. A number of actions are then taken to resolve or reduce the issue as appropriate. The issue process is used to ensure that every issue identified is formally communicated, documented, monitored, reviewed and resolved. **(Westland,2006)**

Although the issue process is undertaken during the execution phase of the project, issues may be identified at any stage of the project life cycle. In theory, any issue identified during the life of the project will need to be managed under the issue

management process. Without an issue process in place, unforeseen issues may negatively affect the ability of the project to achieve the stated objectives. The issue management process is terminated only when the execution phase is complete. **(Westland,2006)**

2.8.1.7. Perform Procurement Management

The procurement management process is the method by which products are acquired for a project from external suppliers. The process involves controlling the ordering, receipt, review and approval of products from suppliers as well as managing the overall performance of the supplier. A procurement process is used to ensure that all products are acquired within the correct timescales, to the level of quality defined and within the budgeted cost identified. **(Westland,2006)**

The process also sets out the procedures for ensuring that supplier relationships are properly managed, through the regular review of supplier performance and resolution of supplier issues. The procurement process is initiated after the procurement plan has been approved and the supplier contract signed. The procurement process is usually managed by a single resource within the project (such as a procurement officer or manager) and over seen by the project manager. Without a formal procurement process in place, it will be difficult to confirm that the products provided by the supplier are 'fit for purpose' and therefore meet the requirements outlined within the procurement plan. The procurement process is terminated only when the execution phase is complete. **(Westland,2006)**

2.8.1.8. Perform Acceptance Management

An acceptance management process is a method by which deliverables produced by the project are reviewed and accepted by the client. The process entails completing a variety of review techniques to confirm that the deliverable meets the acceptance criteria outlined in the acceptance plan. An acceptance process is used to ensure that every deliverable produced by the project is 100 % complete and has been reviewed and approved by the customer. Without a formal acceptance process in place, the owner may not accept the final deliverables produced by the project, thereby

compromising the project's overall success. The acceptance process is terminated only when the execution phase is complete. **(Westland,2006)**

2.8.1.9. Perform Communication Management

A communications management process is a method by which formal messages are identified, created, reviewed and communicated within a project. Clear, accurate and timely communication is critical to the success of any project, as miscommunication can result in increased project risk. Clear project communication therefore ensures that the correct stakeholders have the right information, at the right time, with which to make well-informed decisions. Various types of formal communication may be undertaken in a project. Examples are releasing regular project status or performance reports, communicating project risks, issues and changes, and summarizing project information in weekly newsletters. Regardless of the type of communication to be undertaken, the method for undertaking the communication will always remain the same:

- Identify the message content, audience, timing and format.
- Create the message to be sent.
- Review the message prior to distribution.
- Communicate the message to the recipients.

These four processes should be applied to any type of formal communication on the project, including the distribution of:

- regular project status reports;
- results of phase review meetings;
- quality review reports documented;
- minutes of all project team meetings;
- Newsletters and other general communication items.

Although the communications process is typically undertaken after the communications plan has been documented, communications will take place during all phases of the project. This process therefore applies to all formal

communications undertaken during the life of the project. Without a formal communications management process in place, it will be difficult to ensure that project stakeholders receive the right information at the right time. **(Westland,2006)**

2.8.2. Automated Project Management Systems

Project management, like so many other business applications, lends itself well to automation. As long as you can put software to work quickly and don't have to spend excessive time working through software limitations, duties such as schedule control especially where graphics are employed can be made quick and efficient. Automation is suitable whenever you are spending too much time maintaining a monitoring system. In other words, if your oversight duties remove you from the equally important routines that help you stay in touch with team members, then they are counterproductive and not efficient. If you need to manage a large body of project-related scheduling information, software makes more sense than trying to operate a system by hand. The best kind of software program is one that lets you, as project manager, input and review information without having to wait for someone else to process it for you. **(Westland,2006)**

2.8.3. Project success criteria

One of the topics in the project management plan is the project success criteria. These are the most important attributes and objectives which must be met to enable the project to be termed a success. It is always possible that during the life of the project, problems arise which demand that certain changes have to be made which may involve compromises and trade-offs to keep the project either on programme or within the cost boundaries. The extent to which these compromises are acceptable or permissible depends on their scope and nature and require the approval of the project manager and possibly also the sponsor and client. However, where such an envisaged change will affect one of the project success criteria, a compromise of the affected success criterion may not be acceptable under any circumstance. **(P.Lewis,2007)**

For example if one of the project success criteria is that the project finishes by or before a certain date, then there can be no compromise of the date, but the cost may increase or quality may be sacrificed. Success criteria can of course be subjective and depend often on the point of view of the observer. Judged by the conventional criteria of a well managed project, i.e. cost, time and performance,the Sydney Opera House failed in all three, as it was vastly over budget, very late in completion and is considered to be too small for grand opera. Despite this, most people consider it to be a great piece of architecture and a wonderful landmark for the city of Sydney. While it is not difficult to set the success criteria, they can only be achieved if a number of success factors are met. The most important of these are given below:

- Clear objectives and project brief agreed with client
- Good project definition
- Good planning and scheduling methods
- Accurate time control and feedback system
- Rigorous performance monitoring and control systems
- Rigorous change control (variations) procedures
- Adequate resource availability (finance, labour, plant, materials)
- Full top management and sponsor support
- Competent project management
- Tight financial control
- Comprehensive quality control procedures
- Motivated and well integrated team
- Competent design
- Good contractual documentation
- Good internal and external communications
- Good owner relationship
- Well designed reporting system to management and client
- Political stability.

This list is not exhaustive but if only one of the functions or systems listed is not performed adequately, the project may well end in failure. **(P.Lewis,2007)**

2.9. Construction industry Broader view

The construction industry provides facilities in the built environment worth about 8 per cent of GDP and is responsible for 32 per cent of energy usage in the ongoing life cycle of those facilities. In response, initiatives to save energy and neutralize or significantly reduce non-renewable energy sources are being designed in. It is also a major creator of net waste and many leading players are anxious to show, quite often in response to growing owner pressure, that they are making major inroads into reducing waste in balance to the size of the industry. This affects the efforts of both the design and construction sectors of the industry. **(Bennett,1999)**

2.9.1. Construction industry segments

The construction industry can be broken down into two very broad categories, general building construction and engineered construction. Most construction contractors concentrate on one of these categories, or even on a specialty within one of them. A third category of contractor is the specialty trade contractor, who usually works as a subcontractor for a general, or prime, contractor responsible for the construction of the entire project. We can understand something about the nature of the industry by describing the various types of construction work.

(Bennett,1999)

2.9.1.1. General building construction

Within this very broad category we find projects that include residential, commercial, institutional and industrial buildings. **(Bennett,1999)**

2.9.1.2. Residential construction produces buildings for human habitation, including single-family dwellings, condominiums, multifamily townhouses, flats and apartments and high-rise apartment buildings.

Depending on the project's complexity, such work is usually designed by architects, owners or builders themselves, with construction performed by contractors who hire specialty subcontractors as needed; some of this work may be built by owners themselves. **(Bennett,1999)**

2.9.1.3. Commercial construction includes retail and wholesale stores, markets and shops, shopping centers, office buildings, warehouses and small manufacturing facilities. **(Bennett,1999)**

2.9.1.4. Institutional construction are medical clinics and hospitals, schools and universities, recreational centers and athletic stadiums, governmental buildings and houses of worship and other religious buildings. Architectural firms usually take the lead in the design of commercial and institutional facilities, with assistance from engineering firms for such specialties as structural and electrical elements. Because this type of work is usually more complex and time consuming than residential construction, owners usually engage general contractors to perform the field construction; subcontractors usually provide specialty services such as plumbing, painting and electrical work. **(Bennett,1999)**

2.9.1.5. Industrial Construction Often categorized separately from general building construction, industrial construction is a special segment of the industry that develops large-scale projects with a high degree of technical complexity. Such endeavors result in facilities that manufacture and process products; examples include steel mills, electric power-generating plants, petroleum refineries, petrochemical processing plants, ore-handling installations and heavy manufacturing factories that produce such products as vehicles, rolling equipment and various kinds of large machinery. The engineer, rather than the architect, usually assumes the lead responsibility for the designs of these kinds of projects. Often the owner selects a single entity to provide both design and construction services under a 'design–build' contract and works closely

with the design professional to assure that the owner's special requirements are met. **(Bennett,1999)**

2.9.1.6. Engineered construction

This broad category of construction, sometimes called engineering construction, is characterized by designs prepared by engineers rather than architects, the provision of facilities usually related to the public infrastructure and thus owned by public-sector entities and funded through bonds, rates or taxes and a high degree of mechanization and the use of much heavy equipment and plant in the construction process. These projects usually emphasize functionality rather than aesthetics and involve substantial quantities of such field materials as timber, steel, piping, soil, concrete and asphalt. More so than other types of construction, engineered construction is often designed by an owner's in-house staff. A general contractor is usually engaged to install the work, with subcontractors as needed to contribute specialty services. With these kinds of projects, the exact quantities of some materials can seldom be ascertained in advance; thus these construction contracts are often arranged such that the contractor is paid a pre-agreed-upon unit price for each unit of material actually required. Two common subcategories of engineered construction are highway construction and heavy construction. Highway construction typically requires excavation, embankment construction, paving, installation of bridges and drainage structures and associated lighting and signage. **(Bennett,1999)**

Heavy construction projects include dams, tunnels, pipelines, marine structures, water and sewage treatment plans, railroads, rapid transit systems, airports and utility work such as electrical transmission and distribution systems, water lines, sanitary and storm drains, pumping stations and street paving. Utilities, upon completion, are often owned

and operated by semi public entities such as electric associations or water authorities. **(Bennett,1999)**

2.9.2. Construction industry characteristics

Having introduced the broad categories of construction project types, we shall now consider further aspects of the industry by way of some representative statistical data. We want to look at the role that construction plays in the overall economy, the relative proportions of the various construction categories and the character of the industry in terms of the sizes of companies that carry out construction work. Construction is big business. The industry's significant impact on the world economy can be demonstrated by reviewing construction's proportion of the total value of goods and services, as well as the number of people employed in construction as a proportion of the total workforce and the number of construction firms compared with the total businesses in all industries. **(Kharbada ,1985)**

2.10. The role of three parties in Construction industry

The development and then execution of a project is both a mission and an adventure. A project, in its broadest sense, is any task which has to be accomplished within a scheduled time and within a defined budget. This implies that every project has its stated objectives and there are always three that are basic: the completed facility, complying with the appropriate specifications, the budgeted or target cost and the time required to completion. **(Kharbada ,1985)**

Three lead 'players' can be involved in all such projects, each having their specific role if the objectives outlined above are to be achieved. These are : (a) owner or owner(b) consultant and (c) contractor. Their specific functions can well vary from case to case. No two projects are ever the same, even when they may appear to be. Each and every project is unique and so, therefore, are the roles played in each project by our respective players. Once the owner has decided to proceed with a project he always has to first establish feasibility, then initiate design and construction, and finally commission and operate.

When he begins he has a variety of choices open to him, his choice being determined to some extent by his own capability - or, more often, his own judgment as to his capability, which may well be at fault. He can do it all himself or Seek the services of a consultant or seek the services of a contractor. **(Kharbada ,1985)**

2.10.1. The lines of demarcation

In the concept of project management that we are now developing, the three key participants that we have just introduced have three distinct and separate roles to play, thus:

2.10.1.1. The owner - oversees and pays

2.10.1.2. The consultant - advises

2.10.1.3. The contractor - does the job

The boundary between consultant and contractor is somewhat blurred these days and there are many - too many – contractors who feel that they are quite competent to play 'consultant' and so combine items 2 and **3** above, but we do not agree. For the moment, let us assume that the owner takes the course of employing a consultant and see where that concept takes us in terms of project management. The other significant aspect is that the consultant should be brought in at the very earliest stage. All too often he is brought in after the owner has gone some way along the road. This has the inevitable result that certain aspects of the project become 'fixed', to the later detriment of profitability, but it will be the consultant, not the owner, who finally has to carry the blame. Few realize the powerful influence that the earliest of the actions taken with respect to a project, in what is called the pre-design, or feasibility study stage, can have upon the ultimate cost and profitability of a project. **(Kharbada ,1985)**

2.11. Bribery and corruption

At the heart of ethics is a concern for fair transactions. Corruption is an emotive word and an accusation of corruption is a serious statement to make which could be strongly resisted and denied. It is widely applicable, for example, it can be political, justice, police, mafia, financial, tax, benefits, electoral, professional, educational, competitive or

business orientated. It is often connected in business with procurement and sales and in professional issues with conflict of interest. In the public realm there is a particular effort to establish exemplary levels of practice to meet the demands of public opinion and stewardship of public funds. This chapter investigates bribery and corruption which are commonly faced by professionals in the built environment in order to upset the normal course of events, including fraud, underhand payments, unfair practices in construction procurement, property deals, and distortion of competitive bidding, trading and selling. **(Fewings , 2000)**

2.11.1. Business and professional environments

Bribery occurs when a conscious attempt is made to influence another person unfairly either with a specific payment or gift, or influence is brought to bear to bring unfair advantage. Bribery emerges when a payment moves from an acceptable payment for services or a goodwill gift, to an attempt to distort the outcome which would otherwise be described as fair. Gifts and hospitality out of context may also influence conflicts of interest. Conflict of interest arises from providing services to two parties who need to preserve confidentiality or from a personal interest which might influence a professional's neutrality. The main weapon in the defense of bribery and corruption is the use of transparent practices and financial accounts. The main reason for resisting transparency is commercial confidentiality, which often neutralizes the confidence of core internal stakeholders, e.g. shareholders, as well as the public and external stakeholders. The main reason for a company introducing more transparent practices is to gain a reputation for fair trading. This often places a company in a position of semi-transparency due to the continuing need to maintain owner confidentiality, which is also a professional responsibility. **(Fewings , 2000)**

Resisting bribery and not turning a blind eye to corruption lie at the heart of the professional responsibility to remain objective and be fair to all parties with whom a professional is connected. The concept of transparency is a key weapon in removing

corruption, but this also needs a commitment to eliminating unfair advantage. Professionals also debate the balance between transparency and commercial confidentiality. Professionals have a commitment to fairness and honesty in their codes of practice and to the public good. This helps to make a broad definition of corruption for them, which exceeds the minimum legal compliance. **(Fewings , 2000)**

2.11.2. Reasons for corruption

The difference is made between corruption which occurs because of the low salaries of public officials who are tempted because of a need to supplement their income, and corruption which is greed, which satisfies the desire for status, influence and comfort that is given by being rich or powerful. The latter is notable in the higher position of public officials, private individuals and politicians who do not depend for survival on the bribes collected. A middle case is the temptation or blackmailing of individuals by the promise of betterment or threat of retaliatory action. In all cases it is the furtherance of private interest over public or corporate interest that brings about the corruption of the system. **(Fewings , 2000)**

There is a great deal of debate about what is an acceptable influence, as even good service would influence the owner for future work. Many would define normal competitive behavior as ways of competing and selling so as to gain competitive advantage and clearly a boundary needs to be drawn as to ethical and unethical competitive advantage. **(Fewings , 2000)**

2.11.3. Corruption and construction

Rose-Ackerman (1999) uses an economic argument to identify four key conditions that may create a corrupting climate:

1. The government allocates a scarce benefit using legal criteria other than willingness to pay. ‘Bribes clear the market’ because those who can pay will purchase.

2. Public officials responsible for key permissions are paid low wages and have little incentive to work. 'Bribes act as an incentive bonus' so that they can increase their income.
3. Onerous tax systems can cause those working in legal pursuits or business to seek to reduce the tax and other costs imposed on them. 'Bribes lower the costs' because they are able to avoid paying or reduce the tax burden or duty.
4. Illegal businesses frequently purchase corrupt benefits by corrupting others. In extreme cases a 'Mafia' where the law and order system is dominated by intimidation and violence emerges. 'Bribes permit illegal activity'.

The worst business sectors are construction public works which again sharpen the focus for the built environment. This does cast a shadow over the behavior of both multinational companies and the governments in bringing them to book under the convention and indicates the difficulty in controlling extra-business payments. The OECD writes a country report rating the efficiency of home countries in achieving their aim to reduce corruption and to identify problem sectors. The IMF has also participated by requiring their Fiscal Transparency Tool to operate in the projects which they fund. These include an integrity pact which is signed by the government and the contractor as a commitment to no bribes within the specified terms of the individual contract. **(Fewings , 2000)**

2.11.4. Corruption in the construction business and competition

An average loss of 3.7 per cent of turnover, which represents 17 per cent of profits, has been attributed to bribery payments in the construction industry world-wide. This is a serious economic loss leading to less investment and or damaging company performance. **(Fewings , 2000)**

The international construction industry is huge, with an estimated £3200bn turn over, giving a loss of turnover is up to £100bn. Rose-Ackerman (1999) argues that there is a critical threshold level when the profit margin is eroded and private

companies pressure the government to make reforms. This strengthens the arm of government to do something which will work. **(Fewings , 2000)**

Corruption is considered by the TI index to be worse in construction and armaments than any other industry. The TI annual 2005 corruption report (TI 2005) was dedicated to construction and post-conflict reconstruction, recognizing the additional pressure of expanded demand after the double catastrophes of the tsunami and the Iraq conflict. This also gives an insight into widespread corruption in the sector globally. **(Fewings , 2000)**

2.11.5. Professional and commercial corruption

There are many forms of collusion between companies to share out work between them and restrict competitive pricing. They may be able to influence other parties to make it more likely that they will be chosen in practice, such as writing specifications or weighting criteria which favor the core products of certain companies so that they will have unique advantages. **Gillam (2006)** puts it this way, 'There is no right way to do the wrong thing.' There are lots of grey areas for ethical behavior which applies unfair influence and many are reluctant to admit actions close to themselves.

In the TI report on construction in the UK **(Stansbury 2003**) states there is clear evidence for twenty-three different acts of corruption which, if investigated, could add up to criminal activity. Among them are:

- Submission of false claims and those which are reckless in their accuracy, which is a charge of false accounting.
- The refusal to pay all valid submissions, which is a charge of false accounting or attempted fraud.
- Concealment of documentation such as inflating figures of subcontractors, which is a charge of false accounting or attempted fraud.
- Cover pricing on a tender, which is a charge against the Competition Act.

- Specification of a design that can only be supplied by one contractor, which is a charge of conspiracy to fraud.
- Obtaining a price only for the purpose of comparison where the intention is to go back to the favored supplier and negotiate the price down. This is a charge of fraud by misrepresentation. **(Fewings , 2000)**

These practices are often considered not to be corruption, but the TI have Further bribes may be used to get clients to accept substandard work and product specifications which create wasteful failures later so that systems are ineffective or whole life costs become expensive or even prohibitive. These are often termed incompetence rather than corruption and expensive reworks or even total failure of the system are overlooked as a quality rather than a corruption issue. They are very hard to investigate because tracks are covered or obstacles are put in the way of low level enquiries. Clearly a transparent environment is one to be preferred where the specification is rationalized and there is a commitment to stand by payments by the client. This needs to be matched by true costs from the contractor with shared incentives to reduce costs and improve quality in a partnership where retention is paid. Partnering also has a better chance of finishing on time and preventing inflationary spirals and expensive delays. The trouble is that both sides have built deception and distrust into the process. **Stansbury (2003)** also stresses the need for a benefits analysis so that assets are provided for need. Feasibility reports indicate the importance of value managing the process of building so that waste is squeezed out of the design. **(Fewings , 2000)**

2.11.6. Professional behavior

A professional has a special relationship with their owner based on certain minimum standards of behavior which they are expected to maintain, or they should be removed from the register of approved practitioners. These codes do not make professionals ethical but they deal with integrity, confidentiality and conflict of interest and make some statements about working for the common good. The public expectation of the ethical behavior of professionals and effective decision-making is high, which makes their rationale and thinking

processes all the more critical. Professional institutions have a minimum level of compliance with codes which must be enforceable on their members. **(Taylor and Francis, 2000)**

2.11.7. Conflict of interest

Conflict of interest is the conflict for a single person who has obligations to more than one party to the contract or the clash of private or commercial interest with a person's public position of trust. A delicate balance can be maintained, but it is important to remove strong temptations to be partial at the expense of another party. **(Fewings , 2000)**

2.11.8. Construction dilemmas

Contractors' moral dilemmas revolve round their need to competitively bid for and win work which is sustainably profitable, and the responsibility to provide a good quality budget which is within the budget they have promised the client. Some 84 per cent of contractors in a US survey of contractors said that had encountered unethical acts or transactions in the construction industry, 63 per cent said they had also encountered illegal acts such as unauthorized use of equipment and mis-reporting of costs. Nevertheless, 24 per cent admitted that they might work with unethical contractors and the same percentage said they often ended up hiring them before they knew they were unethical. **(Fewings , 2000)**

Chapter Three

Data Presentation, Analysis and Interpretation

3.1. Nature of respondents

As portrayed in table 1, respondents were asked with regard to their educational qualification and responded as follows: 4.4.% of the respondents are matriculation and above but below graduate; whereas, almost all (95.6%) are graduates and above.

Table 1 : Education qualification and Company type

S/N	Description	Frequency	Percent	Cumulative %
1.Educational qualification of the respondent				
1.1	matriculation and above but below graduate	2	4.4	4.4
1.2	graduate and above	43	95.6	100.0
2. Company type of respondents				
2.1	Consultants	28	62.2	62.2
2.2	Contractors	17	37.8	100

(source: Questionnaire survey February 2013).

As you observe from the respondents one can conclude that all respondents are well knowledgeable to understand the research problem and can provide valid answers to the inquiry. Of the total respondents 28 (62.2%) are consultants whereas 17 (37.8%) are contractors all of them are class one category.

3.2. Different types of Project control in Ethiopian construction industry

It is the level of management control of projects within the construction sector that determines the quality delivery. Above all the government clearly indicate in the economy policy that building the construction sector capacity to global standard ultimately lead the competitiveness of product at service or work . It is very important to check the industry with respect to control practice on basis of some parameters.

Table 2: Importance of project control objectives

	Project control objectives					
	Budget	**Material**	**Cash flow**	**Quality**	**Time**	**Workmanship**
not important	4.4	2.2	2.2	2.2	3.1	2.2
neutral	6.7	15.6	8.9	6.7	6.7	17.8
important	33.3	22.2	28.9	22.2	31.1	20.0
highest important	55.6	60.0	60.0	68.9	59.1	60.0

(source: Questionnaire February 2013).

As the survey result shown in table 2 level of importance in project management and control above neutral i.e those respondents who replied budget control is important and highest important ; accounts 88.9 %, material control accounts 82.2%, Cash flow Control accounts 88.9% , quality control accounts 91.1% , time control accounts 90.2% and workmanship control accounts 80%. The response level signifies that the current public construction projects suffers from poor project management and control that lead to extended completion of projects beyond the planned completion time, cost and poor quality.

Therefore from the table 2, the study implies that there is weak control of projects and respondents are emphasizing the importance of project control on the stated six variables namely: budget, cash flow , material , time , quality and workmanship that there is inadequate project control and management practice in Ethiopian construction industry.

Respondents also stressed the need to control in order of highest to least importance ranking is quality, time, budget, cash flow, material and workmanship.

3.3. Level of corruption in construction industry

There exists a shortage of skilled construction companies for design and construction services. But due the growing demand of construction the market failed to supply the required companies. The market failure created a conducive environment for unfair trade

practice and rent seeking behavior that is manifested by corruption act. Corruption is one of the biggest challenges in the execution of construction procurement, contract administration, purchase of materials and supply. Though the national governments tried to fight bribery and corruption by introducing mechanisms in public service delivery the challenge stayed persistently due to the nature of the tasks and complexity of the industry.

Table :3 Corruption experiences

The frequency of corruption			
Never	Rarely	Often	Always
6.7	28.9	55.6	8.9

(source: Questionnaire February 2013).

As it is indicated in the table 3 above 45 respondents were asked how frequent they encounter corruption practices within the construction business activity, and 6.7% replied they have never encounter, 28.9% rarely, 55.6% often, 8.9% always faced the acts of corruption. From often to always response category, 64.5% of the respondents believe that there is corruption practice in Ethiopian construction sector . There fore, the study concludes that corruption practice can be taken as one of the big challenges of the Ethiopian construction industry that should be fought in a holistic manner.

3.4. The Role of consultants in effective project control

Consultants role are known for effective technical guidance through proper design planning at different stage and close follow up and supervision. But with the existence of current transformational kinds of projects which ranges from small to complex type of projects unbalanced number of consulting firms with respect to the planned projects by the public led to mismanagement of the projects due to absence of consultant at project execution level.

Table :4 Role of consultants

	Unimportant	**Important**	**Very Important**
Frequency	**8.9**	**31.1**	**60**

(source: Questionnaire February 2013).

In the table:4 shown above 45 respondents were asked to rate the level of importance consultants role in Ethiopian construction industry for effective project control problem solving capability. As it is seen from survey, 8.9% responded unimportant, 31.1% responded important , 60% responded very important. Consultant's role is so significant in project delivery with quality, time and prescribed budget. Therefore, the mandate of consultants in the process of construction project life cycle is un substitutable.

3.5. Causes of Construction project problem

Completion of the whole or part of designs whatever type of contract modalities followed is mandatory for the execution of the works on the basis of some conceptual designs is a common practice that worked specially for fast track kind of projects. In Ethiopian construction industry context the misconception of fast track construction practices have been a cause of rework, uneconomical selection of alternatives as well as decisions complicate the project management and control of the projects.

Responses from 45 respondents were in agreement 100% yes, that most of the constructional related problems seen at project level were caused by the incompleteness of design and lack of knowledge by the owner what he exactly needs not communicated in the design preparation stage. As the extension of this root cause of design problems were asked on level of causes for claim and forced design change.

Table : 5 Design problems as cause for claims

Frequency	Less Cause	Neutral	High Cause	Highest Cause
Claims	**4.4 %**	**31.1%**	**28.9%**	**35.6%**
Variation	**2.2%**	**13.3%**	**53.3%**	**31.10 %**

(source: Questionnaire February 2013).

Similarly as given the design change be the major causes of constructional problems 45 respondents were asked the level of causes of design for claims and 4.4% less cause, 31.1% neutral , 28.9% high cause and 35.6 % highest cause for claims. The same causes were asked on that causes variation of design changes and 2.2% less cause,13.3 %

neutral,53.3% high cause and 31.10 % highest cause for variation . Therefore, the study conclude from survey that design related problems are the major causes of claims on contract implementations. It can also be concluded that variation cause is more severe as a problem 84.4% than claim cause which is 64.5%.

3.6. Different project management practices in Ethiopia

3.6.1. Specialization with in industry

Management control of projects in construction industry covers all activities of value chain for each task that are planned to accomplish. It is obvious that without participation of different professionals; like civil engineering, sanitary engineering, electrical, architectural , interior design , quantity surveyor ,contract management , landscape and infrastructure development are mandatory in building sector. For successful accomplishment is based on participation of skilled and experienced personnel.

Table 6: Specialization of construction industry

	SD	D	N	A	SA
Specialization	2.2%	8.9%	26.7%	24.4%	37.8%

(source: Questionnaire February 2013).

The industry practice of specialized project control need were asked and Out of 45 respondents 2.2% strongly disagree, 8.9% disagree, 26.7% neutral,24.4% agreed ,37.8 % strongly agree on matter.

Though, each specialist contributes to the project by following established professional working practices and by implementing particular systems, manifest in sets of procedures which translate each concept into management tasks. However, the researcher concludes that the current construction industries are not interested on specialized professionals. This might be caused by knowledge gaps that existed due to lack of exposures on large scale projects. Even if there seems to be specialization of contractors and consultants for different works there is no as such deep specialization of firms to undertake sub contractors task.

3.6.2. Management of time

The following questions was paused to the respondents, the management of time is fundamental and predominant consideration for any construction project. In practice irrespective of the type of project , its size and resourcing there will be an essential requirement to plan ,monitor and control all activities against the project's duration.

Table 7: Time management practice of construction industry

	SD	D	N	A	SA
Time management	2.2%	4.4%	4.4%	24.4%	64.4%

(Source: Questionnaire February 2013)

Out of 45 respondents, 2.2% strongly disagree, 4.4% disagree ,4.4% neutral , 24.4% agree and 64.4% strongly agree on the importance of time management in construction industry. Therefore; the researcher concludes that time mismanagement is one of the existing problems of the industry that must be improved.

3.6.3. Project control and Budget Control

Uncontrolled projects end up unexpected cost overrun and ineffective accomplished project in terms of cost. The ultimate aim of project control activities is to gain competitive and comparative advantages over the project implementation process specifically to the owners benefit or fit for purpose. But this is not an easy task due to the existence of profit maximization interest in contractor and consultants perspective. Delaying a project would highly benefit the contractor and the consultant whereas harms the project owner .

Table 8: Control of Budget and project practice construction industry

	SD	D	N	A	SA
Specialization	24.4%	20%	31.1%	13.3%	11.1%

(Source: Questionnaire February 2013)

So Project control is all about budget control on the basis of this fact 45 respondents were asked and ,24.4 % strongly disagree,20% disagree,31.1% neutral, 13.3% agree and 11.1% strongly agree.

Therefore, the researcher concludes that project control is not aligned directly with budget control even though it plays its own role. Thus, it is a function of many variables.

3.6.4. Lack of Skilled manpower

Construction industry is known for major contribution of job employment since it is labor intensive. The labor productivity inefficiency in Ethiopian construction industry is a one of the main factors that made the project cost expensive. Where there is abundant workforce in a country like Ethiopia, the great opportunity to build competent construction firms due to lack of relevant technical skill at project level the problem still remain a challenge. In current GTP period, a new approach of engaging manpower in the area of competence, it became one of the key intervention areas to flood the industry by training large number of technical personnel's and certification as per the industry requirements.

Successful project management results timely completion of projects and delivery. In actual sense project management and implementation skill gap of actors are not recognized. This fact has lead to poor quality and accountability. Based on this fact the respondents were asked and replied their agreement as follows.

Table 9: Lack of Skilled Manpower

	SD	D	N	A	SA
Manpower	8.9%	4.4 %	15.6%	35.6%	35.6%

(Source: Questionnaire February 2013)

From table 9 , 45 respondents were asked their agreement with this and 8.9% strongly disagree , 4.4% disagree , 15.6% neutral , 35.6% agree and 35.6% strongly agree skill gap recognition. Therefore, the researcher concludes that the workforce has to be organized so that its skill gaps be identified and filled by trainings, Certification of professionals from semi skilled to high level professional is a key to continuous quality development.

3.6.5. Requirements of registration

Contractors as well as consultants are expected to provide machinery , manpower to get competency certification. But the existing guideline is aged for more than 18 years without revision is restricting the entry of new firms to the sector and the subsequent growth of the existing firms within the ladder.

Table 10: Registration procedures

	SD	D	N	A	SA
Registration	17.8%	15.6 %	24.4%	17.8%	24.4%

(Source: Questionnaire February 2013)

A total 45 respondents were asked about the existing classification of contractors and consultants registration guideline highly discourage the entry of new ones; and responded 17.8 % strongly disagree,15.6% disagree,24.4% neutral, 17.8% agree and 24.4% strongly agree registration related problems for new entrants to the industry. Thus, the researcher concludes that the existing registration guideline of contractors, consultants and professionals is old and has to be updated to the current condition to create fair play ground on the business environment.

3.6.6. Perception of Efficiency and Effectiveness in construction industry

The current Ethiopian construction industry well explained by its wastage of resources like manpower usage, supply and usage of material, delay. This has an implication directly on project cost. The main cause for this was efficiency control in terms of manpower ,machinery material usage not established at project sites, thus. Resulting wide amount of wastage. Similarly, Effective management control of projects is an outcome of technological capacity and research development. The table 11 below shown the perception of the current industry on the basis of efficiency and effectiveness.

Table 11: Efficiency and Effectiveness of construction industry

	SD	D	N	A	SA

Efficiency	2.2%	2.2%	17.8%	28.9%	48.9%
Effectiveness	8.9%	6.7%	35.6%	24.4%	24.4%

(Source: Questionnaire February 2013)

According to the 45 respondents 77.8% showed their agreement on the inefficiency of Ethiopian construction industry besides 48 % showed their agreement ineffectiveness of the construction industry towards expected delivery.

3.6.7. Perception of Industry on Construction management

Construction management knowledge is a key instrument for successful delivery of the construction works.

Table 12: Construction management Knowledge

	SD	D	N	A	SA
Construction management Knowledge	4.4%	6.7%	17.8%	17.8%	53.3%

(Source: Questionnaire February 2013)

On the basis of this existing fact 45 respondents were asked that most of construction sites are suffering from lack construction management knowledge capacity in key players. And responded, 4.4% strongly disagree, 6.7% disagree, 17.8% neutral, 17.8% agree,53.3% strongly agree. There fore , the industry have good perception on the importance of construction management knowledge . Whereas , the Ethiopian construction industry failed to satisfy this tool across the construction activities.

3.7. Utilization of Project techniques & planning

Currently the construction industry planning capability at all levels are facing common challenges. The challenge continued from project initiation to completion stage. It is a reflection of poor planning to no planning that remained through the project life cycle. Under estimation of quantities, completion time, budget and resources are the very common features of Ethiopian construction industry that needs to be transformed. Upon survey result that was conducted on 45 respondents about the experience of applying

planning tool of bar charts, network analysis , modified network PERT and GERT , graphical techniques and mathematical models the responses are tabulated as follows.

Table ; 13 Industry practice of Project techniques & planning

Description	Never	Rarely	Sometimes	Most of the time	Always
Bar Charts	4.4%	4.4%	20%	51.1%	20%
Network Analysis CPM	26.7%	8.9%	26.7%	26.7%	11.1%
Modified network PERT/GERT	42.2%	17.8%	26.7%	8.9%	4.4%
Graphical Techniques	35.6%	6.7%	28.9%	26.7%	2.2%
Mathematical model	37.8%	24.4%	22.2%	6.7%	8.9%

(Source: Questionnaire February 2013)

As portrayed in table 13 of the 45 respondents ,51% of the respondents mostly use bar chart, whereas 26.7% mostly use CPM , 8.9 % modified network PERT/GERT, 26.7% mostly use ,graphical techniques and 6.7 % mostly use mathematical model .From this analysis one can conclude that most contractors and consultants use Bar Chart for project techniques and planning.

Furthermore, from the above table the researcher conclude that employing planning tools for control of projects across the construction industry is at lower stage. The major cause for inconsistent application and knowledge of planning control tools is lack of professionals within the industry and skill gaps on existing one.

3.8. Importance area of project change management

In growing economy at a faster rate like Ethiopia where a continuous double digit growth for successive 8 years, building a competitive construction industry that facilitate the accelerated construction of infrastructure across the national and federal states would be a foundation to keep on the same path. It is clearly seen that due to high demand of construction in the Growth and Transformation Plan (2010-2015GC), implementation capacity is a limiting factor to attain the goals. High demand for workforce, machinery, construction material of locally available as well as manufactured and finances and competent firms were listed in the program stipulated by MoUDC.

To prove and make continuous intervention to build competent construction industry capacity 45 respondents were asked on the level of importance of manpower, machinery, finance, governance structure to bring construction industry transformation and responded in the table shown below.

Table:14 Radical Change need

Description	Sometimes	Most of the time	Always
Manpower	2.2%	31.1	66.7%
Machinery	20%	53.3%	26.7%
Finance	8.9%	37.8%	53.3%
Governance structure	8.9%	37.8%	53.3%

(Source: Questionnaire February 2013)

Thus, from the above survey human resource development is a basis to build competitive construction industry. As most of the respondents (66.7%) replied there is always capacity problem related to manpower number one , whereas finance and governance structure is the second problem and from the respondents machinery problem is not as such a problem .

3.9. Project success criteria

How do you rate the importance of project success of a project taking into account the following criteria in Ethiopian construction industry.

Table 15: Success factor of construction industry

Description	Less Cause	Neutral	High Cause	Highest Cause
Clear objectives and project brief agreed with client	4.4%	13.3%	28.9%	53.3%
Good project definition	4.4%	13.3%	31.1%	51.1%
Time control and feedback system	8.9%	13.3%	26.7%	51.1%
Competent project management	8.8%	6.7%	17.8%	66.7%
Close financial Control	8.9%	13.3%	26.7%	51.1%
Comprehensive quality control procedure	4.4%	17.8%	26.7%	51.1%
Well coordinated and motivated team	4.4%	11.1%	20%	64.4%
Competent design	11.1%	6.7%	26.7%	55.6%
Good owner relationship	4.4%	22.2%	22.2%	51.1%
Good contractual documentation	8.9%	13.3%	26.7%	51.1%

Good internal and external communication	6.6%	15.6%	33.3%	44.4%

(Source: Questionnaire February 2013)

In the table 15 above ,it can be analyzed as follows. The response was categorized based on the high to highest cause as major project success indicators.

Accordingly, the factors for the success of construction projects in Ethiopia are top ranked as follows: competent project management has high score (84.5%) ,coordinated and motivated team work second highest (84.4%) ,competent design (82.3%), ranked third, and good project definition and clear objectives and project brief agreed with clients (82.2%) ranked fourth, quality control procedure, time, financial control s (77.8%) ranked as fifth major cause ,communication (77.7%) ranked six and owner relationship (73.3%) as ranked seventh as the least major cause. Therefore, from the above table the researcher concludes that for the success of the project as the parameter reflected highest cause for success, through the Ethiopian construction industry should embrace and work out a clear objective, project definition, time control and feedback system, competent project management, finance control, quality control plan, motivation of teams, competent design, good relationship, effective communication, and documentation.

3.10. Project performance and Environment

3.10.1. Wastage in Ethiopian Construction industry

It is not arguable that the existence of wastage in Ethiopian construction industry due to weak implementation capacity. The respondents were asked to estimate the level of wastage in range of percentage of the project cost as follows, assume you as one player in industry, the wastage of materials ,finances, resources, and time highly contribute for poor performance of the overall industry. The respondents were asked to estimate wastage taking finance as percentage of project cost as common indicator estimated. The response is shown in the table 16 below.

Table 16: Wastage level of construction industry

Wastage	Less than 10%	10-20%	21-30%	31- 35%	Greater than 35%
Respondents frequency	24.4%	26.7%	20%	6.7%	22.2%

(Source: Questionnaire February 2013)

From the response ,more than 50% of the respondents agreed that the percentage of wastage is more than 21% , a huge amount which indicate the poor implementation capacity of the industry.

Therefore, the researcher concludes that the estimated wastage level is quite significant and beyond Torrance level of especially for a developing country where there is shortage of resources and seeks transformation of the existing mode of management practices.

3.10.2. Construction environment

It is seen that the construction industry of Ethiopia is technologically backward as compared with the current level of development of the sector across the globe. The government is determined to build the capacity in a very fast rate to cope up the global competition and to address the domestic development need. Modernization of the industry comes to the front agenda of the key actors, using the best method of designing, using appropriate technology that would enhance the productivity so as to compete at global level.

Modernizing the construction industry as one segment of the economic sector is a timely issue. In this regard most challenging in terms of changing the context and to understand how the industry is positioned itself, the respondents were asked on three environments to level the challenges and responded in the table shown below.

Table :17 Environment of Construction industry

	Less Cause	Neutral	High Cause	Highest Cause
Policy environment	6.6%	15.6%	35.6%	42.2%
Market environment	2.2%	13.3%	40%	44.4%
Social environment	8.9%	17.8%	26.7%	46.7%

(Source: Questionnaire February 2013)

Construction market environment (84.4%) is ranked top highest cause of conducive enabler of construction environment, policy environment is ranked second (77.8%) and social environment (73.4%) ranked 3rd as enabler of construction projects.

Therefore, the researcher concludes that all the three environments determines and to be considered further in analysis of modernization of Ethiopian construction sector.

3.11. Descriptive Statistics

Performance of Project Management Rating in Construction management of Ethiopia

Table: 18 Reliability

Reliability Statistics	
Cronbach's Alpha	N of Items
.869	7

Reliability analysis was carried out for seven items for internal consistency with regard to respondent's data on project management control performance rating using cronbach's alpha and in principle cronbach's alpha of 0.7 is acceptable for internal consistency of data obtained from respondents. As depicted in the above table, cronbach's alpha value is 86.9%,well above acceptable level and fit as reliable for data analysis.

Table: 19 Correlation

Correlations								
		Overall project management	Contract management	Cost effectiveness	Technology capability	Man power utilization	Cost competitive	Gov Government implementation capacity
Overall project mgt	Pearson Correlation	1	.449**	.668**	.505**	.280	.614**	.404**
	Sig. (2-tailed)		.002	.000	.000	.062	.000	.006
	N	45	45	45	45	45	45	45
Contract mgt	Pearson Correlation	.449**	1	.478**	.429**	.551**	.552**	.398**
	Sig. (2-tailed)	.002		.001	.003	.000	.000	.007
	N	45	45	45	45	45	45	45
Cost effectiveness	Pearson Correlation	.668**	.478**	1	.593**	.319*	.640**	.564**
	Sig. (2-tailed)	.000	.001		.000	.032	.000	.000
	N	45	45	45	45	45	45	45
Techno capability	Pearson Correlation	.505**	.429**	.593**	1	.491**	.444**	.573**
	Sig. (2-tailed)	.000	.003	.000		.001	.002	.000
	N	45	45	45	45	45	45	45
Man power utilization	Pearson Correlation	.280	.551**	.319*	.491**	1	.368*	.534**
	Sig. (2-tailed)	.062	.000	.032	.001		.013	.000
	N	45	45	45	45	45	45	45
Cost competitive	Pearson Correlation	.614**	.552**	.640**	.444**	.368*	1	.427**
	Sig. (2-tailed)	.000	.000	.000	.002	.013		.003
	N	45	45	45	45	45	45	45
Gov implement capacity	Pearson Correlation	.404**	.398**	.564**	.573**	.534**	.427**	1
	Sig. (2-tailed)	.006	.007	.000	.000	.000	.003	
	N	45	45	45	45	45	45	45

Correlations								
		Overall project management	Contract management	Cost effectiveness	Technology capability	Man power utilization	Cost competitive	Gov Government implementation capacity
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	Sig. (2-tailed)	.002		.001	.003	.000	.000	.007
	N	45	45	45	45	45	45	45
Cost effectiveness	Pearson Correlation	.668**	.478**	1	.593**	.319*	.640**	.564**
	Sig. (2-tailed)	.000	.001		.000	.032	.000	.000
	N	45	45	45	45	45	45	45
Techno capability	Pearson Correlation	.505**	.429**	.593**	1	.491**	.444**	.573**
	Sig. (2-tailed)	.000	.003	.000		.001	.002	.000
	N	45	45	45	45	45	45	45
Man power utilization	Pearson Correlation	.280	.551**	.319*	.491**	1	.368*	.534**
	Sig. (2-tailed)	.062	.000	.032	.001		.013	.000
	N	45	45	45	45	45	45	45
Cost competitive	Pearson Correlation	.614**	.552**	.640**	.444**	.368*	1	.427**
	Sig. (2-tailed)	.000	.000	.000	.002	.013		.003
	N	45	45	45	45	45	45	45
Gov implement capacity	Pearson Correlation	.404**	.398**	.564**	.573**	.534**	.427**	1
	Sig. (2-tailed)	.006	.007	.000	.000	.000	.003	
	N	45	45	45	45	45	45	45
**. Correlation is significant at the 0.01 level (2-tailed).								
*. Correlation is significant at the 0.05 level (2-tailed).								

As shown in the above table, Based on a survey of 45 respondents from the construction project sector in Ethiopia, a bivariate Pearson product moment correlation analysis is run and shows the following result:

There is an overall project management performance relation with the remaining variables (r=0.723). Specifically, overall project management control with contract management is positively correlated significantly(r=0.449, $p<0.01$); with cost effectiveness is positively correlated significantly(r=0.668,$p<0.001$) , with technological capability is positively

correlated significantly(r=0.505,p<0.001) , with cost competitiveness is positively correlated significantly(r=0.614,p<0.001) , with government implementation capacity is positively correlated significantly(r=0.404,p<0.001) , respectively. On the other hand ,based on the Pearson correlation test all the remaining variables i.e contract management ,cost effectiveness, technological capability, manpower utilization ,cost competitiveness and government implementation capacity have strong significant correlation results at 1%significant level.

Table: 20 Regression Model

Model Summary				
Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	.723[a]	.522	.447	.69652
a. Predictors: (Constant), gov implement capacity, contract mgt, cost competitive, techno capability, man power utilization, cost effectiveness				

As portrayed in the model summary, overall correlation is 72.3% and coefficient of determination is 44.7%,i.e, 44.7% of the variation in project management control performance is explained by the variables, contract management performance, cost effectiveness, technology capability, manpower utilization, technology capability ,cost competitiveness and government capacity.

Table: 21 ANOVA analysis

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.143	6	3.357	6.920	.000[a]

	Residual	18.435	38	.485		
	Total	38.578	44			
a. Predictors: (Constant), gov implement capacity, contract mgt, cost competitive, techno capability, man power utilization, cost effectiveness						
b. Dependent Variable: overall project						

As depicted in the above table ANOVA was carried out to see model fitness($F=6.92, p<0.000$) and found to be the model is fit to the data captured and predictor variables are statistically significant enough to explain the dependent variable.

Table: 22 Determination of Coefficients

Coefficients[a]						
Model		Un standardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.284	.403		.706	0.055
	Contract mgt	.091	.172	.081	.533	0.0031
	Cost effectiveness	.421	.188	.389	2.241	0.0311
	Techno capability	.168	.166	.158	1.014	0.0321
	Man power utilization	-.054	.152	-.054	-.352	0.727
	Cost competitive	.274	.152	.283	1.802	0.05
	Gov implement capacity	-.029	.152	-.030	-.192	0.048
a. Dependent Variable: overall proj mgt						

Based on Regression model,

Project Management Control = 0.284+0.91contract management + 0.421cost effectiveness + .168 technology capability + (- 0.54 manpower utilization) +.274 cost competitiveness+(-0.29government capacity to control projects)

If the dependent variable, Project management control is denoted by Y

X1….xn, the independent variables, then,

Y= β0+ β x1+ β x2+ β x3+ β x4+ β x5+ β x6+ε,

Hence,

Therefore, **Y=** $=0.284+0.91X_1+0.421\ X_2+.168\ X_3 - 0.54\ X_4+.274\ X_5 - 0.29\ X_6$.

CHAPTER FOUR

Summary of Major Findings, Conclusion and Recommendations

4.1. Summary of major findings

In order to attain the envisaged transformational plans, the Construction Industry in Ethiopia faces major implementation capacity problems. Based on the study undertaken, the researcher has come up with the following findings.

- All respondents are well knowledge able to understand the research problem and can provide valid answers to the inquiry.
- The major key actors consultants and contractors who are engaged within the Ethiopian construction industry believe that the project management of construction is dictated by the direct and systematic control of budget, cash flow , material , time , quality and workmanship.
- The current public construction projects suffers from poor project management and control that lead to extended completion of projects beyond the planned completion time, cost and poor quality.
- There is weak control of projects and respondents are emphasizing the importance of project control on the stated six variables namely: budget, cash flow , material , time , quality and workmanship that there is inadequate project control and management practice in Ethiopian construction industry.
- Most of the respondents believe that there is corruption practice in Ethiopian construction sector.
- The mandate and role of consultants in the process of construction project life cycle is un substitutable.
- That most of the constructional related problems seen at project level were caused by the incompleteness of design and lack of knowledge by the owner what he exactly needs not communicated in the design preparation stage.
- Design related problems are the major causes of claims on contract implementations.
- The current construction industries are not interested on specialized professionals. This might be caused by knowledge gaps that existed due to lack of exposures on large scale projects.

- Time mismanagement is one of the existing problems of the industry that must be improved.
- Project control is not aligned directly with budget control even though it plays its own role.
- The workforce has to be organized so that its skill gaps be identified and filled by trainings, Certification of professionals from semi skilled to high level professional is a key to continuous quality development.
- The existing registration guideline of contractors, consultants and professionals is old .
- There exist high level of inefficiency and ineffectiveness in Ethiopian construction industry.
- The industry has good perception on the importance of construction management knowledge.
- Employing planning tools for control of projects across the construction industry is at lower stage.
- The major cause for inconsistent application and knowledge of planning control tools is lack of professionals within the industry and skill gaps.
- Human resource development is a basis to build competitive construction industry in Ethiopia.
- The factors for the success of construction projects in Ethiopia are top ranked as follows: competent project management.
- The estimated wastage level above 25% is quite significant and beyond tolerance level of especially for a developing country where there is shortage of resources and seeks transformation of the existing mode of management practices.

4.2. Conclusion

From the Ethiopian construction industry context of management control of projects research conducted the researcher reached to the following conclusions.

- Inadequate local capacity of contractors, consultants, suppliers .
- Shortage of finance, equipment, machinery and skilled and unskilled human resources.
- Weak performance of the construction sector due to wastage more than 20 % .
- The existing registration procedure is became barrier to new entry and take market opportunity.
- Poor control and management capacity due to lack of sufficient laws and regulations (domestic and international) governing the construction industry.
- Low productivity level in terms of manpower, machine, materials utilization.
- There is prevalence of wide corruption in the construction industry.
- There is significant wastage , and poor quality delivery
- There is project delay, cost overrun in most of construction projects.
- The key actors like consultants, contractors, clients are not strengthened with appropriate skillful professionals.
- There is absence of modern Scheduling techniques, planning and evaluation practice at project level.
- Project management and control capability in terms of time , manpower , material, finance , quality control are not up to standard.
- There exist lack of competent personnel to construction project management & control service.
- There is lack of knowledge for project control and management tasks.
- Very low experience of using computers programs for effective project management and control.
- There are no well developed design aids, procedures, guidelines, standards and quality assurance system.
- There is low productivity of manpower at project implementation stage and unwise utilization or human resource.

- There is unclear demarcation of roles of consultants, contractors and clients.
- The long age unrevised registration process and procedures contribute to poor performance of the industry and not promote free market environment instead it facilitates monopoly.
- There is lack of capable construction related research and development institution.

4.3. Recommendation

On the basis of the major findings of the study, the researches directs the following points for policy makers to put it into actions.

- Improve the capacity and competitiveness of the local construction enterprises (contractors, consultants and informal sector)
- Improve the capacity and performance of the public sector and private sector clients so as to ensure efficient, transparent and effective implementation and management of construction projects.
- Ensure efficient and cost effective performance of the construction industry that will guarantee value for money on constructed facilities in line with best practices.
- Promote application of cost effective and innovative technologies and practices to support socio-economic development activities such as road works, water supply, sanitation, shelter delivery and income generating activities.
- Ensure application of practices, technologies and products which are not harmful to both the environment and human health.
- Mobilize adequate resources from both the public sector and the private sector for construction and maintenance of public infrastructure.
- Enhance participation in regional and international cooperation arrangements for the purpose of promoting the capacity and competitiveness of the industry and developing markets for export of its services and products.
- Improve co-ordination, collaboration and performance of the institutions supporting the development and performance of the construction industry.

- Organize the key actors with appropriate associations so that the common goals met for global level market competitiveness.
- Introduce new technologies, codes and standards to the industry enhance the productivity.
- Establish an institution in charge of construction industry capacity buildings focusing mainly on project management and control.
- The Construction industry needs a comprehensive policy to ensure compliance with the national, social and economic development objectives and goals.
- The key actors of the industry like consultants, contractors, owners capacity should be improved.

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Appendix

Questionnaires survey on Management control of projects in Ethiopian construction industry.

Dear Respondents!

The purpose of this questionnaire to gather information from construction industry key actors on Management control of project s in construction industry practices in Ethiopian context. The information provided will be kept confidential and used to research on the existing construction management challenges to recommend the appropriate scientific solutions for the accelerated development of the sector in technological and implementation capacity.

Your name is needed for follow-up surveys. However, all responses to this survey are completely confidential. Please be assured that the information you provide in this study will have no effect on your business.

Thank You in Advance for Your cooperation

PART ONE: BACKGROUND INFORMATION OF RESPONDENTS

1. Name of the respondent _____
2. Educational Qualifications (General)

   Below Matriculation ☐

   Matriculation and above but below Graduate ☐

   Graduate and above ☐
3. Company name _____
4. Category _____
5. When did you start your business ?_____ Year

6. Types of Business

   General contractor ☐ Building Contractor ☐ Consulting Firm ☐

Road Contractor ☐ Specialty Contractor ☐ Professional ☐

PART TWO: QUESTION ON DIFFERENT TYPES OF PROJECT CONTROL

1. Please indicate your ranking of the importance of the following construction project control objectives by assigning ranks from " 1" to "**5**", where "1" is the least important and "**5**" is highest important.

	1	2	3	4	5
7.1 Budget control	☐	☐	☐	☐	☐
7.2 Material control	☐	☐	☐	☐	☐
7.3 Cash Flow control	☐	☐	☐	☐	☐
7.4 Quality control	☐	☐	☐	☐	☐
7.5 Time control	☐	☐	☐	☐	☐
7.6 Workmanship control	☐	☐	☐	☐	☐

2. How frequent you encounter corruption practices in construction industry business?

Never	Rarely	Often	Always
☐	☐	☐	☐

3. How do you rate the role of consultants in Ethiopian construction industry for effective project control problem solving capability?

Totally unimportant	Unimportant	Important	Very important
☐	☐	☐	☐

4. The possible cause for the unfair trade practices in Ethiopian construction industry rated in degree of contribution.

	1	2	3	4	5
4.1 Policy environment , rules , regulation	☐	☐	☐	☐	☐
4.2 Professional ethics ,values	☐	☐	☐	☐	☐
4.3 Consultant's capacity	☐	☐	☐	☐	☐
4.4 Contractor's capacity	☐	☐	☐	☐	☐

4.5 Shortage of construction resources	☐ ☐ ☐ ☐ ☐

PART THREE: CAUSES OF CONSTRUCTION PROJECT PROBLEMS

1. Starting construction before designs are complete or the client knows what exactly what he wants is a major cause of constructional problems.

   Yes ☐ NO ☐

2. If your answer is yes rate the following causes in scales given by assigning ranks from " 1" to "4" , where "1" is for less cause and "4" is for highest cause.

	1 2 3 4
2.1 Claims	☐ ☐ ☐ ☐
2.2 variation	☐ ☐ ☐ ☐

PART IV: LEVEL OF AGREEMENT/DISAGREEMENT ON DIFFERENT PROJECT MANAGEMENT PRACTICES IN ETHIOPIA (1=strongly disagree to 5= strongly agree)

	1 2 3 4 5
1 . Today's construction project control in Ethiopia could not function without some degree of specialization. Each specialist contributes to the project by following established professional working practices and by implementing particular systems, manifest in sets of procedures which translate each concept into management tasks.	☐ ☐ ☐ ☐ ☐
2. The management of time is fundamental and predominant consideration for any construction project. In practice irrespective of the type of project , its size and resourcing there will be an essential requirement to plan ,monitor and control all activities against the project's duration.	☐ ☐ ☐ ☐ ☐
3. Project control is all about budget control on the basis of this fact rate the practice of project control process in construction industry	☐ ☐ ☐ ☐ ☐
4. Successful project management results timely completion of projects and delivery. In actual sense project management and implementation context skill gap of actors are not recognized. This fact has lead to poor quality and lack of accountability.	☐ ☐ ☐ ☐ ☐
5. The existing classification of contractors and consultants registration guideline highly discourage the entry of new ones.	☐ ☐ ☐ ☐ ☐
6. Efficiency control in terms of manpower ,machinery material usage not established at project sites. As a result it is seen a wide amount of wastage.	☐ ☐ ☐ ☐ ☐
7. Effective management control of projects is an outcome of technological capacity and research development. How do you rate the attitude to new apply new technique and interest of higher education to engage in problem solving research topics.	☐ ☐ ☐ ☐ ☐

8.	Most of construction sites are suffering from lack construction management knowledge capacity in key players.	☐	☐	☐	☐	☐

PART FIVE: UTILIZATION OF PROJECT TECHNIQUES AND PLANNING

1. During your project control and management please rate in scale given your experience of applying the programming techniques and contract Planning**

	Never	Rarely	Sometimes	Most of the time	Always
	1	2	3	4	5
1. Bar Charts	☐	☐	☐	☐	☐
2. Network analysis CPM	☐	☐	☐	☐	☐
3. Modified network PERT & GERT	☐	☐	☐	☐	☐
4. Graphical techniques	☐	☐	☐	☐	☐
5. Mathematical model	☐	☐	☐	☐	☐

** If you use different techniques please use separate paper.

PART SIX: IMPORTANCE AREAS OF PROJECT CHANGE MANAGEMENT

1. How do you rate the importance to bring radical change in Ethiopian construction industry project management control practice.

	Sometimes	Most of the time	Always
	1	2	3
Manpower	☐	☐	☐
Machinery	☐	☐	☐

Finance	☐	☐	☐
Governance Structure	☐	☐	☐

PART SEVEN: CRITERIA FOR PROJECT SUCCESS

Rate on the importance of project success of a factors in Ethiopian construction industry. (1 for lowest 5 for highest)

	1	2	3	4	5
1. Clear objectives and project brief agreed with client	☐	☐	☐	☐	☐
2. Good project definition	☐	☐	☐	☐	☐
3. Time control and feedback system	☐	☐	☐	☐	☐
4. Competent project management	☐	☐	☐	☐	☐
5. Close financial Control	☐	☐	☐	☐	☐
6. Comprehensive quality control procedure	☐	☐	☐	☐	☐
7. Well coordinated and motivated team	☐	☐	☐	☐	☐
8. Competent design	☐	☐	☐	☐	☐
9. Good client ,consultant and contractor relationship	☐	☐	☐	☐	☐
10. Good contractual documentation	☐	☐	☐	☐	☐
11. Good internal and external communication	☐	☐	☐	☐	☐

PART EIGHT: IMPORTANCE OF DIFFERENT DESIGN OPTION

Well managed and prepared t designs with proper details are important for success of the construction projects. In this regard considering your experience rate the importance of the following design option for Ethiopian construction industry in degree of relevance in current economic development context. (1 for lowest 5 for highest)

	1	2	3	4	5
1. Design by employer or a consultant	☐	☐	☐	☐	☐
2. Outline designs provided with detailed design by others	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

3. Layout design by Employer ; detailed design by contractor	
4. Functional specification by Employer: design by contractor	

PART NINE: PROJECT PERFORMANCE and ENVIRONMENT

1. Assume you as one players in industry ,the wastage of materials, finances , resources, and time highly contribute for poor performance of the overall industry. In your opinion the estimated wastage taking finance as common indicator estimated.

Less than 10% ☐ Between 10 -20% ☐ Between 20-30% ☐

Between 30 – 35% ☐ Above 35% ☐

2. To modernize the construction industry as one segment of the economic product is a timely issue. In this regard what in your opinion most challenging in terms of changing the context. (1 for lowest 5 for highest)

2.1. Policy environment

1 2 3 4 5

☐ ☐ ☐ ☐ ☐

2.2. Market environment

1 2 3 4 5

☐ ☐ ☐ ☐ ☐

2.3. Social environment

1 2 3 4 5

☐ ☐ ☐ ☐ ☐

PART TEN: OVERALL PERFORMANCE OF PROJECT CONTROL PRACTICE IN ETHIOPIA (1= Very Poor to 5= Excellent)

No	Description	Scale				
		1	2	3	4	5
1.	How do you rate the overall project management control practice in construction sector of Ethiopia	☐	☐	☐	☐	☐
2.	Construction contract management	☐	☐	☐	☐	☐
3.	Cost effectiveness	☐	☐	☐	☐	☐
4.	Technology capability	☐	☐	☐	☐	☐
5.	Manpower utilization	☐	☐	☐	☐	☐
6.	Competitiveness in terms of cost	☐	☐	☐	☐	☐
7.	Implementation capacity of government institutions	☐	☐	☐	☐	☐

Thank you Again for your help!

LIST OF REGISTRED CONSULTANTS

No	List of Consulting Firm	Category	Class
1	HABTAMU INTERNATIONAL CONSULTING AR & EN PLC	CAE	3
2	TSEDALE &SILESSI DESIGN AND CONSTRUCTION CONSULT	CMC	3
3	ADUGNA DEGEFA CONS.ARC.ENG	CAE	3
4	SG CONSULTING ENGINEERS P.L.C	HBC	3
5	BRAVE COSULTANTS P.L.C	CAE	3
6	IDCON INFRASTRACTURE DEVELOPMENT CONSULTANTS PLC	HBC	3
7	ETHIO INFRA ENGINEERING PLC	HBC	3
8	GET CONSULT P.L.C	CAE	3
9	OADUS P.L.C	CAE	3
10	OTT CONSULTING ARCHITECTS &ENGINEERS	CAE	3
11	ASSOCIATED ENGINEERING CONSULT P.L.C	HBC	3
12	AFRI CONSULTING ARCH &ENGIN P.L.C	CAE	1
13	M.G.M CONSULT P.L.C	CAE	2
14	KALEAB TESHOME	CAE	3
15	MOGES DESTA	CAE	3
16	BREEZE CONSULTANCY P.L.C	CAE	3
17	BEREKET TESFAYE	CAE	3
18	TESFS MEN CONSULTING ARCHITECTS AND ENGINEERSA	CAE	3
19	UNITED CONSULTING ENGINERS P.L.C	HBC	3
20	RAMA CONSULT P.L.C	HBC	3
21	PARAGON ENGINERING CONSULT	HB	3
22	ROAD DESIGN AND DEVELOPMENT CONSULTANT P.L.C	CE	3
23	DYNAMIC PLANNERS P.L.C	CAE	3
24	DANA &ASSOCIATES P.L.C	HBC	3
25	HAGER CONSULT	CAE	3
26	SLESHI CONSULT P.LC	CAE	1
27	ZIAS DESIGN INTRNATIONAL P.L.C	CAE	1
28	NIAT ENGINEERING P.LC	CAE	3

LIST OF REGISTRED CONSULTANTS

No	List of Consulting Firm	Category	Class
29	GOGOT CONSULTING P.L.C	HBC	3
30	ADERA ENGINEERING	HBC	3
31	SKYLINE CONSULTING ARCH. & ENGINEE. P.L.C	CAE	3
32	RAAS ATCHSTECTS P.S.C	CAE	2
33	YOHNES ABBAY TESSEMA	CAE	1
34	BET AARCHITEETS P/L/S	CAE	2
35	WH,TEKNGHT CONSTRU MOYMENT	CMC	3
36	MH ENGINEERING P.L.C	CAE	1
37	CLASSIC CONSULT P.L.C	CE	3
38	AMAHA FKJRY CINSULTING ARCH &CNG	CAE	3
39	AT-CON ENGINEERING CONSULT P L C	CAE	3
40	SEGENET ENGINIERING P.L.C	CAG	3
41	LYDA CONSUCTIVG ARCHITECT & ENGINENER P.L.C	CAE	3
42	NiCHE INGFRASTRACTING CONSSSLTING ENGINEERS	CAE	3
43	OMEGA CONS. ENEINEERS P.L.C	HBC	3
44	GENCON ENGINERING SHATE COPANS	CEG	1
45	JCB CONSILT P.L.C	CAE	3
46	NATIONIA; ENGNINEERING P.L.C	CAE	3
47	GONDWANS ENGINEERRING P.L.C	HBC	3
48	CEVITA CONSLTANT FOR CONSTRUCTION WORK	CA	2
49	LITE CONSULT	CAE	3
50	ASSOCIATED ENGINEERING COSULT P.L.C	CAE	1
51	YOHEL CONSULT P.L.C	CAE	3
52	ICON ENGINEERING P.L.C	HBC	3
53	ADDIS MEBIRETH	CAG	3
54	SKHAS CONSULTANCU P.L.C	CAE	3
55	ULTIMATE PLAN P.L.C	CAE	1
56	ETG DESGNERS AND CONSUTANCY P.L.C	CAE	1
57	GERTTA CONSULT P.L.C		1
58	MULLI D ENGINRING P.L.C	HBC	3
59	ROHA CONSULTING ENGENEERNG P. L.C.	CAC	1
60	NOMY ENGINEERING P.L.C	CAE	1
61	HAILE GABRIEL CONSULT P.L.C	CAE	3
62	VIRTUAC CONSSULTING P.L.C	CAC	3
63	KEEN CONSULTANTS P.L.C	CAT	1

LIST OF REGISTRED CONSULTANTS

No	List of Consulting Firm	Category	Class
64	IEDAW CONSULTING ARCH	CAC	1
65	WOLE EMGOMEEROMG CPMSEULT	HEC	3
66	APCON DESSIGN GUILD P.L.C	HBC	3
67	TORNADO ENGINEERING CONSULTING P.L.C	HBC	3
68	CIVIL WORKIG CONSULTING	HBC	3
69	SAIBA ENGINERRING P.L.C	HBL	3
70	ASSEFA GEBEYEHU	CAE	3
71	HABTAMU INTERNATIONAL CONSTRUCTION	CAE	1
72	TORNADO ENGINEERING CONSULTING P.L.C	CAE	3
73	ACUTE ENGINEERING P.L.C	CAE	3
74	TABY ENGINERING	SC	3
75	DERHAN TEGEGN THKELE	CAE	3
76	WOSSEN ARCHITECT P.L.C	CAE	2
77	IGC GENERAL BBUSINESS P.L.C	CEG	3
78	NA CONSULTING ARCHITECTS AND ENGINEERS P.L.S	CAE	3
79	MOMY ENGINEERING P.L.C	HBBC	3
80	METAFERIA CONSUCTING ENGINEERS	CAE	3
81	BIRHAN CONSTRUCTION DESIGN CONSULTANTS	CEG	3
82	GAMETS INTERNATOPMA; P.L.C	CAE	1
83	CORT CONSULTING ENGONEERS P.L.C	HBC	2
84	SLS SENGINEEING P.L.C	CAE	3
85	SOLMON FEREDE ZERIHUN	CAE	3
86	MH ENGINEERING P.L.C P.L.C	HBC	3
87	SKAS CONSULLING ARCHILLETS	CA	1
88	NET CONSUCT CONSLTING & ART P.L.C	HBC	3
89	NOBLE INTERNAIONAL BUSINESS P.L.C	CAE	3
90	FIME ENGINEERING P.L.C	CEG	3
91	WOSSEN WOLDEKIDAN	GC	3
92	OPEN CONSULTIN ARCHITECT P.LC	CAT	3
93	C.G.F CONSUTANCY P.LC	HBC	3
94	ARTS.THCH CUNSULTANTS S.C.O	HBC	3
95	MESAL & ASSCUATES ENGI CONSULTANCY P.L.C	CAE	1
96	DH CONSULT	HBC	3
97	STADIA ENGINEERING CONSULTANT	HBC	3
98	MS CONSULTANS	HBC	3

LIST OF REGISTRED CONSULTANTS

No	List of Consulting Firm	Category	Class
99	SHIGEZ CONSULTANCY P.L.C	CA	1
100	ABAKO INTERNATIANAL PERTNERS	CAE	3
101	FASIL GLORGLLIS CONSULT P.L.C	CA	2
102	TRANSNATOPN ENGINERERG P.L.C	HBC	2
103	DNH ENGINERING P.LC	HBC	3
104	ESNA & ASOCTATES CONSULTING P.L.C	CBC	3
105	UNVERSAL CONSULTANT	CAE	2

LIST OF REGISTRED CONTRACTORS

Ser. No.	Organization	ID No.	Reg. No. Con/_	Category
1	Universal Construction P.L.C.	04143	0028	BC-1
2	Mela Engineering & Construction P.L.C.	00270	1427	BC-1
3	Mescon Construction	04138	2456	BC-1
4	Mel con Construction	05852	4991	BC-1
5	Arsema Abebe Kahsay	05905	5744	BC-1
6	Yirgalem Construction P.L.C.	02446	0871	GC-1
7	Rama Construction P.L.C	03045	0915	GC-1
8	Akir Construction P.L.C	01638	0922	GC-1
9	Samson G/Yohannes Tedla	06050	0984	BC-1
10	AB Construction	01097	0268	BC-1
11	Living Steel Construction PLC	06094	5818	BC-1
12	Lema Wodajo Cheber	06114	0917	RC-1
13	Yaregal Yifredew Mengistu	06138	3308	RC-1
14	Tebebe Construction PLC	00304	0770	GC-1
15	EL General Business P.L.C.	04215	4345	BC-1
16	C.G.C. OVERSEAS CONSTRUCTION ETHIOPIA LIMITED	03400	4146	GC-1
17	Berhe Hagos General Contractor	01532	1190	GC-1
18	Pyramid Construction & Trade P.L.C.	05399	0084	GC-1
19	3M Engineering & Construction P.L.C.	03599	0086	BC-1
20	Samuel S/Mariam Endale	03691	0311	BC-1
21	Teklehaymanot Asegdom Teddela	03367	0515	BC-1
22	N.K.H. Construction P.L.C.	01003	0996	GC-1
23	Geomluigi Varnero plc	01364	0746	GC-1

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Ser. No.	Organization	ID No.	Reg. No. Con/_	Category
24	A.M.B Construction P.L.C.	03225	0430	BC-1
25	Afro Tsion Construction P.L.C.	03337	0380	GC-1
26	Orbit Engineering & Construction P.L.C.	03274	0166	BC-1
27	Demere Engineering & Construction	03422	0026	BC-1
28	Flintstone Engineering	01421	0627	BC-1
29	Issayas & Herouy con.plc	06374	1529	GC-1
30	Tilahun Abebe Gebremariam	04037	4569	BC-1
31	Zeleul Yohanns Gangul	06398	2628	BC-1
32	Gad Construction PLC	05688	0993	BC-1
33	Gad Construction PLC	05688	0993	BC-1
34	Sur Construction P.L.C.	02003	0876	GC-1
35	Data Construction P.L.C.	03090	0041	BC-1
36	Yotak Construction P.L.C.	01373	0799	GC-1
37	Zamr Construction	05267	0620	BC-1
38	Kebew Copnsturction plc	02121	0131	BC-1
39	Midroc Constructio P.L.C.	06521	1203	GC-1
40	Jibrel Geressu Habib	05039	0645	BC-1
41	Rediete Dagem Enginering & Const. P.L.C.	05421	0265	BC-1
42	Emenete Endeshaw W/Hanna	01523	1073	GC-1
43	Equator Engineering Construction P.L.C.	03935	0938	BC-1
44	Ethio Canadian Business Group	01811	2772	GC-1
45	Nasew Construction P.L.C.	01394	0031	BC-1
46	Kulubi Construction Enterprise	04247	0263	BC-1
47	Trust Construction	05561	0853	BC-1
48	Magercon P.L.C.	01677	0605	BC-1
49	Haileslassie Birhanu Lakew	06670	4483	BC-1
50	Keangnam Enterprises Limited	06678	1943	GC-1
51	Satcon Construction P.L.C.	04139	0774	GC-1
52	Giga Construction P.L.C.	01756	0659	BC-1
53	Awash Walday W/Abzigi	05234	4728	BC-1
54	Alemayehu Ketema W/Tsadik	01412	0568	GC-1
55	Radar Construction	05298	2636	BC-1
56	Tewodros Abera Oda	04588	0778	BC-1
57	Unity Engineering P.L.C	03428	1031	BC-1
58	Else Addis Industrial Development Plc	06787	6046	BC-1

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Ser. No.	Organization	ID No.	Reg. No. Con/_	Category
59	Raycon Building cons. & Machinery Rental	06789	5744	BC-1
60	Berhan Tobiaw Mareye	06797	0009	BC-1
61	Salini Costruttori S.P.A Ethiopian Branch	06811	2521	GC-1
62	Pan Africa Construction Engineers P.L.C.	06815	0824	BC-1
63	Diriba Defersha Amosha	06831	0417	GC-1
64	Santa Maria Construction P.L.C.	05456	0283	BC-1
65	Yoakan Consturction	06873	3772	BC-1
66	Tekleberhan Ambaye Construction P.L.C.	06874	0981	BC-1
67	Finfine Construction P.L.C.	06877	1035	GC-1
68	Enyi General Business P.L.C	04193	1904	GC-1
69	Sygin Tex.TR.& Ind.Joint Stock Company	06895	05815	BC-1
70	Sunshine Construction P.L.C. (Samuel Tafesse)	01829	0135	GC-1
71	Yencomad Construction PLC	06919	1202	GC-1
72	Nejib Aden Hassen	04999	1141	BC-1
73	Bridge Construction P.L.C.	06922	4455	BC-1
74	Grace Engineering	01658	0928	BC-1
75	Orchid Bussiness Group P.L.C.	05643	2267	GC-1
76	Hazi II General Contruction & Trading	01749	1818	GC-1
77	Taye Asfaw Mekonnen	00100	0643	BC-1
78	Red Sea Construction P.L.C	01969	0859	BC-1
79	Macro General Contractor & Trading P.L.C.	02182	0101	RC-1
80	TNT Construction (Tesfaye Tilahun Yehualawork)	07080	2972	BC-1
81	Crafts Construction P.L/C.	07093	2230	BC-1
82	Bamacon Engineering P.L.C.	07094	2604	BC-1
83	Homa Construction PLC	07096	0760	BC-1
84	Elimi Olindo Construction P.L.C.	07104	1150	BC-1
85	CRBC Addis Engineering PLC	07065	1846	GC-1
86	Raycon construction & Machinery Rental	07087	5744	BC-1
87	D.M.C. construction P.L.C.	01614	0864	GC-1
88	Koracon Construcion	07088	0645	BC-1
89	Kasahun Abeje Azeref	07123	2648	BC-1
90	Shade General Contractor P.L.C.	05052	4027	GC-1
91	Mureza Leja Balacha	07129	0806	BC-1
92	Getachew Atsbha Kidanu	07169	0635	BC-1

LIST OF REGISTRED CONTRACTORS

Ser. No.	Organization	ID No.	Reg. No. Con/_	Category
93	ATS Engineering P.L.C.	07174	2821	BC-1
94	Yemane Girmay Bisrat	07195	3393	GC-1
95	Ziquala Construction	05355	1172	BC-1
96	F.E. Construction PLC	07199	3183	BC-1
97	Bereket Endashaw W/Hana	02911	3749	BC-1
98	Midroc Foundation Specialist PLC	03009	1542	PFW-1
99	Africawit Building Contractor P.L.C.	07226	0083	BC-1
100	Defence Construction & Engineering Enterprise	05261	4076	GC-1
101	Man General Contractor	04765	2615	GC-1