Addis Ababa University
School of Graduate Studies
Center for Regional and Local Development Studies
Urban Development and Management Program

Causes and Effects of Poor Inter Sectoral Linkage in Infrastructure Development Works: The Case of Road and Light Rail Construction Projects in Addis Ababa

A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Arts degree in Urban Development and Management

MAHLET GEBREEGZIABHER

ADVISOR: WONDIMU ABEJE, PhD

Addis Ababa, Ethiopia

June, 2014

Addis Ababa University
School of Graduate Studies
Center for Regional and Local Development Studies
Urban Development and Management Program

Causes and Effects of Poor Inter Sectoral Linkage in Infrastructure Development Works: The Case of Road and Light Rail Construction Projects in Addis Ababa

By: Mahlet Gebreegziabher

Approved by Board of Examiners:

Wondimu Abeje		20/06/2014
Thesis advisor	signature	date
Agizew Nigussie		20/06/2014.
External examiner	signature	date
Dr. Israel Paul		20/06/2014.
Internal examiner	signature	date

Chair of Department or Graduate Program Coordinator

Acknowledgements

First and foremost '**Glory be to God the Almighty**', who gave me enormous endurance from the beginning to the end of my task.

Next to God, there are numerous people, without whom, completing this thesis would not have been as successful. I am grateful to the support, guidance and encouragement from my advisor, Dr. Wondimu Abeje. I am appreciative of the support and assistance from my parents especially my dear brother Solomon G. and the understanding of all of my friends. I would like to sincerely thank employees of AACRA, EEPCo, AAWSA, and ETC for providing me the necessary information for the inputs of this thesis works especially Ato Asnake. My deepest gratitude also goes to Ellu, Bomboye, Red and Rishan who has been assisting me in collecting data. You guys are friends from heaven. Finally, to all the people who participated in the research process, your involvement has contributed to the success of this project, and for that I am grateful.

May God bless you all!

LIST OF TABLES AND BOXES

LIST OF FIGURES

TABLE OF CONTENTS

Chapter four Data presentation and analysis

Chapter five Summary of findings and Conclusions

Reference list

Appendix

Acronyms

AACRA	Addis Ababa City Administration Road Authority
AAWSA	Addis Ababa Water and Sewerage Authority
BWUD	Bureau of Works and Urban Development
CBO	Community Based Organization
CSA	Central Statistics Authority
EEPCo	Ethiopia Electric Power corporation
ERC	Ethiopian Railway Corporation
ETC	Ethiopian Telecommunication Corporation
GIS	Geographic Information System
ICT	Information Communication Technology
IDSMT	Integrated Development for Small and Medium Towns
IUIDP	Integrated Urban Infrastructure Development Plan
IUISP	Integrated Urban Infrastructure and Service Plan
LDP	Local Development Plan
LGIF	Local Government Infrastructure Fund Program
MIP	Municipal Infrastructure Program
MOFED	Ministry of Finance and Economic Development
MSIP	Multi-sectoral Investment Planning
NGOs	Non-Governmental Organizations
RoW	Right of Way
TOR	Terms of Reference

Abstract

Sectoral linkage in urban infrastructure development and service provision plays an important role in determining the urban economic and physical development and has indispensible role in the livelihood of urban dwellers, efficiency and effectiveness of service providers and development of the nation at large. However, Ethiopian cities/town administrations and policy makers pay meager attention to the issue in their strategy and urban development policy partly due to the lack of sufficient research works that clearly show the importance of coordination in urban infrastructure development works and the possible effects of uncoordinated activities to the respective institutions, urban dwellers and the country at large.

This research work looked in to the process of urban infrastructure development works to identify the dimensions and root causes for the absence of inter sectoral integration between urban service providers and investigate the possible economic, social, and environmental effects of the problem with a particular emphasis on selected light rail and road development projects in Addis Ababa.

To achieve the above objective, the study used both qualitative and quantitative methodology and relevant data for the study were gathered from primary as well as secondary sources through questionnaires, interviews, field observation and document reviews. The collected is analyzed using exploratory, descriptive as well as narrative methodological approach.

The research found out that the institutional and administrative structure and institutions level of accountability coupled with the various sources of budget as factors contributing to the poor inter sectoral integration. Besides, lack of communication during design preparations and common standards and guidelines to all service providers is also identified as one of the root causes.

It was also realized that, the reactive nature of the legal procedures and lack of clearly stated rules and regulations which suggest coordination among service providers along with weak enforcement has greatly contributed to the problem under review.

Moreover, findings also confirmed that there is still loose communication during implementation due to poor utility database, lack of institutions capacity, interest and commitment, absence of responsible body to do the job and lack of long term plan.

The study has also identified the major economic, social and environmental effects of poor sectoral coordination on local residents, service providers and the nation at large. The economic effects on service providers are characterized by property damages, high cost of compensation, cost of carrying out repairs and relocations, cost for any temporary service arrangements necessary, and the possible loss of "product" and revenue reduction during service interruptions. The identified effects on utility customers include, frequent service interruptions, business may be stopped and data lost, and for industrial properties production may be halted and machinery damaged, low productivity, decrease in number of customers, low profit etc. among the social effects of the problem, lost time, business opportunities and additional fuel consumption, spoiling of food because of refrigeration failure, injuries and traffic accidents, traffic congestion, safety hazards and lack of transportation access were identified by the study. As per the environmental effects of the problem, contamination of water supply, sewage backing up, flooding and storm water inundation, noise pollution, air pollution, and dust induced lung diseases are identified by the study.

Chapter one
Introduction

1.1 Background to the study

Globally, government is saddled with the responsibility of providing some basic infrastructures for its citizens. Construction of roads, bridges, railway lines, dikes, energy supply and drinking water supply, to name a few infrastructures, are critical for the functioning of modern societies. They are not only keys in delivering essential services; they are the precondition for wider development of a country or region. Without good infrastructures, regions will remain peripheral in economic, social and cultural terms (Van der Woud, 2007). Thus they are among other functions or obligations of government may owe its citizens.

Governments mandate public agencies to put infrastructure policy into practice and those public agencies will provide goods and services to citizens according to their purpose of establishment.

The presence, absence as well as the quality of urban infrastructure greatly affects the welfare of citizens and an efficient functioning of urban economy. In broad, urban infrastructure is classified as 'hard' and 'soft' infrastructures. The availability and provision of such services especially utility infrastructures are a matter of survival in cities.
In a context of rapid urban growth, the management of cities is increasingly a crucial factor in national development strategies.

One would be hard pressed to underestimate the challenges now facing the world's urban areas. Already, cities account for more than half the global population, 70 percent of greenhouse gas emissions and vast amounts of national productivity. Indeed, in both the developed and developing world, cities are striving to provide a raft of critical urban infrastructure assets to support their burgeoning – in some cases unrelenting – growth; more effective transportation systems, reliable and low-carbon energy, safe and secure water networks, and efficient and scalable social infrastructure will all play central roles in the smooth transition to urbanization. (KPMG international, 2012)

However, many cities are using a sectoral approach to planning in which every corporation or agencies are responsible for their own individual institutions goals. In general all those institutions are pretty competent to manage their own sector; they do what we would call good sectoral management.

Good institutional/sectoral management is of course, indispensable. Those institutions know their area and responsibilities and usually try to manage it well, but it is not enough to manage individual institutions separately, it necessary to have a coordinated and integrated system among those government institutions in construction as well as provision of infrastructures.

All government institutions are interlinked, especially, providers of essential utility services are networked and those sector networks are highly interdependent which intern relates to consideration of vulnerability and planning which takes on an added dimension of complexity.

A comprehensive system for coordinated plans and activities of government institutions would help address interdependencies, as well as efficient resource utilization and sustainability. Overtime, refining the system of communication and coordination to encompass all of our interdependent road, rail and utility infrastructure providing sectors is a goal worthy of attention at all governmental levels, especially in cities (Alain B. 2013).

However, urban infrastructure in the developing world is often subjected to haphazard planning, disjointed implementation and poor post installation management. Usually inadequate attention is given to the interdependencies between infrastructure systems, the urban functions to be served and to the sustainability of the facilities. This is also true for the Ethiopian urban centers which are characterized by, among others, shortage of basic urban infrastructure and services. The problem is vividly observed in Addis Ababa, the capital city.

On top of this, lack of coordinated and integrated infrastructure and services planning and implementation has exacerbated the problems observed in the infrastructure development effort of the city. Hence, this study aims to assess the causes and effects of poor sectoral integration in infrastructure development works with special emphasis on selected road and LRT projects currently undergoing in Addis Ababa.

1.2 Research Statement

Unprecedented rates of urbanization have been witnessed in many developing regions during the second half of the twentieth century. Half the people of the developing world are expected to live in urban areas by the year 2015. This demographic change tends to have important implications for strategies to provide basic infrastructure and services to the largest number.

Ethiopia is a predominantly rural country. Addis Ababa, which is in the middle of the country, is by far the largest urban center. Population and agricultural activity are concentrated in the central and northern areas of the country, and the far south and east are only sparsely inhabited. Ethiopia's infrastructure backbone development therefore tends to be centered in Addis Ababa and to spread from there outward.

While Ethiopia has a high rate of urbanization (estimated at 4.4 percent per year), the level of urbanization is still very low. 35 percent of the urban population lives in the seven major urban centers in Ethiopia. Among them, the primacy of Addis Ababa emerges starkly, with 25 percent of the urban population living in the capital city (CSA 2006). This gradual increase in the level of urbanization was accompanied by corresponding increase in the absolute number of urban residents, with each new entrant seeking better employment opportunities and a higher quality of living that can only be delivered through efficient and effective urban infrastructure which in turn has exerted a much greater pressure on the city administration to provide a massive amount of infrastructure and quality services to meet the growing and shifting demands of its residents. However; the provision of such infrastructures is highly constrained by planning, institutional, technological and policy factors.

The government has been and is still engaged in comprehensive infrastructure development programs in roads, telecommunications, energy and others. The Addis Ababa City Road Authority (AACRA) is currently engaged in the city's road expansion and upgrading while

EEPCo (Ethiopian electric power corporation), is thriving to enable the provision of high quality, sustained and safe electric power so as to help promote investment and bring economic growth in the country. Ethiopian Telecommunication Corporation (ethio telecom) on the other hand, has objectives and strategies of upgrading the already built ICT network to accommodate the emerging latest information technologies; improve the network quality and expansion of

services; ensure all inclusive telecommunication service delivery and ICT assisted development (MoFED, 2012).

Addis Ababa water supply and sewerage authority (AAWSSA) was established in 1971 GC. Supplying portable water to the city residents that balances with the fast growth of the city and modern sewerage service in a sustainable way by utilizing resources of water, spreading out of modern sewerage system, and working by coordinating with stakeholders are the main objectives of the sector (AAWSA, 2013).

However, those corporations are working to achieve their individual organization's objectives sometimes in the expense of other organizations effort and property. Usually inadequate attention is given to the interdependencies between infrastructure systems, the urban functions to be served and to the sustainability of facilities. The outcome is poor facility functions, early deterioration and unwanted settlement development, implying wasteful use of scarce resources.

The residents and the city have been incurring tremendous costs to repair the damage to houses and streets caused by the uncoordinated activities of the utility companies. The residents endure a great deal of inconvenience as a result of frequent interruptions and outages of services. The cost of rehabilitating damaged streets and other infrastructure left in disrepair by these public corporations has become an added burden on the taxpaying residents of Addis Ababa (Meheret Ayenew, 1999).

The problem has got even worse following the light rail transit project construction work currently undergoing by the Ethiopian Railway Corporation. The rail way has a total length of 34.25 km (North-South line 16.9 km and East-West line 17.35 km) providing the capital city Addis Ababa with a mass transit system (MoFED, 2010).

Sectoral linkage in urban infrastructure development and provision plays an important role in determining the urban economic and physical development. It also has an indispensible role in enhancing safety, eliminating unexpected conflicts with utilities, avoiding unnecessary utility relocations and damage to utilities and the subsequent untimely loss of utility service, possibility to extend or maintain the service life of the roads, etc. Nevertheless, Ethiopian cities/towns administrations and policy makers pay meager attention to the issue in their strategy and urban development policy. This is partly due to the lack of sufficient research works that clearly show

the importance of coordination in urban infrastructure works and the possible effects of uncoordinated activities to the respective institutions, urban dwellers and the country at large.
So far, a few researchers have studied on the area of urban infrastructure provision problems and tried to take a glance at the linkage between those service providers. Yirsaw Z. (2012) has tried to assess the extent of urban utility infrastructure provision problem in Bahir Dar City while Hailemariam G. (2010) on his part has tried to assess the extent of integration among urban service providers and overview weakness and strength of these service providers in the inner city of Addis Ababa. However, there has been no study conducted, at least to the best knowledge of the researcher, to investigate the root causes of the problem of inter sectoral linkage in infrastructure development works and its socioeconomic as well as environmental effects on residents of the city, the institutions as well as the nation at large. Thus, there is apparent lack of empirical research in the area of the study which clearly shows the existing problem and offer alternative remedies for the problem.

Thus, this study intends to fill the identified gap by investigating the problem of inter sectoral linkage among urban infrastructure and service providers in Addis Ababa mainly emphasizing on road and light rail construction projects so as to find out the root causes of the problem and identify their economic, social and environmental impact.

1.3 Research Objectives

General objective

The general objective of the study is to make an assessment of the causes and effects of poor inter sectoral linkage in infrastructure development work in Addis Ababa by taking two road and LRT project sites as a case.

Specific objectives

- To investigate the process of urban infrastructure service provision in the city
- To identify the real dimensions and causes for the poor level of integration in urban infrastructure development works
- To find out the socio economic as well as environmental impact of poor inter sectoral linkage in urban infrastructure development works

1.4 Research Questions

In relation to the research questions, this study seeks to answer the following questions

- How is the process of urban infrastructure service provision enacted in the city?
- What is the current stage of integration among infrastructure service providers?
- What are the real dimensions of the problem?
- Why are roads and utilities not being designed and implemented in an integrated manner?
- What are the social effects of poor coordination among infrastructure service providers?
- What are the economic effects of poor coordination among infrastructure service providers?
- What are the environmental effects of poor coordination among infrastructure service providers?
- Does the master plan or physical plan give adequate emphasis for utilities?

1.5 Significance of the Study

This study is hoped to provide an important study results for policy makers, municipalities & infrastructure providing authorities as well as professionals within the area of the study.

Thus, the result is hoped to initiate policy makers in the area of the subject matter and serve as an input in the policy making process by easily identifying the core and sub-problematic areas.

At the same time the study is believed to promote institutional coordination among urban infrastructure providers for the provision of an integrated and sustained urban infrastructure.

Moreover; municipalities, urban infrastructure providing authorities, policy makers and professionals could use the document as an input for further discussion, application and investigation.

1.6 Scope of the Study

Urban infrastructure is classified as 'hard' and 'soft' infrastructures (Knaap and Talen, 2003). The former refers to the street network and utility infrastructures while, the latter denotes the communication along with educational services and environmental infrastructures.

Among these broad infrastructure divisions, this study focuses on 'hard' urban infrastructure with special emphasis on the three basic utility services; electric power supply, water and drainage lines and telecommunication distributions along with road and light rail infrastructures. Furthermore, the infrastructure providers at intra sectoral level will be assessed starting from designing and implementing to managing the infrastructure or utilities. However, the technical and engineering dimensions of the problem will not be addressed by this study.

Besides, the study will investigate the causes and consequences of the problem in Addis Ababa city with an emphasis on two infrastructure development project works currently under construction; Winget to Enkulal Fabrica road construction project and Atikilt tera to Autobistera light rail transit project. (See justification for area selection).

1.7 Limitation of the study

As most of the other researches financial constraints was crucial limitation of this study. Other than the financial constraints, insufficiency of referencing materials to review previously conducted studies particularly empirical evidence in the context of Ethiopia was difficult. The lack of yearly registered compensation cost of utility partners on certain extent limited the assertive quantitative information to the study.

Unavailability of experts and willingness of respondents from the target institutions to participate in the interviews were the major challenges faced during the research.

1.8 Chapter Scheme

The study will be divided by five chapters. The first chapter covers the introduction part of the study including background to the study, research statement, general and specific research objectives of the study, significance of the study, and the scope of the study; the second chapter deals with review of literatures on the concept of urban infrastructure, policies, strategies and programs of the country issued and designed on infrastructure development, experiences of urban centers in developing as well as developed countries and review of other studies related with the issue; The third chapter presents the research material and methods which covers the research methodology, research design, data source, data type, data gathering tools, and data analysis. The fourth chapter is devoted to data presentation and analysis. The last chapter covers the conclusion and recommendations.

Chapter two
Literature review

2.1 Introduction

The purpose of this literature analysis is to identify the existing knowledge base and debates and consequently develop a meaningful and relevant research project. The purpose of this chapter is to present the research, theory, concepts and ideology that exist with regard to the theoretical and practical issue of urban infrastructure development works and urban utility infrastructure provision.

The key objective is to inform the review of the current and up-to-date knowledge about the general concept of urban infrastructure, integrated and coordinated infrastructure planning and development, and concepts of utility infrastructure provision in international and local contexts. Web-based searches has been conducted using the latest literature search to ensure that the process has in its background documents state of the art think tank pieces to consult on.

2.2 The concept and need for infrastructures

2.2.1 Meaning of infrastructure

Infrastructure assets are physical structures, networks, and other facilities that provide services essential for economic production. Transportation (roads, bridges), communication, regulated (water, wastewater, transmission and distribution lines) and social (hospital, schools) assets are among typical infrastructure assets (Atamturk and Zafar 2012).

Infrastructure is usually defined as the underlying basic buildings, institutions and facilities or other essential elements that are necessary to sustain and enable growth and development of a community. Infrastructure, therefore, includes a broad spectrum of services, institutions and facilities that ranges from transportation systems and public utilities to finance systems, laws and law enforcement, and education and research. It is clear from the above definitions that infrastructures play key roles in our society (Arenas, n.d).

In the broadest sense, infrastructure is the structural foundation or supporting system for economic and social activities. In more detail it is: *The network of services in a society which are essential for its cohesion and for the efficient functioning of the economy* (Perth, 2003).

In the industrial age, infrastructure referred primarily to collective physical assets such as roads, bridges, ports, rail tracks, pipes, power lines and other public works. Its usage extended to include the resources that are carried by those assets such as water, gas, electricity and trains. It is also used to refer to those aspects of the built environment that facilitate the functioning of society, such as schools, hospitals, police and fire stations and recreational facilities. Current usage of the term includes social and community systems (i.e. justice, education, health and community support systems) and information systems (i.e. telecommunications and computer networks) (Neutze, 1997).

Infrastructure is often categorized as 'hard' to refer to physical and built structures such as transport, water, energy and telecommunications services or 'soft', which includes human and community services such as education, health, policing and emergency services/facilities.

2.2.2 The need for infrastructure

All development is about change, but not all changes take place at the same rate; different time clocks seem to apply to different phenomena. Energy and environment are related to slow or transition processes, including construction and infrastructure investment and are related more to technological breakthrough and long waves that to rapid economic, social and institutional response. Adequate quantity, quality and reliability of infrastructure are necessary preconditions for rapid economic growth. The state of the infrastructure also has a direct correlation to internal production, international competitiveness, flow of direct foreign investment, and export dynamism. Good infrastructure helps raise productivity and reduce cost in the directly productive activities of the economy, but it has to expand fast enough to accommodate growth (Belew, n.d).

Infrastructure provision is tightly linked to economic development. Developing nations are investing in motorways, railroads, and utilities to allow their economies to grow. The linkage between economic activity and infrastructure continues to grow stronger and more critical as economic activity itself becomes increasingly more complicated and global in scope. In an era of accelerating change, the infrastructure challenge will be how to continue to broaden that range of choice, and in so doing improve the quality of people's lives (Arenas, n.d.).

The importance of infrastructure in the economic and social system of a nation has been recognized. It is a key element in the generation of economic growth and development and the main driver of urban activities. The efficiency of economic and social systems is to a large extent dependent on the efficiency of infrastructure. For a nation to experience sustainable economic development and growth it must have developed an efficient infrastructure system. This is essential for efficient and proper functioning of urban economic and social activities (Nwuba, 2010).

2.2.3 Importance of infrastructure in cities

Cities simply defined, as concentration of people, resources, information, and activities. Clever and skilled people in close proximity with each other generate benefits due to the diversity of interactions of people and ideas and potential for economies of scale and scope from agglomeration. Where interaction is fluid, dense and diverse, there emerges potential for innovation and creativity. Although we realize that people and ideas are fundamental to

successful cities, these people and the process they put in motion need support from urban infrastructure to ensure that cities remain healthy, safe, and accessible and to support cultural, economic, and social systems. Efficient, effective urban infrastructure does not lead in itself to competitive, innovative cities, but the lack of it would strongly impede their development or sustainability. Though infrastructure's enabling function, complex, dynamic cities come to life (Belew, n.d.).

The longevity and essentially path-determining nature of urban infrastructure investment influences urban development patterns and costs for decades, as urban infrastructure services are usually inputs to further production or to end consumers. These are important reasons why such inputs have to be efficient-positive or negative efficiency effects are cumulative, thus a flexible but conservation approach needs to be taken to major investment decisions due to the locational, sunk nature of costs and the long term impacts of such investment (Belew, n.d.).

Infrastructure provision is tightly linked to economic development. Developing nations are investing in motorways, railroads, and utilities to allow their economies to grow. The linkage between economic activity and infrastructure continues to grow stronger and more critical as economic activity itself becomes increasingly more complicated and global in scope. In an era of accelerating change, the infrastructure challenge will be how to continue to broaden that range of choice, and in so doing improve the quality of people's lives (Arenas, n.d.).

2.2.4 Public participation in infrastructure services

Infrastructure is often considered to serve a 'public' rather than a 'private' good for a number of reasons, including that they are principally provided by governments in most jurisdictions (education, healthcare, open space, public transport and roads) or they are 'public utilities' with a spatial monopoly meaning that all properties in a particular area are normally supplied by the same network (Neutze, 1997). He further identifies public involvement in infrastructure services is appropriate because they:

Provide essential or strategic services – infrastructure services are essential to the amenity, health and wellbeing expected by urban residents. Three supporting reasons for this are that (1) consumption of the services is not greatly affected by their prices (inelastic demand), (2) the

public has an expectation that these services should be available to all citizens at a reasonable cost and (3) the lack of provision can tend to have other costs or benefits such as impact on the environment or future generations.

Are generally natural monopolies – in that it is generally more expensive to offer consumers a choice of supplier than to have a single monopoly responsible for supplying all consumers within a geographic area. For instance, to provide customers with a choice of water supplier would require a duplication of the water mains in each street. The investment costs and economies of scale of this infrastructure are so significant that customers would have to pay more for water if more than one supplier was in the market. This shows that competition between suppliers can result in higher, not lower, prices to consumers. Another reason is that infrastructure is an interconnected network. For instance, an effective public transport system has to provide patrons with a means of transferring from one route or service to another without incurring an additional payment just because it is owned and operated by a different supplier.

Require compulsory access to land – as infrastructure services generally need to connect directly to specific land parcels, they must have compulsory access to land as required. Only governments have the power to compulsorily purchase or access land. A key means to achieving this is government ownership of roads and road reserves, which allow for co-location of other infrastructure assets such as gas, water, electricity and telecommunications infrastructure.

Produce public goods and impacts – some infrastructure services have an unavoidable effect on the external environment, called externalities. These externalities can be beneficial or damaging, or both, on people other than those who use the services. For example, citizens arguably benefit from police, fire and emergency services most when they have no direct interaction with police and fire service officers.

Impact on the equity and rights of citizens - some services such as basic education, health, welfare and freedom (provided by defense services) are offered to citizens as a fundamental human right, irrespective of the capacity to pay for the service. Collectively, a democratic society is unwilling to leave these services to the private market, which is not directly answerable to the people. One of the objectives of this is equal distribution of benefits between the rich and the poor, even though costs (i.e. taxes) may not be equally distributed.

2.3 Integrated urban infrastructure and service planning

Integration is a combination and coordination of separate and diverse elements or units into a more complete or harmonious whole on the other hand integration is unified control of a number successor of similar economic processes formerly carried on independently. It requires both cooperation and coordination in order to work, it also calls for the existence of a single formalized decision making system and the procedures that facilitate the existence of such a system. Integration potentially allows for more effective and efficient use of resources in order to achieve a given set of objectives. Integration may take three forms, which are:

- Integration within an infrastructure sector/entity (intra-sectoral integration): for example integration within road sector between Road Authority (arterial and sub arterial road) and local government and community initiatives (local and collector road)

- Integration between infrastructure entities (inter-sectoral integration); integration between different sectors/infrastructure entities.

- Integration of infrastructure with other urban development sectors housing, business, industrial areas etc. (which is also inter-sectoral integration). Integrated infrastructure planning is a tool for implementing housing, business and industrial development.

The following figure shows the process and conceptual framework of integrated urban infrastructure and service planning.

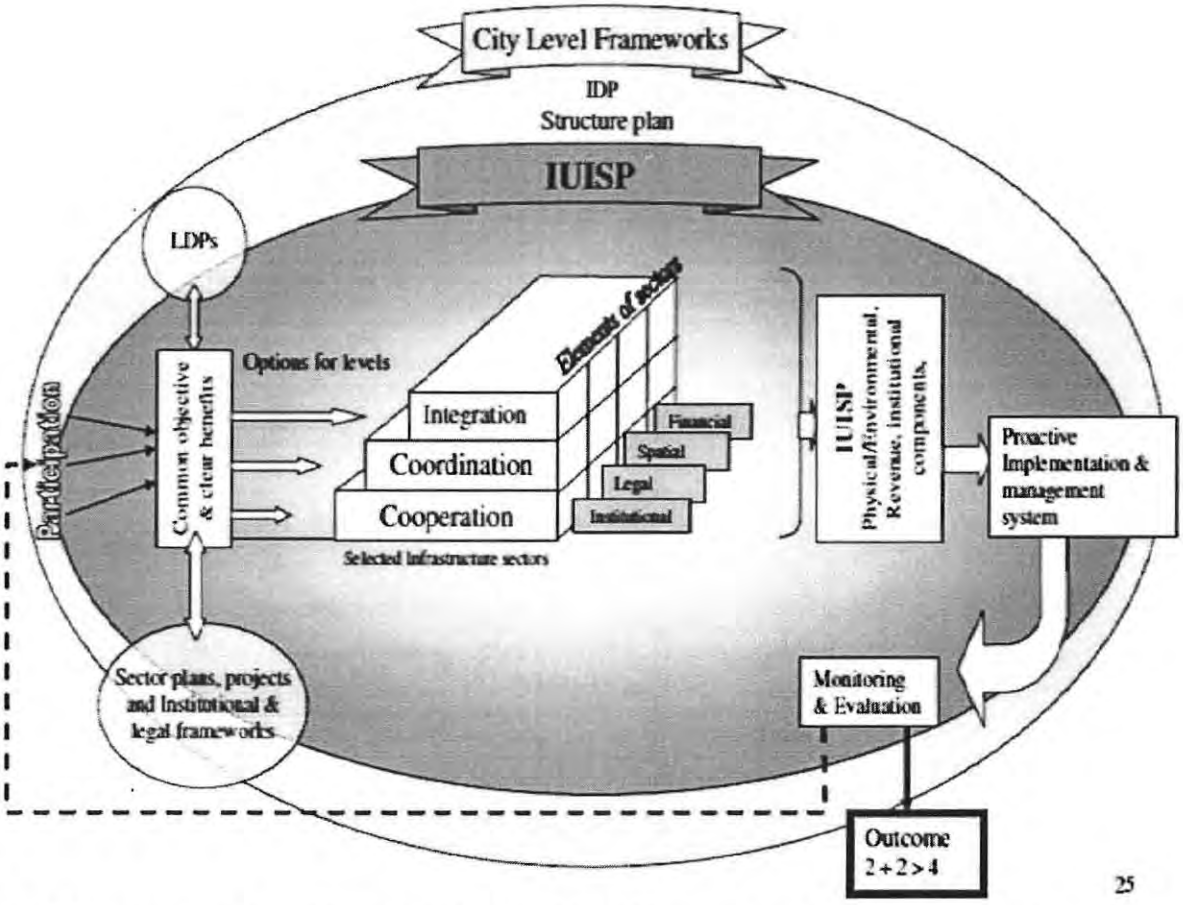

Figure 2.1 Conceptual Frame work For Integrated Infrastructure & service planning
Source (Mathewos, 2006)

As can be seen from the above diagram, cooperation is the lowest level which only requires motivation, trust and goodwill. It is the simplest form which serves as a foundation for the other levels. It creates joint/multi sectoral working culture and understanding among different sectors. Coordination is the second level which requires certain guidelines, mechanisms and procedures. Formal procedures are established and applied at this level to regularly consult and discuss issues among concerned sectors. Integration is the highest level which brings the planning, financing, implementation and management of different sectors into a formalized decision making system and procedures. Since this is the most challenging level, the other lower levels should work smoothly, effectively and efficiently prior to application of full integration. The forms and elements of sectors to be dealt with include financial, institutional regulatory and spatial elements. Institutional element is about the relationship between concerned institutions, their roles and ability of working together. Institutions refer not only to governmental sectors but also

to the NGOs, private firms and CBOs involved in the delivery of infrastructure. This requires not only conducting consultation and stakeholder forum but also institutionalizing the participatory approach through the formation of steering committees and working groups for the continuation of the process (Mathewos, 2006).

Spatial element deals with the linkage of infrastructure programs, linkages with other development programs, land uses (i.e. housing, industrial development etc.) and overall physical conditions in a specific geographical area.

Financial element deals with the budgets, revenue and management of financial resources for infrastructure development.

All these stated measures require political will, societal support and legal backing for practical implementation and realization of the plans and programs. The final output of IUISP has three major components for integrating the abovementioned elements, which are Physical, and Environmental Development, Revenue Improvement and Institutional Development. The physical and environmental development component deals with the technical and spatial elements of sectors, selected physical infrastructure prepared with spatial plan including determined infrastructure needs, identified projects, financial and technical feasibility and detailed designs. Revenue Improvement component deals with finance, tariff setting, resource mobilization from user charge and contribution, sharing of resources etc. Institutional Development component deals with the required organizational capacity which includes organizational structure, staffing, training, inter institutional working relationships, roles and responsibilities. The entire final outcome is to achieve added value and extra benefits (Mathewos, 2006).

2.3.1 Mechanism of integration

Infrastructure management systems can be integrated in different ways. However, data sharing which employs geographical information systems (GIS) is one mechanism which offers great promise and existing integration mechanisms are as follows: (Zhang and Hudson, 1998)

1) Manual data sharing: as the simplest, flexible method, manual data sharing uses diskettes or tape drives as the medium to exchange data and information. Though primitive this method is still in wide spread use.

2) Automatic data sharing: the automatic method differs from the manual one primarily by its medium of data transfer. Instead of using diskettes or tapes, this method provides data sharing via network wires, which is efficient for frequent data transfer.

3) Standardization of data: another level of integration can be achieved by standardizing data items, definitions, collection procedures, quality, and updating schedules. Standardization is especially important for a central database involved in data sharing.

4) Standardization of analysis procedures: data sharing includes not only data items directly collected in raw form, but also those generated as outputs from analysis procedures. For an integrated system, some analyses may require certain inputs that are output from prior analyses.

5) Policy and decision-making integration: the information generated from the proceeding levels of integration can be used by administrators to develop coordinated policies and to make comprehensive decisions. Such an integrated approach of administration can make the best use of available resources.

6) Integrated systems: the most desirable one is the integration of separate management systems. An integrated system does not necessarily mean combining everything into one grand "lump-sum" system; rather the integration should be carried out by using a common platform. Because of the geographical nature of transportation and public works, GIS is an excellent integration platform using location as the integrator.

2.3.2 Benefits of integrated system

Zhang and Hudson, (1998) have identified the ssubstantial benefits which can be achieved through the implementation of an integrated system.

These advantages and/or benefits include:

- *Free flow of information:* integration yields greater compatibility which allows data and information to be accessed and/or transferred from one system to another and from one department to another.
- *Elimination of redundant data:* data collection is expensive and data storage consumes disk space. Well-integrated management systems minimize duplicate efforts in data collection and storage through data sharing.

- *Better solutions:* an integrated system allows the analysis results from one system to be immediately available to the others. Results from other systems can be used together to achieve overall optimal decisions.
- *Cost reduction in system development and maintenance:* effective integration reduces the overall system development costs through coordinated and standardized software coding. Agency-wide standardization of software can also make future system maintenance less expensive.

It should be made clear that integration does not mean the creation of a huge and complicated system simply by lump-sum combination; rather it represents a process where all the components of a system are logically linked together on a common platform using a modular approach. (Zhang and Hudson, 1998)

2.3.3 Key Principles of integrated infrastructure and service planning

As indicated in the integrated urban infrastructure and services planning manual prepared by Mathewos (2006), there are basic principles to integrated infrastructure development and service planning explained here after;

Participatory approach: Integrated planning of infrastructure and services requires a foundation of shared interests, visions and common objectives of stakeholders in a structured and directed manner. Such a foundation should be built through the active participation of all stakeholders that have significant roles in investment decisions of the selected infrastructure and services. This approach helps to reorient the activities towards a common line that helps to maximize overall benefit.

Decentralized decision making process: Integrated urban infrastructure and service development plan requires decentralization and empowerment of local governments as key actors in investment decision of infrastructure and service development. Local governments have greater role in the operation, maintenance and sustainability of the development. Overall, decentralization makes it possible to effectively meet the needs of local areas.

Setting clear and common objectives for common benefits: applying integrated infrastructure and services development planning requires clear and common objectives of all concerned

parties. The process of integration must be transparent and less sophisticated. Benefits that a successful integration brings up must be clear to all. IUISP should be able to bring new and additional benefits to all and in doing so help to enhance the initiative towards the plan and ensure the commitment of sectoral offices.

Precautions should be made prior to initializing IUISP: Inappropriate attempts might cause adverse effect. Integration has drawbacks if it is misguided. It might cause resistance and opposition from different sectors due to fear of losing power. Therefore, Integration should not be regarded as an end by itself but as a means to achieve clearly set objectives.

Developing cooperation and coordination: A cooperation and coordination level in infrastructure and service delivery is a stepping-stone for the highest level of integration to work. The foundation for full level of integration should be laid through cooperation and coordination.

Integration should link the institutional, regulatory, spatial, environmental, and financial/economical elements across sectors. All elements should be inter-linked while preparing integrated infrastructure and service planning. This inter-linkage could be applied though different combinations of elements with different levels of integration based on the specific conditions.

Follow incremental proceeding in order to be pragmatic to specific local conditions and to build on existing capacities. Start with the minimum level of integration (cooperation/collaboration and focusing on limited sectors). This should be tested through projects and levels of integration could be increased based on the output of the projects, gained experiences and local capacity.

IUISP should also be linked with key development frames of Structure plan and IDP of municipalities. IUISP requires linking and coordination of the programs at federal level with the local priorities (Mathewos, 2006).

2.4 Urban utility infrastructure

The location and the condition of utility infrastructure services and facilities information are very important for municipalities within the area of their boundary. This information will enable them to set changes in different parts of the city, as level of services they want to identify in the

deprived areas of the city/town. Consequently, planners may wish to refine their options to meet the need of the area (Pickering, et al., 1993).

Utility refers the set of 'hard' infrastructure services which is provided by utility organizations consumed by the public hence it is commonly named as public utility. Here, utilities are the 'conduits' or 'technological systems' which support the rapid movement of waste, water, energy and information up on which their integration together into economic and social structure depends. That's why, any attempt to improve, or even maintain, the standard of living in rapidly developing urban areas cannot go forward without adequate and well administered municipal infrastructures (Pickering, et al., 1993).

Urban utilities infrastructure accounts the water supply, sewerage facilities, drainage systems, power distribution networks, communication transmissions and other related underground, surface and overhead services and facilities. As Pickering and his associates (1993) the economic and efficient delivery of infrastructure service depends on effective planning and management systems.

2.4.1 The need for coordination and cooperation

The need for coordination is accelerating as more utilities are installed in limited right of-way. It is true that, resulted with high level of problems in the city centers, urban areas are always in progress since they are epicenter of the development and they accommodate a large number of populations mainly resulted from natural increase and rural urban migration. Rapid population growth as well as dense and plan less structuring, have also lead to an increase in demand for utilities services and consequently, in the resources used for the construction and maintenance of utilities, most Third world cities could not be saved from such problems. Moreover, in cities with dense population, damages to roads and sidewalks during the construction and maintenance of utilities cause problems in daily life, create financial burden and necessitate effective solutions (Turkish court account, cited in Hailemariam 2011).

The rapid population growth in collaboration to haphazard planning of urban sectors may cause for devastating urban structure and cause for the process of retarded urban development. Infrastructure works mostly result in inevitable physical disruption, which leads to social costs,

which are incurred but are not accounted for in the project budget. This would include lost time, business opportunities and additional fuel consumption, etc. resulting from the effects of traffic disruption, noise, air pollution, and other environmental/social impacts. An organization may construct road, after a while another organization may excavate the construction for multiple reason with a week or month difference, excavation haphazardly affect the existing infrastructure and also cause for wastage of the resource. It is also the major reason to reduce significantly the actual service age of the road (Hailemariam, 2011).

According to best management practice (2010) with increasing frequency, excavation and conflicts with utilities have had significant negative impacts on public work projects throughout the metropolitan city area. As a result conflicts with utilities have become a leading issue in the design and construction of projects. They include not just the construction change orders, but serious delays and service disruptions to the public and poor public relations within the community. The costs of relocation to the Utilities also affect the community with higher rates and user fees, as the Utilities recover the extra costs (APWA, 2010). The issue of continuous excavation has many negative impact other than the economic cost, among them continuous service interruption (power, water, telecommunications) and the like are the major features. In addition it is also the major cause for traffic incidents and health problems. These and other similar problems helped the concept of coordination attractive by stakeholders and being promoted for urban infrastructure. It is common to see institutions to work individually and always tried to achieve their objective, improved coordination has the potential to reduce these impacts dramatically. The existence of coordination helps to bring the change in urban growth which directly includes reduced project costs through efficiencies of scale and avoidance of repeat maintenance costs, primarily in the pavement repair area.

According to APWA (2010) utility coordination mainly has been a reactive undertaking, often only occurring towards the end of a design project, rather than a proactive process that begins at project conception. Proper planning, locating, and coordination between involved stakeholders will minimize costs and delays and lead to the best possible project at the lowest ultimate combined cost to the community. The overall plan of utilities is to provide best services for the community at reasonable price; it is also possible to bring the urban life at ease by doing so, but due to the absence of coordination the cost will increase and projects will be delayed more than

their accomplishment time. Moreover, the effect will extend up to the reduction of the service age of the roads due to continuous excavation and also haphazardly affect the environment. Effective utility coordination leads to many tangible benefits helping keep construction costs in line and projects on schedule, as well as promoting collaborations that make the process move more smoothly and efficiently for all.

Expected Benefits from Coordination

According to APWA (2010) proper and timely utility coordination has the following benefits. Proper utility coordination:

- Allows for flexibility and time for Utilities/Engineers to develop the most cost effective relocation plan.
- Reduces delays to the Contractor during highway construction caused by cutting, damaging, or discovering utilities that were not known.
- Avoids unnecessary utility relocations. Accurate utility information is available to the designers early enough in the development of a project to design around many potential conflicts.
- Eliminates unexpected conflicts with utilities. The exact location of virtually all utilities is known and accurately shown on the construction plans. In addition reduces delays to the project caused by waiting for utility work to be completed.
- Enhances safety. When excavation or grading work can be shifted away from existing utilities, there is a high possibility of damage to a utility that might result in personal injury, property damage, and releases of product into the environment.
- Avoids damage to utilities and the subsequent untimely loss of utility service.
- Possible to extend or maintain the service life of the roads, etc.

These all expected results will be effective when and where the practical and sound policy is in place because the issue of policy gives legal ground for all stakeholders that continuously use the rights of way.

2.4.2 Utility mapping

Any attempt to improve, or even maintain the standard of living in rapidly developing urban areas cannot go forward without adequate municipal infrastructure and utility services. Inadequate or poorly managed services limit urban economic development in several ways:

- Exposing segments of the urban population to healthy risks
- Limiting economic productivity when services are cut off or unreliable
- Adding financial costs to individuals and enterprises through unnecessary property damage and
- Creating additional economic costs from congestion of transportation and communication systems

The economic and efficient delivery of infrastructure services intern, depends on effective planning and management. Without proper information spatial and otherwise the quality of service delivery, financial performance and ability to plan can be eroded. Information from maps and records, based largely on records of utilities and infrastructure facilities, contributes not only to efficient services, but also to the operation and maintenance of assets, and to the sensible planning of extensions and new works. Any serious lack of such information can adversely affect the economy, quality of life, public health, and the environment (Pickering, 1993).

2.4.3 Utility coordination

Cities, towns and other organizations planning transportation projects must coordinate the work with any utility company or railroad that may be affected. Utility facilities consist of public or private lines or equipment – power lines, telephone landlines, cable television lines, underground water, sewer, gas and telecommunications lines, and railroad tracks. To keep a locally administered project on schedule, it is important to identify these facilities and contact their owners as early in the design process as possible (MaineDot, 2013).

Steps in Utility Coordination

According to Local Project Administration Manual (2013), utility coordination involves a series of steps. The typical steps in utility coordination are as follows:

1.) Identify utilities.

The utility coordinator identifies and contacts all utility companies and any railroad potentially affected by a project, typically providing a map or other location information. This step typically involves a meeting with the utilities and a site visit.

2.) Verify facility information.

The utility coordinator sends copies of topographic survey to all utility and railroad contacts, requesting verification of utility locations and any concerns.

3.) Determine preliminary impacts.

The utility coordinator distributes preliminary plans for a detailed determination of impacts. The coordinator also makes sure that all concerns are addressed.

4.) Identify locations of underground utilities.

The utility coordinator identifies where test pits will be needed to verify the depths of buried lines. Completed test pit data is then sent to the utility coordinator and utilities. If no test pits are required, relocation requirements and buried facility designs should be included in the preliminary design report distribution.

5.) Prepare final impacts, relocation strategy and agreements.

The utility coordinator provides all affected utilities and any railroad with 75-80 percent plans for review. Additionally, the coordinator prepares draft special provisions, as well as any draft agreements.

6.) Prepare utility specification and certification.

The utility coordinator provides the final railroad and utility special provisions to the Local Project Administrator and project manager with a certification that all necessary arrangements have been made.

7.) Set utility relocation schedule.

After a construction contract is awarded, the utility coordinator schedules a preconstruction meeting with the affected utilities and railroad, if involved. The coordinator develops with the contractor, utilities and construction resident an understanding of how the utility work will be sequenced and accommodated. During construction, the contractor is primarily responsible for contacting and working with the utilities in accordance with the construction contract documents.

For any new transportation project, planners need to know what hazards exist and where gas, power, water and other potentially perilous utility lines lie under the ground so they can design around them. It is important to note that the majority of construction delays are caused by the surprise discovery of underground utility lines (Goodbee and Associates, 2012).

2.4.4 The need for utility maps and records

According to Pickering and his associates (1993), the need for records in each infrastructure sector or utility can be addressed from three main points of view:

The utility as business

Irrespective of the ownership of a utility or service, or of the commercial/ political environment in which it operates, the utility/service has to be managed and controlled in a way that insures its present objectives and attained. Thus although the utility should operate as a business, it need not be one in which profit is of the utmost significance. Furthermore, each level within the utility will require information to manage its assets, plan extensions, design new works, and carry out systematic operations and maintenance. It will need sufficient data on its networks, for instance, to analyze such factors as capacity, performance, and condition. In addition, it will need full details on the properties and customers served to support its income base. Such data ensure that the best use is made available funding and that cogent arguments are put forward for continued investment. Expenditure proposals cannot be justified without facts to illustrate their soundness; and continued investment cannot be justified without good records of the existing assets and their conditions to indicate whether limited funds are being put to their most effective use. Investment priorities must also be considered. If a utility can put together a well- documented proposal, based on adequate record information, it is more likely to obtain funding for its project, because the investment can be more accurately quantified and programmed. The kind of information required includes raw data concerning asset condition, and the quality and level of service (Pickering, 1996).

Because most systems operate smoothly for much of the time, the usefulness of good records does not usually become apparent until a problem arises. When a medium voltage power cable is damaged, or a trunk water main bursts, a great deal of time and money can be saved if information is readily available from a record plan that will make it possible to configure the system quickly so as to restore supplies while the fault is repaired. It would be important, from the point of view of informing the customers, to be able to identify areas in which supply cannot be restored immediately. Although good record plans do not automatically mean that everyone will understand how the system operates or that the necessary maintenance will be done, without

them the system will be impossible to analyze systematically. Where management has become accustomed to working without good records, its primary concern will be to find the services, which all take precedence over any analysis of the problem (Pickering, 1993).

The utility as part of the urban infrastructure

Municipalities need to know what services are provided by all the utility in the area. This information enables it to set charges for differing parts of the city, depending on the level of service, or to identify deprived areas that need assistance. Accordingly, planners may wish to refine options for centers of development or meet the needs of existing unplanned settlements. To do so, they will need information on the utilities' strategic network- for example, on routs of high voltage cables and sites of transformers, trunk mains and service reservoirs for water supply, and trunk sewers and relative ground elevations (Pickering, 1993).

In their daily operations, utilities find they need exchange information regularly. The benefit of making accurate and good records available to other utilities is immeasurable with regard to reducing the risk of plant damage or accident. Not knowing what underground plant exist under the carriageway of footway or where it may be found is a serious disadvantage and a hindrance to all present and future authorities who may wish to work in this vicinity. If they ignore the existence of the plant they may cause damage for which they may be held responsible and if they take care to avoid it they forced in to expensive excavation methods from which they will also have to pay (Pickering, 1993).

The utility in the wider context of the city

Utilities exist primarily to provide a service to the community. Often, the service is fundamental to the quality of life, depending on the country. Functions such as water supply may be seen as a duty of the government, whereas the supply of gas may be viewed as a purely commercial activity. In either case, record maps of some form are needed to show the connection between the source of supply and each customer. Without such records, the quality of service to the customer will fall short of what is acceptable. Because infrastructure provision is often precariously balanced in rapidly expanding cities, inadequate records will have negative effect on levels of service and hence on the quality of life enjoyed by the inhabitants of the cities.

Utility mapping is also required for reasons of safety, either because the utility involved handles an inherently dangerous product (such as gas or power) or because the product, if compromised, might reduce public health (such as results from contaminated portable water). Adequate mapping reduces the risk of accidental damage to utility apparatus and hence raise the level of safety, both to the general public and to the operations of the utility (Pickering, 1993).

Disadvantages of not having records

One obvious disadvantage of not possessing accurately prepared and maintained records is that it invites unnecessary expenditure.

The ability of a utility to provide third parties, in particular other utilities or construction agencies, with information on the location of its installations is vital for damage control. In any city, especially one that is growing rapidly, there is considerable risk that infrastructure assets will be affected by development and building work. The consequences of damaging the property of utilities must not be overlooked as the following example shows: (Pickering, 1993)

- Expense to the utility. Cost of carrying out repairs, cost or any temporary service arrangements necessary, and the possible loss of "product". This latter loss may be serious, as in the case of the loss of water in times of drought or shortages.
- Effect on the utility's customers. Although the loss of service to domestic properties may be an inconvenience only in the case of commercial premises, business may be stopped and data lost, and for industrial properties production may be halted and machinery damaged.
- Risk to public health. Hygiene problems may arise because of water supplies being contaminated, sewage backing up, or flooding and storm water inundation.
- Highway repercussions. Where highways are affected, there can be traffic holdups or need for diversions and damage to the road base and structures.
- Damage to property of other parties. Typical examples of how others may be affected include the loss of the contents of a warehouse through flooding, the spoiling of food because of refrigeration failure, and damage to houses or other buildings by undermining.

2.5 Urban Infrastructure Provision in Developing Countries

Most cities of the developing countries are faced with various problems of which high incidences of poverty and unemployment, poorly developed infrastructure, inadequate public services, acute and ever worsening shelter deficits and accelerated environmental deterioration tend to be significant. These problems are mainly the result of the mismatch between their rates of population growth and their paces of economic development. Urban infrastructure is invariably linked with productivity of urban economies and macroeconomic development. That is why upgrading urban infrastructure has received increasing attention over the past few years. The focus on urban infrastructure is particularly visible among developing countries, which are making serious efforts to enhance the productivity of their economies through improved provision of infrastructure. (Kulwant singh et al, cited in Mathewos, 2006)

Developing world cities (Bishop, et al., 2000) are expanding at a much greater rate than in developed countries, these cities are usually the engines of economic development in the respective countries, their infrastructure and quality of life is "often deteriorating". Addressing these issues in cities of the developing world is one of the great challenges facing "all" societies in the next millennium ((Yirsaw, 2012).

The development of urban infrastructure and municipal services is of paramount importance for economic growth and for the improvement of the quality of life in the cities of the developing countries (Mathewos, 2006). However, the development and improvement of infrastructure and services requires appropriate investment decisions and effective utilization of scarce municipal resources.

Yirsaw (2012), argue urban infrastructure in the developing world is often subjected to haphazard planning, disjointed implementation and poor post installation management.

The urban areas of the developing countries are not only faced with problems of poorly developed physical infrastructure. They are also suffering from woefully inadequate, provision of municipal services. Especially, their efficiency in the provision of such services as water supply, electricity, transport and communication and the management of municipal waste is awfully low. This is mainly because their service giving institutions, which are found at different levels of development, do not have integration, are extremely bureaucratic and very much

lacking as regards access to and the use of a qualified workforce and the state of the art technology (Mathewos, 2006).

2.5.1 Distinguishing characteristics of cities in developing countries

Numerous differences exist between the cities of developing countries and those in the developed world. In particular, differences exist in their ability to adopt GIS technologies.

Some important distinguishing characteristics of the cities in developing countries which affect their ability to adopt spatial information technologies as identified by (Ian D. Bishop) include:

1. The rapid growth in population is not matched by growth in delivery of land for housing, services, utilities and infrastructure important to sustain a reasonable quality of life. This is evident from the sprawl of informal settlements, increase in congestion, air and water pollution, poor and deteriorating infrastructure, and dilapidated housing (Williamson, cited in Ian D. Bishop).

2. The growth of cities is dictated by market forces rather than strategic planning. Urban development is often uncoordinated and land speculation pursues quick financial gains. The suburban and rural areas are invaded by market-induced developments.

3. Laws and guidelines for land registration, planning and land management is diverse and often uncoordinated in developing countries. The reasons are many and varied between different countries with different traditions and political structures. Thus, the establishment of SDI cannot be easily standardized for developing countries.

4. Developed countries in general have moved from a prescriptive form of land use planning (e.g. Master Plan) towards a market oriented 'spot-zoning' approach conforming to environmental guidelines. However prescriptive urban land use planning is adopted in most of developing countries, resulting in long term land use and master plans which are less market sensitive and consequently often not followed.

5. In order to cater for an urgent demand for housing, almost all cities in developing countries have a significant proportion of the population living as squatters in slums or informal settlements. As a result tenure and ownership is often obscured and unregulated in the cities of

developing countries with access to land and security of tenure being major problems. Planning and the management of services is very poor or non-existent in these circumstances. Since these informal settlements are a special phenomenon in cities of developing countries, the strategies for managing cities in the developed world are inappropriate to these circumstances.

6. Unplanned developments make it difficult to provide utilities, while providing utilities at a later stage is very costly. As a result of poor systems for land administration and either poor or non-existent base mapping, city administrations usually does not know the location of existing services. It follows that efficient maintenance of services and infrastructure is almost impossible. Without proper land information, the acquisition of land for public facilities or the undertaking of any city planning exercise is very cumbersome, if not impossible.

7. There is little or no spatial information infrastructure (and particularly large scale base maps). The biggest single barrier stopping the construction of a spatial infrastructure is a lack of data. Other limitations include inefficient processes for purchasing spatial information or GIS technology; lack of skilled personnel to establish and manage the infrastructure; and lack of funding or political will to support the construction of the infrastructure. (Ian D. Bishop, n.d.)

2.5.2 Spatial Data Infrastructures in developing countries

The availability of spatial information for cities in developing countries is poor or non-existent. In many cases, the spatial data is in the form of un scaled sketches. Where maps exist they are often out dated or classified as restricted information and access by public departments is very difficult if not impossible. Where current and unclassified maps exist, they are usually of different scales aggravating the problem of sharing information efficiently among various sectors of the city. Digital representation of spatial data is even rarer due to the lack of appropriate equipment and trained staff. Few cities are ready to begin generating digital spatial databases as the task is seen to be too large, too costly and too complex both technically and administratively. The design and implementation of a workable spatial data infrastructure is often a dream for the future, and without a SDI, GIS are not possible (Ian D. Bishop, n.d.).

Ian D. Bishop (n.d.) observed that reproduction of maps, where they exist, is often done with ammonia printers with the original maps prepared and up-dated on transparent sheets. Cadastral

data is usually stored in hard copy registers and updated manually where available. Where a digital database is being prepared for a city, map production often continues to be done manually in parallel. Information about state owned land or government property is poor. In many cities, there are large military land holdings where information is restricted. Often maps showing land ownership are in the form of sketches which are not to scale. Therefore, the exact demarcation of much of the land is impossible or very difficult and time consuming. Most information about land ownership and utilities are in the experienced hands of key personnel in separate departments. Due to the absence of any other information system they are treated as the primary information source. As a result this information can be easily lost.

Ian D. Bishop further argues that information about the location of underground utilities and facilities is often worse than the maps showing above ground features. Utilities and facilities are marked on plans but are rarely up-dated. In most cases the actual location of these service lines is different from the location appearing on those plans. Agencies responsible for the provision of different infrastructure maintain their own maps usually showing only the location of infrastructure under their control. These maps are often only in the form of sketches that are interpretable only by the staff of these organizations. For underground utility lines the depth of the lines is seldom or correctly shown on maps. It is often the case for these utilities that some lines run on top of another utility line at a different depth (Ian D. Bishop, n.d.).

2.6 International Practices

Integrated urban infrastructure and services planning is a planning approach to urban infrastructure development which has been widely practiced in many countries. Different countries have different experience of integration and reviewing other countries experience is very important to understand the importance and necessity of integration and to adopt some useful perspectives in the effort of integration in the Ethiopian context. Thus, experiences of Asian countries (namely Indonesia, India and Philippines) provide a wide range of lessons and perspectives. In addition, the case of South Africa is also found worth considering because it has helpful perspectives.

2.6.1 Urban infrastructure planning and coordination in Philippines

As indicated in Matheowos (2006), in the Philippines, Metro Manila had a Capital Investment Folio process, which is one of the examples of Multi-Sectoral Investment Planning (MSIP). It was primarily an exercise for coordinating the major parastatal providers under the aegis of a politically powerful inter-agency forum, with local governments in a subordinate role. Formerly there was a recognized metropolitan planning jurisdiction with capital-allocating power. But the capital allocating power of this metropolitan planning jurisdiction could not be sustained after the change of the political leadership.

Later, a Local Government Infrastructure Fund program (LGIF) was launched to devolve greater power to the local governments. A matching fund concept was applied to pool funds from private capital, banks and municipal bonds. Through these programs successful municipal bonds were floated to finance a low cost housing project and to secure a bank loan for multi-purpose sport centers. To qualify for LGIF grant application, integration of vital services and utilities became a pre-requisite (ibid).

2.6.2 Urban infrastructure planning and coordination in Indonesia

According to Mathewos (2006), the Integrated Urban Infrastructure and Services Development Plan (IUIDP) of Indonesia is a good example of improved infrastructure planning and coordination. Prior to the IUIDP practice, there was little coordination and tremendous backlog of unmet needs of infrastructure. Since the late 1980s the towns and cities of Indonesia have been planning and implementing IUIDP. The IUIDP had institutional, revenue and physical improvement components. The IUIDP was initiated by the Ministry of Public Works of Indonesia in collaboration with the World Bank and was also supported by Asian Development Bank.

The IUIDP was first experimented at local project level and later extended to city level projects. Then based on the experiences gained, it was developed to a national scale program and policy. This was achieved incrementally and refined over time.. This process led to a major conceptual change and shift in the planning and programming of urban infrastructure from a sectoral and centralized project approach towards a bottom up and integrated program approach (ibid).

Different problems and challenges were faced in the process of IUIDP development especially during the first experimental periods. Particularly, there were substantial delays due to policy differences and technical problems between donors, central and provincial governments. Shortage of qualified project managers and inconsistencies between guidelines were also among the challenges that were faced. Though Indonesia has achieved a substantial improvement of urban infrastructure through this program, the impacts registered in making the organizations responsible for providing, maintaining and sustaining the achievements were limited (ibid).

2.6.3 Urban infrastructure planning and coordination in India

Integrated Development for Small and Medium Towns (IDSMT) of India is a program that aimed at promoting the development of smaller towns through the funding of strategic projects with the specific objectives of reducing the high rates of migration to the big cities and bringing about a balanced urban growth. The program consisted of land development for shelter (such as sites and services, major transport, road and traffic improvement and commercial and industrial development) and slum improvement. The program was launched during the 1980s and carried on up to 1998. Through this program a considerable amount of infrastructure has been built, but the level of investment was very weak and not focused on making a major impact. The decision-making process was too centralized and the local government's role was often too weak to make good strategic decision-making. This was partly due to the inadequacy of technically qualified and trained personnel. Lack of a sustainable institutional mechanism to ensure proper inter-agency coordination was also one of the key problems.

The program could not help to divert migration away from the metropolitan centers and thus could not stimulate growth in smaller and medium towns. Government policies ran counter to the program. Industrial liberalization caused faster growth of the metropolises thereby constraining small towns' development. The structural readjustment program also aggravated poverty in small cities.

2.6.4 Urban infrastructure planning and coordination in South Africa

As stated on Mathewos 2006, South Africa adopted a municipal infrastructure program in the late 1990s with the aim of improving the quality of life of the poorest sections of South African

communities through granting access to basic services. It is A multi-faceted development program containing different packages such as water supply, sewage, road, storm water drainage, transport facilities , toilet and sport facilities.

The department of consultation development has been responsible for integration of MIP projects in to broader multifaceted development programs. The department prepares goals and objectives and strives for the success of stated goals. Local governments were established in response to the mission. These local governments in South Africa restructured to focus on the provision of basic infrastructure by decentralizing the system. In general the program has met its mission to deliver infrastructure. It has also achieved its mission through the coordination of municipal infrastructure program by considering MIP fund and mobilizes local resource (Hailemariam 2011).

The Provincial government receives the grant funds from the national government and manages the funds in accordance with the approved business plan. In general the program has met its mission to deliver infrastructure to remote locations most in need of assistance to marginalized urban communities. It has achieved its mission through the coordination of municipal infrastructure program by leveraging MIP fund and mobilizing local resources.

2.7 Urban infrastructure provision in the local context

2.7.1 Infrastructure and Related Policy Issues in Ethiopia

A notorious characterization of Ethiopian urban centers is their spontaneous growth and haphazard development, which has in the main taken place outside the purview of conscious urban planning intervention. Nevertheless, the lack of clearly-stated policies should be seen as another factor that have had a bearing on their growth and development in addition to the absence of urban planning instruments, processes and capacities.

It is known fact that, there is no single full-fledged/consolidated infrastructure policy in Ethiopia however, the infrastructural development was as major component of urban policy of Ethiopia, the urban policy of Ethiopia that promulgated in the year 2006 raise and depict some important elements of cities infrastructure.

The water supply, street networking, telecommunication and electric light infrastructures are the prioritized policy directions under urban infrastructure provision. But the importance of an integrated urban utility infrastructure provision is not addressed by the document.

However, the issue of integrated urban infrastructure and service planning was addressed in the integrated urban infrastructure and services planning manual prepared by the Ministry of Works and Urban Development (September, 2006). The document presents some of the important urban infrastructure provision problems. The document also indicated the need of integrated infrastructure development strategy, the policy gaps, the direct relationship between some utility infrastructures with the street network and infrastructure provision experiences of Asian countries and South Africa.

Urban infrastructure and service providing institutions have been thriving to achieve their respective objectives and responsibilities and facilitate the social and economic development of other sectors and the whole country in general.

However, the new and existing infrastructural development activities undergoing are in a disintegrated manner. A number of factors can be mentioned here as a root cause, According to Tesfaye (2001), Poor management of utility lines with in the right of way of roads being the major /core problem, its effect manifested by interference of utility providers, repeated excavation, road cutting and incurring extra expense. The possible cause for the problem could be one or a combination of the following:

- Absence, lack or non-familiarity of guiding frames
- Lack of implementing capacity
- Lack of sustainable concern and Lack of coordination

As the writer said the aforementioned factors have strong impact on the absence of integration but lack or low level of integration is not only resulted from the above reasons. According to Mesfin (2009), Lack of established infrastructure policy, Lack of information with coordinate data on the existing underground utility locations, lack of clear and accountable legal frame work, and so on for the absence of integration on road and utilities.

Hence, those institutions have never been able to work in harmony due to the previously mentioned reasons and have been causing so many problems mentioned earlier. There was no coordinated information system among those institutions or any office which can coordinate and follow up the various activities performed by those institutions until the startup of the large

railway project of Addis Ababa which required a strong coordination and support from each utility service providers.

As a result it was necessary to establish a committee which consists of officials from each agency and which will be responsible to coordinate the activities of those institutions. During my visit to those organizations I was informed that they are on the process of signing an interface among the four utility service providers: Ethiopian Electric Power Corporation, Ethiopian Telecommunications Corporation, Ethiopian Road Construction Authority and Ethiopian Railway Corporation.

The major aim of the interface is to create an integrated and coordinated information system among those institutions to prevent problems and damages occurred due to their disorganized activities and ensure sustainability of infrastructures. The major duties and responsibilities of the committee include:

- Create a coordinated information system among those institutions during project planning
- Giving due attention and prevention during newly construction of transmission cables and lines related with power generating and telecommunication and place them out of road and rail way infrastructure sites.
- Taking extra care when there is a need to replace existing network and utility lines inside the road construction site and,
- Solving problems in consultation with officials from utility provision organizations and provide and recommend possible solutions.

2.7.2 Local Practice of Integrated urban infrastructure and service planning

Though, there were some efforts of urban infrastructure and services planning in Ethiopia, they were however, not systematically developed. Evidently, almost all infrastructure and service institutions (water, transport and drainage, electricity and telecommunications) always tried to integrate their plans with the existing and proposed road networks. Nevertheless, due to lack of consistent follow-up, the initiatives could not be as successful as expected (Mathewos, 2006).

Due to uncoordinated planning and design and weak institutional arrangements redoing faulty designs and rebuilding utility lines have wasted a significant amount of resources. Frequent cutting of city streets by various utility companies has severely affected the environmental quality and the efficiency of the urban transport system. In Addis Ababa, when utility companies (ETC, AAWSA, and EEPCO) needed to install new lines or to improve the existing ones underneath the roads, they used to apply to the Addis Ababa City Road Authority (AACRA) for permit to cut paved roads. Very often permits were not granted promptly. Besides, the permits given were not based on adequate information and database. The concerns of the utility company that secured such a permit were limited only to laying its own utility lines. As a result such developments often took place at the expense of the other utility lines that were already in place. In fact this has resulted in the cutting and destruction of other infrastructure lines that were otherwise functioning in good conditions. It has also resulted in delaying in the implementation of projects thereby adversely affecting overall city infrastructure and services provision (ibid).

As stated in the integrated urban infrastructure and services planning manual (2006), after a long period of neglect, it was only some 10 years back that an ad-hoc committee (composed of representatives from AACRA, AAWSA, ETC, EPCO, BWUD) responsible for integrating infrastructure development planning was formally established by the Addis Ababa City Government. The committee was found to be ineffective mainly due to lack of a legal enforcement mechanism and the absence of a strong coordinating institution. What is more, the committee consisted of busy officials. Thus representatives of various institutions usually failed to attend the committee meetings in times when the committee was not deliberating on issues that were not of vital interest to them. The only success of the committee was its effort of coordinating some of the launched projects of the city Administration.

The Office for the Revision of the Addis Ababa Master Plan attempted to prepare integrated infrastructure database in 2000. The office produced an existing infrastructure network database, which includes telecommunication, electricity, drainage, water and road lines on a single integrated map. The revised master plan has also proposed the establishment of an Infrastructure Authority for effective coordination and integration of infrastructure institutions working in the city. Following, the City Administration's reform in 2003, the Addis Ababa Infrastructure and

Construction Authority was established. The Authority was empowered to undertake coordination of infrastructure institutions and to supervise their projects (ibid).

As indicated in the integrated urban infrastructure and services planning manual (2006), to implement integrated urban Infrastructure each stakeholder follows certain process and procedures. These are:

- It is mandatory to get permit from AAICA before any infrastructure construction is undertaken.
- The applicant has to get adequate data from all Infrastructures institutions to safeguard the existing underground lines.
- AAICA will check whether the applicant fulfilled all the required information and official data from other utility institution and the Addis Ababa City Roads Authority.

The consequent permit process is to synthesize and evaluate the relevant data on all infrastructure institutions and check the location in the light of the road network plan.

For efficient integration all infrastructure institutions are urged to submit their three years plans to AAICA. Then AAICA prepares a Three-year coordinated Infrastructure plan. The Infrastructure Coordination Department and the Coordination Team within AAICA are responsible to execute the day to day jobs. They evaluate the proposals, check the data for conformity with the master plan, and integrate day-to-day infrastructure construction applications.

Chapter three
Research Methodology

3.1 Introduction

In conducting research, there is the need to gather and collect data by using various tools with the aim of analyzing them into useable information for decision making. It gives enlightenment into how the data gathering instruments were designed, administered and the various methods employed for the data analysis.

For clarity purposes, the collected data is organized in line with the major components of the research questions. Applied data collection focused on participatory, affordable, easy to understand and useful techniques. Stakeholders at all levels are consulted for their views, experience, and inputs to the assessment process. Information gathering/ data collection and analysis are conducted in close co-ordination and consultation with the target respondents and authorities.

Following, the research design, the kind and types of information to be gathered, sampling methods and sample size, data collection techniques used and the analysis system utilized to organize, interpret and present findings are presented.

3.2 Study Area Selection and Justification

According to daily Ethiopia report, the provision of good quality infrastructure services is the key to an efficient operation of the private sector and the integration into the global market as well as for attracting foreign direct investment. Therefore, the Government has been and is still engaged in comprehensive infrastructure development programs in roads, railway, energy and others.

Especially in the capital city, Addis Ababa new development and massive improvements of the existing infrastructure are undergoing. Among the new infrastructure development works, the light rail transit construction and construction of new roads and improvement of existing roads is the major once.

The case study selected for the study are two infrastructure development project works currently undergoing in Addis Ababa; Winget to Enkulal Fabrica road construction project and Atikilt tera to Autobis tera light rail transit project. The projects are selected purposely for the following reasons: The light rail transit project undergoing from Atikilt tera to Autobis tera is a place where the largest market in Africa; Merkato, and the largest vegetables and fruits selling place in the city; Atikilt Tera are found. Besides, the study area is a place where lots of business activities take place with a high mobility and movement of people, things and vehicles.

The second study area selected is the road construction project currently undergoing from Enkulal Fabrica to Winget, which is one of the delayed projects. The construction of the road is delayed because of land compensation process and inability to remove electric lines and water holes and is still undergoing. Following this, lots of complaints have been and still are being raised by the residents, business establishments, governmental and other institutions in the area. With these all facts the two projects were very convenient to look at the impact of the disintegrated infrastructure development works in the city.

3.3 Research design

The research is designed in such way to investigate the crosscutting issue of urban utility service providing authorities. The research has employed a mixed approach research design which involves both quantitative and qualitative tools and analysis (triangulated) in order to produce a richer and more complete report.

3.3.1 Data type and source

The study employs both primary and secondary data. Thus, primary data is collected form target institutions: Addis Ababa city administration, Addis Ababa city utility service providing authorities, Addis Ababa city administration road authority, Ethiopian Railway Corporation and on site observation was also considered as a primary source of information.

Furthermore, in order to find out the consequences and possible effects of the problem on the residents of the city, questionnaires were distributed for purposely selected residents and business establishments in the two study areas.

In addition to primary data secondary information are gathered from the above mentioned institutions as well as from Addis Ababa city planning institute, ministry of construction and urban development, and from other published and unpublished materials.

Besides, different books, journals, research papers written on the issues and the internet are considered for the study.

3.3.2 Sampling method

The process of urban infrastructure construction and provision is a multi-sectoral activity which involves various actors and stakeholders. To this effect, concerned actors and institutions indicated above are considered for the study and the sample respondents, sampling techniques as well as target institutions are discussed here after;

As indicated above, the target institutions selected for the study are EEPCo (Ethiopian Electric Power Corporation), ETC (Ethiopian Telecommunications Corporation), AAWSA (Addis Ababa Water and Sewerage Authority), AACRA (Addis Ababa City Administration Road Authority) and ERC (Ethiopian Railway Corporation). From those target institutions, four departments who have direct and indirect relation with the issue under study are purposively selected. These departments are design, operation, right of way and legal departments. From each department experts who are expected to have better knowledge in the area of the study were purposively selected so as to control the quality of the information.

The second sets of respondents of the study are households, business establishments and institutions sited in the study area. First, those located immediately along the road were selected and arranged in to groups such as households, business establishments and institutions. In the second stage sample respondents were drawn from the groups using systematic random sampling technique. Besides, randomly selected pedestrians from the study area are also considered for the study.

In general, a combination of purposive, random and systematic random sampling techniques were employed to select target departments, households, business establishments, institutions, pedestrians as well as experts in order to elicit the necessary information for the study and achieve the research objectives.

3.3.3 Sample size

The case study method involves a multi-perspective analysis, which requires the use of multiple data collection techniques and sources in order to reveal details that help with the understanding of complex relationships beyond that which seems obvious (Tellis, 1997). As indicated earlier, in this study, empirical data was collected from various sources so as to investigate and analyze the root causes and consequences of the problem as well as the process of infrastructure development works and service provision. Moreover, multiple sources were used to triangulate and evidence about the same subject in order to enhance validity. The type and number of respondents as well as the respective data collection techniques are summarized in table 3.1 and table 3.2 as follows:

Table 3.1 Distribution of respondents by category from each study area

Respondent category	Sample respondents		Total	Instrument
	Project 1	Project 2		
Households	24	23	47	Structured questionnaires
Business establishments	27	25	52	Structured questionnaires
Institutions	12	11	23	Structured questionnaires
Pedestrians	5	5	10	Unstructured interview
Consultants	1	1	2	Semi structured interview
Grand Total	**69**	**65**	**134**	

Project 1: Winget to Enkulal Fabrica road construction project

Project 2: Atikilt tera to Autobis tera light rail transit project

Table 3.2 Distribution of respondents from each institution and instruments of data collection

Target institutions	Number of Respondent/experts	Instrument
EEPCo	6	Semi Structured Interview
ETC	6	Semi Structured Interview
AAWSA	5	Semi Structured Interview
AACRA	7	Semi Structured Interview
ERC	1	Semi Structured Interview
Total	**26**	

3.3.4 Data collection methods

In order to elicit the necessary information for the study interview and questionnaires were considered as the major means of data gathering tools. In addition to this, the study also used field observation and pictorial data collection.

Thus, three sets of semi-structured interview questions were administered. The first set of interview were administered to purposively selected experts working in each utility provider institution who are expected to have better knowledge in the area of the study so as to control the quality of the information.

The second interview session was conducted with experts working at Addis Ababa city administration road authority and Ethiopian Railway Corporation who has better exposure in the area of the study. The third set of interview was conducted with the consultants working on the two case project sites.

Structured questionnaires were used to collect information from selected households, business establishments and institutions in the study areas regarding the various social, economic and environmental effects they are facing due to the problem under review. The target households, business establishments and institutions are selected based on their location and proximity to the areas of construction works especially those located immediately along the road are considered for the study. Besides, randomly selected pedestrians were also considered for the study.

In addition, relevant documents are reviewed from the target institutions to substantiate the findings obtained from the qualitative sources.

Finally field survey was undertaken by the researcher to assess the condition of the existing infrastructure construction works within the boundary of the study area.

3.3.5 Data analysis

In order to achieve the above objectives, the study has employed an exploratory and descriptive methodological approach along with narrative data analysis technique. The information collected through review of documents, field observation, interviews and questionnaires is analyzed within the framework of the study objectives. Data collected through structured questionnaires are

edited, coded, and analyzed. Data obtained from observation is presented using pictures. Qualitative data is used to enrich, illustrate, and elaborate on the quantitative findings. Both the qualitative and quantitative analysis focuses on answering the study questions.

Information obtained from the secondary and primary source are used to make a descriptive analysis of the situation and based on the findings relevant conclusions are drawn.

Chapter four
Data presentation and analysis

4.1 Introduction

This chapter provides the results obtained from field survey, key informant interviews with experts of the target institutions, questionnaires and the surveys undertaken with residents, business establishments and institutions in the study areas.

The information collected through, field observation, interviews and questionnaires are analyzed within the framework of the study objectives. Interviews have been held with 26 experts working in the 5 target institutions' design department, operations department, legal department, right of way department and heads of these departments.

A community surveys have also been undertaken for this project. The purpose of the community survey was to investigate the problems faced by residents dwelling in the specific project areas due to the problem under review. Data collected through structured questionnaires are edited, coded, and analyzed. Data obtained from observation are analyzed using checklists and pictures.

Information obtained from the secondary and primary source is used to make a descriptive analysis of the situation.

Hence, this chapter seeks to discuss the implications of the findings in relation to the research objectives that were set out in the introduction and the results are presented concurrently according to the three key topics listed below.

- The process of urban infrastructure service provision in Addis Ababa
- Dimensions and causes for the poor sectoral integration in urban infrastructure development works
- The consequences and possible effects of poor inter sectoral linkage

4.2 An overview of the process of integrated urban service provision in Addis Ababa

Knowing the process of the city infrastructure service provision will be an indicator to the solution. Hence, the process of urban utility infrastructure provision is presented in table 4.1 below in terms of level of administration, type of utilities, authorities, accountability, source of budget and roles and responsibilities of the institutions'.

As displayed in the table below, EEPCo, ETC and ERC are administered federally while AAWSA and AACRA are under the city administration. The organizational structure and level of accountability was mentioned in expert interviews as one of the cause for lack of coordination between stakeholders. Consequently, AACRA has a better coordination with AAWSA than other service providers while EEPCo and ETC work in better coordination than the other two.

Similarly, those stakeholders have various sources of capital budgets for line installations and new road projects. This also implies that since they have different sources of budgets, each of them is forced to plan and execute independently according to their budget and fund schedules.

Though, there were some efforts of urban infrastructure and services planning in Ethiopia, they were however,. not systematically developed. Evidently, almost all infrastructure and service institutions (water, transport and drainage, electricity and telecommunications) always tried to integrate their plans with the existing and proposed road networks. Nevertheless, due to lack of consistent follow-up, the initiatives could not be as successful as expected (Mathewos, 2006).

Table 4.1 urban utility service providers and their level of administration in Addis Ababa

Evaluation criteria	urban infrastructure providing authorities/institutions and their level of administration				
	Federally administered infrastructure service providing authorities			Infrastructure service providers administered by the city administration	
	Electric power	**Telecommunication**	**Rail ways**	**Water & sewerage services**	**Road**
Name of authority	EEPCo	ETC	ERC	AAWSA	AACRA
Accountability	Federal government	Federal government	Federal government	Addis Ababa city administration	Addis Ababa city administration
Among major roles and responsibilities	provision of high quality, sustained and safe electric power	improve the existing network quality and expansion of new services	providing the capital city Addis Ababa with a mass transit system	Supplying pure water and spreading out of modern sewerage system in a sustainable way	To be a safe, effective, efficient and fully integrated Road Authority which will best meet the needs of all the Residents of the City of Addis Ababa
Source of capital budgets for line installations and new road projects	Own income and direct loan/ project finance	Own income	Direct loan/project finance	Direct loan and city government	Direct loan/project finance and city government

4.3 Dimensions and causes for the poor level of integration in urban infrastructure development works

4.3.1 The design dimension of the problem

As discussed in the literature review, cities, towns and other organizations planning transportation projects must coordinate the work with any utility company or railroad that may be affected. Utility facilities consist of public or private lines or equipment – power lines, telephone landlines, cable television lines, underground water, sewer, gas and telecommunications lines, and railroad tracks. To keep a locally administered project on schedule, it is important to identify these facilities and contact their owners as early in the design process as possible. With this regard, experts from the design department of each utility service provider as well as ACCRA and ERC were presented with a series of questions regarding the design process and related issues.

- **Preparation of project designs**

It was agreed by all interviewees of utility service providers that their designs are prepared by their own engineers and professionals in the respective areas. There are two ways of preparing road designs in ACCRA. One way is preparing designs by case team of the authority itself and the other is outsourcing to external agencies through contracts.

It is a fact that any work in any city should comply with the master plan either directly or indirectly. Hence, any work has to refer the city master plan.

As indicated earlier, the city master plan is the framework to the city that can be traced particularly for urban service provision. However, interviews with experts reveal that even if they are obliged to refer the master plan while planning, the application is not commonly practiced in the city of Addis Ababa. This is mainly due to the less emphasis given to utilities in the master plan, what is depicted in the master plan and the reality in the ground doesn't always match and there are places which are out of the master plan.

Proper planning, locating, and coordination between involved stakeholders will minimize costs and delays and lead to the best possible project at the lowest ultimate combined cost to the

community. However, utility coordination mainly has been a reactive undertaking, often only occurring towards the end of a design project and the beginning of construction, rather than a proactive process that begins at project conception and early design stage.

Apart from the master plan, each utility service provider as well as AACRA and ERC has their own manuals which they refer procedures and standards while preparing their designs. Having manuals and guides in one organization is a very important thing but these manuals are not common for all. For a better integration and coordination between those institutions, besides the independent standards and guides, it is necessary to have a common platform or guide book which they all can refer to.

- **Communication and coordination during design preparation**

Designing is a very important step in which all stakeholders which might be involved in the project directly or indirectly should communicate in order to minimize possible conflicts that can arise in the implementation stage. Conversely, utility service providers or AACRA do not communicate each other's plans or designs unless one asks the other during implementations. The usual trend is that they each prepare their own designs individually without referring to the others plans or designs then they go to the city administration for permission to implement what they have planned. After that, they will write letters for the other stakeholders if for instance relocations are necessary. The usual practice is preparing workshops, meetings or discussions at the end of the designing phase. Hence, there is no communication or coordination between stakeholders during designing which is more likely to create disparities and conflicts in the next stages.

- **The current status of integration at inter sectoral level**

In trying to understand the current level of integration among stakeholders, experts were asked to indicate the level from high to none. Accordingly, every interviewee replied that the current status of integration among stakeholders is said to be low. However, there were an efforts made to introduce an integrated approach but were not successful due to various reasons such as lack of strong legal enforcement, lack of capacity, lack of interest and commitment of stakeholders, absence of responsible body to do the job and lack of long term plan which is practical on ground than on papers etc.

According to the AACRA, in addition to the above factors the absence of belongingness and responsibility play pivotal role for the low level of integration. The current poor or low level of integration is resulted from the absence of system that assures accountability. AACRA also commented that, the only way to bring integration among the stakeholders is the institutional accountability and responsibility scheme.

- **Responsibility to coordinate service providers**

As indicated on the overview of the integration practice, the absence of strong coordinating body was mentioned as a reason for the failure of integrating urban services. Majority of the respondents from urban service providers as well as AACRA and ERC agreed that, there should be strong and independent governmental organization to coordinate the effort. While some other suggested that there should be a committee organized with representatives from each institution and others especially experts from AACRA argued that AACRA should take the responsibility to coordinate the others since everything is installed along roads. Utility service providers argue against the option that ACCRA or any one of them to take the responsibility because it's obvious that the institution is going to favor its own objectives and plans.

4.3.2 The legal dimension of the problem

The legal dimension is the second and most central factor for urban utility infrastructure provision problem. To this effect, experts from legal departments of the target institutions were consulted and related documents were reviewed. Among the responsibilities of those departments, solving conflicts cases before they are taken to court, handling purchasing contacts of the authority (both goods and services), negotiating compensations for relocations and property damages, etc. are the major once.

The responses from the experts revealed that there are no clearly stated rules or regulations or any legal conditions which suggest coordination among stockholders at any stage so far. But there are legal conditions to hold stakeholders accountable for property and other damages occurred during construction in the form of compensations. If one of these institutions, knowingly or unknowingly damages the other's properties during construction, it is obliged to pay compensation as determined and claimed by the victim institution for the lost or damaged property. This is done at a department level between the two institutions if the damaging

institution accepts and is willing to pay the compensation, if not, the case will be taken to the court. Consequently, all of the target institutions has been sued by and has sued other stakeholders for property damages. There are also legal conditions were by households can claim compensations for damaged properties by anyone of the utility providers or AACRA but this is rare because of citizens lack of awareness of their claiming rights.

This suggests that just like in the designing process, the rules and regulations are mainly reactive undertakings in which institutions claim and sue each other for compensations after the damages are done, rather than a proactive process which suggests those institutions to work in coordination beginning from project conception.

4.3.3 Implementation/operation dimension of the problem

The construction phase of a road or a highway improvement project begins after all of the design, right-of-way acquisition and the letting processes have concluded with the award of a contract. At that time, all of the previously unrelated parties of a project are first put together as the team to build the project. In this sense, every stockholder's, contractors, utility owners, road owners and others should come together. Thus, a formalized communications process is necessary to maintain communications among all parties to the construction project in order to put all the individual entities of the construction project together as a team to manage the project in a manner that benefits all parties.

- **Instruments used to keep alignments**

With currently advancing technology, there are instruments which help to accurately measure and indicate alignments to follow street standards. Interviews revealed that AACRA is the only institution which always uses surveying instruments to keep alignments. EEPCo, they sometimes use surveying instruments and sometimes use nothing at all. By the same token, ETC most of the times install their lines under sidewalks 50cm away from a house or building located immediately after the sidewalks. Similarly, AAWSA uses both surveying materials and simple ropes to keep alignments. The use of instruments other than surveying materials is more likely to cause miss location of lines especially underground facilities. This is one of the causes for the failure of service providers to accurately indicate the locations of their underground facilities.

- **Utility database and records**

As indicated in the literature review part, the economic and efficient delivery of infrastructure services depends on effective planning and management. Without proper information spatial and otherwise the quality of service delivery, financial performance and ability to plan can be eroded. Information from maps and records, based largely on records of utilities and infrastructure facilities, contributes not only to efficient services, but also to the operation and maintenance of assets, and to the sensible planning of extensions and new works. Any serious lack of such information can adversely affect the economy, quality of life, public health, and the environment.

For any new transportation project, planners need to know what hazards exist and where gas, power, water and other potentially perilous utility lines lie under the ground so they can design around them.

In trying to investigate the state of utility database, utility service providers were asked if the size, type and location and other information of their facilities are documented and are available. Interviewees from the three utility service providing institutions ascertained that even if the accurate location of the entire lines and other facilities are not known, almost every line, pipe or pole is registered either in hard or soft copies or both depending on the category.

Likewise, AACRA and ERC were asked how often they receive information from utility service providers regarding the location of utility lines and other overhead as well as underground infrastructures and the sufficiency of the information. The experts from the operation department complained that the majority of construction delays are caused by the surprise discovery of underground utility lines which they did not receive any information about and they also said that they usually do not receive accurate information especially underground utility lines. They further believe that majority of the property damaged are caused due to lack of accurate information from the utility service providers about the type, size and location of their underground facilities.

On the other side of the argument, utility service providers blame AACRA and ERC for not informing them before the construction is started, for the insufficient time they usually are given for relocations and for sometimes purposefully damaging their facilities. They further argued that one of the main reasons for the frequent service interruptions in the city besides during

relocations is the frequent damages done to the lines during construction and the time taken to maintain or replace the damaged lines.

This clearly implies that there is a lack of communication and coordination between the various stakeholders. It can also be noted that the various stakeholders are negligent and careless for each other and only cares for their individual project success and completion.

- **Reasons for relocation and project delays**

The most distressing issue in construction of new roads or redevelopment of the existing ones is the relocation of utility lines and poles. Construction projects can be delayed for various reasons but mainly due to lack of prior communication and commonly agreed up on schedules.

Among the main reasons indicated by experts from AACRA for the delays in project implementation is failure of utility providers to relocate their facilities on time. Following, the researcher asked if they have a standard time set for utility line relocation and right of way clearance. In principle at least 80% of the right way should be cleared before any construction is started but the time provided depends on the actual situations on ground. The time for relocations is sometimes set by the relocating utility provider and sometimes it is set by ACCRA or ERC.

Utility service providers complain that the time period they receive for relocations is not sufficient because AACRA or ERC often do not consider their problems they only care for the timely completion of their own projects. On the other hand, AACRA blames utility service providers for the majority of their project delays. Especially EEPCo do not finish relocating even in the time period they say they will finish.

On the other hand, contractors and consultants of the two projects in the case study areas were interviewed to see the real cause of the problem. First they were asked if the 80% of the RoW was cleared and prepared for them before they started execution. Both of them replied that they were told it will be cleared as they are working and they had to start operating to cope up with the schedule but they said they are suffering a lot and are lagging behind because of delayed relocations.

4.4.1 Utility service provision before and after the construction works

A. Water services

In trying to understand the effects of lack of integrated construction works, residents, business establishments and institutions located in the road construction and light rail construction projects have been solicited concerning the various economic, social and environmental problems they face because of the problem under review. The following table (table 4.2 4.1) illustrates community survey responses comparing water services before and after the construction works in the two study areas.

Table 4.2 water services before and after the construction works in the two study areas

Responses	Atikilttera – Autobistera LRT project				Wingate - Enkulal Fabrica road project			
	Before		After		Before		After	
	frequency	%	frequency	%	frequency	%	frequency	%
Excellent	-	-	-	-	8	13%	-	-
Very good	-	-	-	-	20	32%	-	-
Good	43	63%	-	-	30	48%	10	16%
Bad	19	28%	15	22%	3	5%	5	8%
Very bad	1	2%	43	63%	1	1%	42	67%
No change	-	-	6	9%	-		5	8%
No response	5	7%	4	6%	1	1%	1	1%

Source: own survey

As displayed in the above table, majority of the respondents (63%) from Atikilttera to Autobistera LRT project said water services were good before the construction works. However, 63% of them said water services have become very bad after the construction works and 22% said the services are currently in a bad condition.

Similarly, majority of the respondents from Wingate to Enkulal Fabrica road project area agreed that water services before the construction are way better than the current service status. Comparing the situation in the two project areas, the problem seems more prominent in road construction project area.

Table 4.3 frequency of water service cuts in the two case study areas

Response	Atikilttera –Autobistera LRT project		Wingate-Enkulal Fabrica road project	
	Frequency	Percentage	Frequency	Percentage
Very often	29	43%	37%	59%
Often	27	40%	9%	14%
Sometimes	5	7%	9%	14%
Occasionally	2	3%	3%	5%
Rarely	-	-	4%	6%
Non response	5	7%	1%	2%

Source: own survey

The above table indicates the frequency of water service cuts in the two project sites. As can be noted from the above responses, water services are cut every so often in both project sites similarly. Respondents further added the service could be out for 10 to 15 days straight. Anyone can simply imagine living 10 days or so without water.

Officials of AAWSA were also asked the reasons for the frequent service interruption in those areas. According to them, lack of coordination with AACRA and the process of securing the position of pipe lines before the construction of the road are the main reasons for the service interruptions. The following box summarizes responses of community survey respondents regarding the various problems they have faced due to the frequent water service interruptions.

Box 4.1 Community reactions towards the frequent water service interruptions

"We can't cook without water or wash our cloths, we are suffering"(a woman from Filance Medhanialem)

"as you can see everything is dusty due to the construction and we don't have water to wash ourselves" (household respondent around Enkulal fabrica)

".... Even to bring water from other areas is difficult because the road is excavated. People fall and get injured while crossing the road carrying water" (resident from Habtegiorgis Dildiy)

"we are forced to incur unnecessary cost to buy water from other places"

"we pay 6 birr for 25lit of water and we buy packed water for drinks because the water is not clean"(resident in Gojam berenda)

"our customers are going away because we can't provide them with enough water"(a cafeteria around Autobistera)

B. Power services

Table 4.3 below illustrates responses of community survey respondents from both case project areas comparing electric power services before and after the construction works. As can be noted from the table, majority of the respondents (75%) from Atikilttera to Autobistera LRT project site said power services were good before the execution of the project. Similarly more than 80% of the respondents from the road project site agreed that power services were in a good status before the construction works. This suggests that residents from both case areas were satisfied with the services before. However, majority of the respondents from both project sites agreed that power services have been very bad and are still bad due to the construction works. Likewise, this problem seems more conspicuous in the road construction project area.

The reasons provided by EEPCo for the frequent service interruptions in the study areas include: lack of capacity to upgrade the existing infrastructure, low quality of spare parts used to replace the damaged lines during relocations and by other stakeholders, overloading of transformers in substations and failure of technicians to properly do their jobs in the fields. Community survey respondents also complain about technicians being corrupted and use the current complex situation to get bribes from the community. They sometimes unplug lines and change

dysfunctional transformers so that the can get bribes especially from business establishments to fix what they have purposefully dysfunction.

Table 4.4 electric power services before and after the construction works in the two project sites

Responses	Atikilttera –Autobistera LRT project				Wingate-Enkulal Fabrica road project			
	Before		After		Before		After	
	frequency	%	frequency	%	frequency	%	frequency	%
Excellent	-		-	-	3	7%	-	-
Very good	3	5%	-		13	31%	-	-
Good	51	75%	2	3%	20	48%	5	8%
Bad	11	16%	23	29%	5	12%	13	21%
Very bad	3	4%	42	54%	1	2%	43	69%
No change	-	-	11	14%	-	-	1	2%

Source: own survey

Community survey respondents were also asked to indicate how often electric power services get interrupted in their area. Table 4.5 below presents percentage results from residents' indicating frequency of power service interruptions in the two case study areas. Accordingly, majority of the respondents from Atikilttera to Autobistera LRT project area replied power services get interrupted a lot. By the same token, majority of the respondents (63%) from Wingate to Enkulal Fabrica indicated that power services interrupt very often in their area.

Table 4.5 frequency of power services interruption in the two study areas

Response	Atikilttera –Autobistera LRT project		Wingate-Enkulal Fabrica road project	
	Frequency	Percentage	Frequency	Percentage
Very often	21	30%	39	63%
Often	30	44%	13	21%
Sometimes	18	26%	8	13%
Occasionally	-	-	1	1%
Rarely	-	-	1	2%

Source: own survey

Community survey respondents also indicated that there were times where power services were out for a whole week and it gets interrupted every now and then.

Box 4.2 community reactions towards the frequent power service cuts

Households	*"we can't use electronics materials at all such as refrigerator, we can't charge our phone, we can't make enjera or cook without power"* (a woman from Filance) *"materials are damaged because of high power"* (Medhanialem) *"we are incurring unnecessary cost for charcoal and candle"* (Pasteur) *"we can't watch TV, we can't get latest information"* (Enkulal Fabrica)
Business establishments	*"we are incurring unnecessary cost for generators"* (Gas station, Pastuer) *"we have to taste materials before we sale them but we can't do that because of the frequent power interruptions"* (electronics shop around Gojam berenda) *"we can't use the cash register without power or sale hot beverages"* cafeteria *"we can't operate machines, computers or cameras without power"* photoshop *"Can you imagine our job without power? We are bankrupted"* (internet café around Medhanialem)
Institutions	*"we can't duplicate exams, we are forced to postpone exam schedules, plasma services have been interrupted, extension classes have been stopped due to power outages"* (Addis Ketema Preparatory School) *"inefficient customer service and loss of data"* (Bank around Medhanialem) *"we can't use our laboratories and equipment without power so patients are have to wait long for results and we are incurring additional fuel costs for generators "* (Pawlos Hospital)

C. Telecommunication network services

Just like water and electric power services, households, business establishments and institutions in the two study areas were asked to compare telecommunication network services before and after the construction works. Accordingly, their responses are illustrated in the table below.

Table 4.6 telecommunication network services before and after the construction work

Responses	Atikilttera –Autobistera LRT project				Wingate-Enkulal Fabrica road project			
	Before		After		Before		After	
	frequency	%	frequency	%	frequency	%	frequency	%
Excellent	-	-	-	-	1	1%	-	-
Very good	-	-	-	-	28	37%	-	-
Good	37	54%	-	-	28	37%	3	5%
Bad	27	40%	16	24%	16	21%	8	13%
Very bad	4	6%	43	63%	3	4%	52	82%
No change	-	-	9	13%	-	-	-	-

Source: own survey

As can be seen from table 4.6, more than half of the respondents (54%) from the LRT project area agreed telecommunication network services before were rather good. However, more than 85% of them said the services have become poor after the construction has started. Correspondingly, majority of the respondents from the case road project site also replied that network services are much better than the current network service situation in their areas. Similarly, community survey respondents indicated the frequency of network service interruptions. As shown in table 4.7 below, the most prevalent responses from both areas are "very often" and "often". This also indicates that, like water and power services, telecommunication network services get recurrently interrupted due to the construction works.

Table 4.7 frequency of network service interruption in the case project sites

Response	Atikilttera –Autobistera LRT project		Wingate-Enkulal Fabrica road project	
	Frequency	Percentage	Frequency	Percentage
Very often	15	31%	29	69%
Often	26	54%	7	17%
Sometimes	5	11%	4	10%
Occasionally	2	4%	1	2%
Rarely	-	-	1	2%

Source: own survey

Experts of ETC were asked for the major reasons of frequent service interruptions in those areas. The first reason provided was power interruption. Since the network lines and fibers operate using electric power, they stop working when electric power gets interrupted. The other reasons are interruptions during relocations and repairing of damaged lines and cables during relocations and installations. Moreover, the experts ascertained that the cables and network lines once they are damaged, even if they are repaired they will provide low quality interrupted service.

With this regard, community survey respondents were asked to explain the effects of frequent telecommunication (network) service interruptions. Below sample quotes from households, business establishments and institutions explaining the problems they faced are presented.

Box 4.3 a case from survey respondents explaining the effects frequent network service cuts

> *"we have stopped selling prepaid cards because people can't charge their phone without network connection"* (shop, located around Filance)
> *"Our business is highly dependent on network services. We are bankrupted because there is no network connection"* (internet café around Medhanialem)
> *"loss of customer, inefficient customer service, lower level of transaction"*(bank, Enkulalfabrica)
> *"we have lost data due to the frequent network interruption and our customers are dissatisfied"* (bank around Shewadabo)

4.4.2 Service cut announcements

Announcing service cuts earlier before the services are actually cut is one of the responsibilities of service providers in normal conditions. Residents and customers of those services should be informed about service outages earlier so that they can prepare themselves. In this regard, community survey respondents were asked if they receive any announcements from each one of the service providers regarding service cuts. The results from the following figure (figure 4.7) suggests that residents of the study area do not receive announcements before services are cut.

Likewise, utility service providers were asked how often they announce service outages earlier to their customers and most of them argue that they always announce service cuts earlier under normal conditions but if the service interruptions are caused due to line damages or relocations, they rather focus on maintaining and fixing than announcing it.

> ***"We don't announce service cuts occurred due to damages earlier because we don't see it coming ourselves but we try to fix it as soon as possible"*** (ETC)

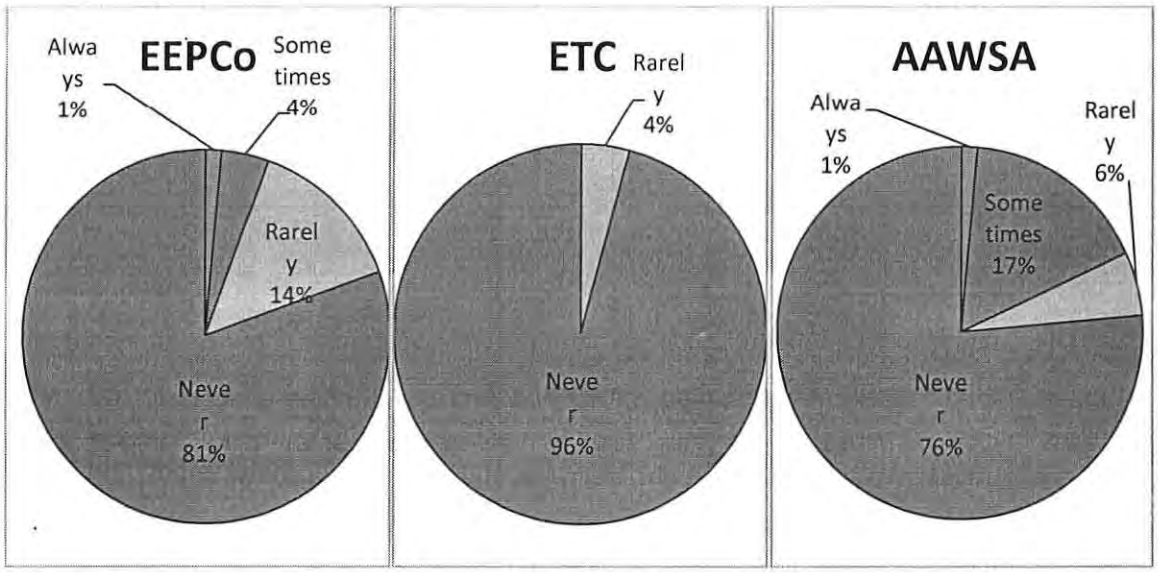

Figure 4.1 Do you receive any announcements on mass media before the services are cut?

This implies that majority of the service interruptions and cuts are unexpected and caused by accidents and damages that cannot be seen by service providers earlier so that they can announce. Rather they focus on fixing the damages as soon as possible than announcing the

problem even after it has happened unless the maintenance is going to take long. This all stems from lack of coordination during construction works.

4.4.3 Complaint raising and handling mechanism

Local residents and customers of utility services are the main victims of the disintegrate activities of service providers and road construction agencies. As indicated earlier, among the problems that local residents especially those who are located around the construction projects face are frequent service interruptions. Consequently, they have the right to raise their complaints and get immediate responses of service providers as much as possible. Therefore, proper complaint handling system should be in place by service providers.

In this regard, community survey respondents were requested to indicate how they raise their complaints and evaluate the complaint handling system of service providers.

Table 4.8 how do you raise your complaints?

Compliant raising mechanism	Frequency
Through phone calls	32
By going to the offices in person	43
Through mass Medias	2
Phone calls and going to the offices	26
Other	19

Source: own survey

The above table highlights how residents raise their complaints. Of the total responses, the most prominent was "by going to the offices in person" followed by "through phone calls" while who do both accounts 26 responses being the third common response. Only two respondents said they use mass Medias to complain. The rest haven't complained at all. The next important question raised by the researcher was how often they get immediate responses to their complaints. Table 4.9 below presents the results from community survey respondents.

Table 4.9 how often do you get immediate responses to your complaints?

Response	Frequency	Percentage
Always	5	4%
Sometimes	15	12%
Rarely	45	37%
Never	47	39%
Never complained	10	8%

Source: own survey

As can be noted from the above table, 39% of the respondents never got immediate responses for their complaints while 37% said they rarely get immediate responses which in general indicate a poor complaint handling mechanism. The researcher further asked the respondents how content they are with the compliant handling mechanisms of service providers. It was found out that almost all of the respondents are dissatisfied with complaint handling mechanisms of those institutions especially EEPCo. They further complained that they have to bribe the technicians and employees of the corporation to get immediate responses. Especially business establishments are suffering from such problems. An anonymous business owner said:

> ***"Once, I called and reported to EEPCo because power was out for days and they sent a technician. I was not surprised when he asked me to give him some money and I did because I didn't have other option. Unfortunately, I found out he didn't fix it after he was gone. I called to tell him that it was not fixed what he said after that was surprising. They are doing business not serving the community"***

Out of the total respondents, 8% of them said they never complained and they were further asked to explain their reasons for not raising their complaints. Sample responses are presented below.

Box 4.4 a case from survey respondents explaining why they never complained

> *"It's just a waste of time. Nobody listens to you"* (Cafteria around Enkulal fabrica)
> *"They don't care so they don't respond. Why should I bother for no response?"*(respondent from Habte Giorgis Dildey)
> *"I don't know what to do; I don't know how to complain I just wait"*
> (a housewife from Medhanialem)

4.5 The effects of poor inter sectoral linkage

4.5.1 Effects on business activities

In areas where road and railway construction projects are underway, there is an interruption in utility services and congested transportation system which results in a reduced movement of activities and consumers are less interested to go to such places which intern will have a negative impact on business transactions, revenue generation and the amount of tax to be collected from those business establishments.

In this regard, business establishments and institutions located in both project sites were asked to explain their profit level and number of customers after the construction works. Concerning the level of their profit, 33 business owners from the LRT project site said it is decreasing after the construction due to the frequent service disruptions and loss of customers. Similarly, of the total respondents from the road construction project site, 28 (85%) of them replied that their profit level has been decreasing and still decreasing due to the construction works.

Table 4.10 profit level after the construction works in the two study areas

Responses	Atikilttera –Autobistera LRT project		Wingate-Enkulal Fabrica road project	
	Frequency	Percentage	Frequency	Percentage
Increasing	-	-	-	-
Decreasing	33	79%	28	85%
No change	5	12%	1	3%
Can't judge	4	9%	4	12%

Source: own survey

As to the number of customers, similar responses were forwarded by majority of the respondents from both study areas that more than 80% of them ascertained the number of customers is decreasing from time to time due to the construction works in both case areas.

Table 4.11 number of customers after the construction works in the two case areas

Responses	Atikilttera –Autobistera LRT project		Wingate-Enkulal Fabrica road project	
	Frequency	Percentage	Frequency	Percentage
Increasing	-	-	-	-
Decreasing	40	83%	31	86%
No change	5	11%	1	3%
Can't judge	3	6%	4	11%

Source: own survey

Among the main problems of disintegrated urban infrastructure development works indicated by business owners and institutions; frequent service interruptions, property damage, time loss, loss of data, machinery damage, lower productivity and bankruptcy were rated as the most significant.

4.5.2 Effects on the daily life of residents

Among the main problems faced by residents in the two study areas, the most significant once as indicated by the respondents are; additional transport costs, time loss, physical injury, damaged property, increased incidence of dust induced lung diseases, traffic jams, lack of transport services, environmental pollution and noise pollution.

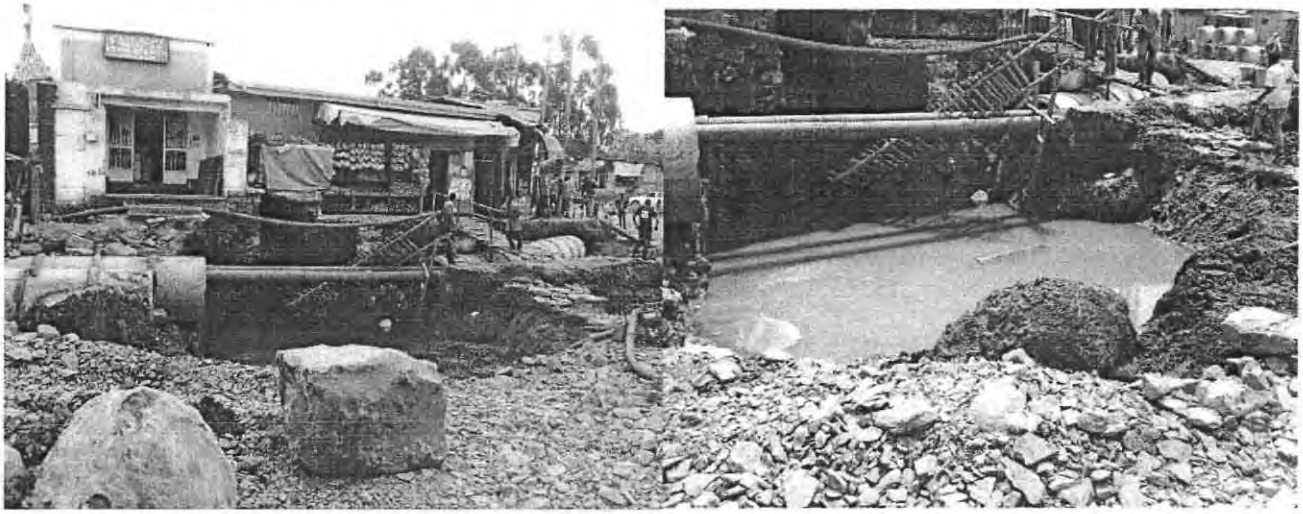

Figure 4.2 photos taken on field survey (April, 2014), location filance Medhanialem

4.5.3 Compensations for property and other damages

Property damage was mentioned by community survey respondents as one of the problems caused by the frequent power interruptions. According to EEPCo, customers have the right to claim compensation for property damages caused by high power released by the corporation. Similarly, it was learned from experts of AACRA that residents can claim compensation for damages related with the construction of roads such as compensation for relocations, for other property damages caused during the construction, physical injuries etc. thus, community survey respondents were asked if they have received compensations for property and other damages (if any). As illustrated in table 4.12 below, out of the total responses, only 3% of them have received compensations while 16% haven't received anything. The rest 22% did not claim at all.

Table 4.12 have you received compensation for property damage? (If you had any)

Response	Frequency	Percentage
Yes	4	3%
No	19	16%
Didn't claim	27	22%
No damages	72	59%

The researcher further asked those respondents who haven't claimed for any compensation to explain their reasons. The essence of this question was to investigate whether residents know their rights or not concerning such situations. The results are illustrated in figure 4.13 below.

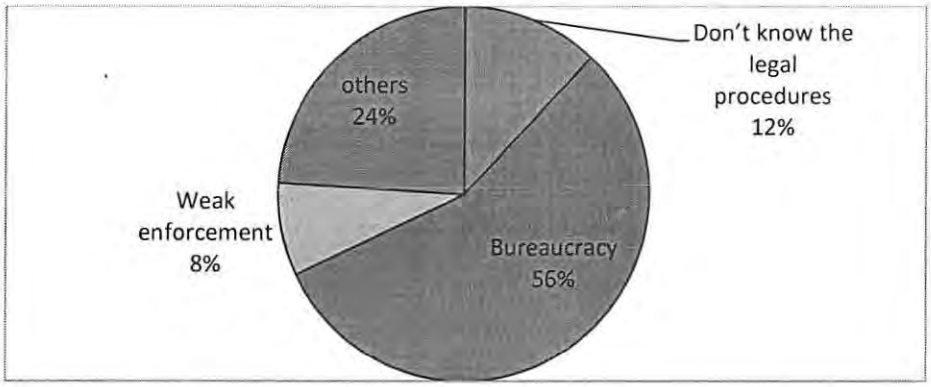

Figure 4.3 reasons for not claiming compensations

As can been seen from the above figure, of the total respondents (27) who have not claimed for compensations, 56% (15) of them indicated bureaucracy as their main reason for not claiming followed by 12% (3) who doesn't know the legal procedures for doing so leaving 8% (2) who didn't claim due to the weak enforcement of such cases. The rest 24% forwarded other reasons such as; "I fixed it myself", "it is time taking", etc. Below is a sample response from anonymous respondent working in a Bank in one of the study areas, explaining the response they got for their claims for compensation:

> ***"Once, 8 computers got damaged due to high power release and we claimed for compensations. The technicians came and looked at the computers and said the damages are not because of power so they will not compensate. This is what they do; they come and check for the formality but will give you the same answer every time"*** (Bank located around Pasture)

4.5.4 Safety

Safety of workforce and local residents must be an absolute priority for any construction project. Such project as road and light rail has to commit to preventing injury to local residents and workers as a result of construction activities.

Although only construction personnel should be permitted to enter the working corridor, consideration need to be given to those who may not understand the hazards posed by the construction activity such as small children and blind individuals. Field observations revealed that there are no signs or other measures taken by the contractor to keep residents and pedestrians out of the construction corridor. Furthermore, utility service providers leave their wires everywhere and ditches filled with sewer wastes unprotected.

The following picture was taken from Atikilttera to Autobis tera LRT project site around Addis Ketema Preparatory School. The first picture shows a busted sewerage line and a ditch filled with liquid sewage while the second picture shows pedestrians trying to walk around a ditch filled with liquid sewage and surrounded by wires posing physical and health hazards to the residents as well as pedestrians.

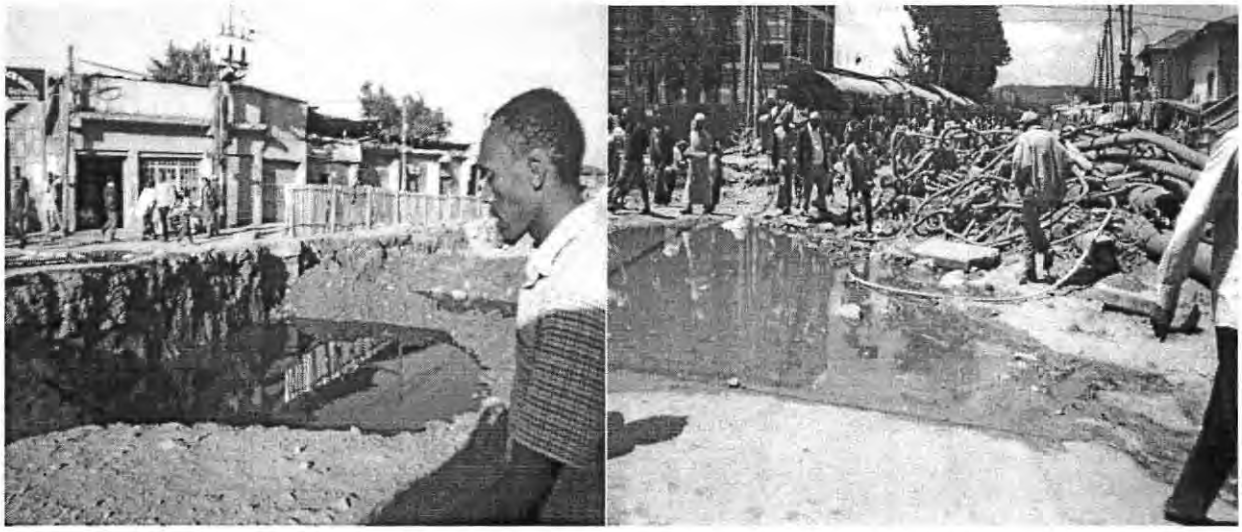

Figure 4.4 photos taken on field survey (April, 2014), location Autobistera next to Addis Ketema preparatory school

Interview with AACRA revealed that there are no appropriate measures undertaken to ensure the safety of people from accidents caused by machinery and from falling in to trench. The following

picture was taken when people are passing and moving around while heavy equipment is operating within less than 50cm.

Figure 4.5 photos taken on field survey (April, 2014), location Gojam Berenda

Another greatest safety hazard posed by the construction phase for local residents is the increased traffic loads on neighboring roads. Due to the closure of the main streets for construction reasons drivers are using roads inside the residential areas as alternatives. As a result there is an increased traffic load especially in rush hours on these road which poses a great danger to residents of the local area especially children. In this regards, community survey respondents were asked to indicate the extent to which the current environment is safe to children and disabled people. The percentage results of the responses are illustrated in figure 4.6.

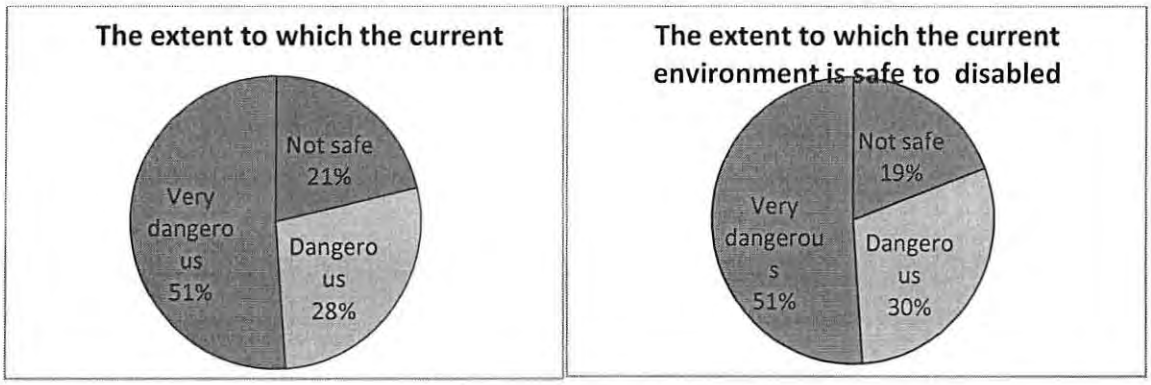

Figure 4.6 the extent of safety in the project areas

The following picture also substantiates the responses of community survey respondents and pedestrians regarding the safety of the environment. A water pipe was damaged in this specific location during construction before a month and now days it is common to see cars stuck and swamped, a highly congested traffic especially during rush hours, very difficult for a pedestrian to pass bay and almost impossible for disabled pedestrians to walk in this area.

On top of that, public transports especially 'taxi's' are forced to diverge route. Consequently, transportation cost has increased; there is lack of access to transportation, fuel consumption has increased, cars are being damaged, etc. as a result the local residents are suffering a lot and it has created a negative attitude in the community towards infrastructure development or anything related to it.

Figure 4.9 picture taken on field survey (April, 2014) around Autobis tera

The following quotes were recorded from anonymous pedestrians in the study areas.

Box 4.5 Safety: community feedback

"An old lady fell in one of the manholes and nearly died" (pedestrian from Pasteur)

"they left wires everywhere and the wires injured pedestrians" (pedestrian from Autobistera)

"with the ditches and the heavy equipment operating, I get so scared to cross the road" (a woman from Gojam berenda)

"sewerage lines blowup every time and they stink so much we are sick all the time"(pedestrian around Autobistera)

4.5.5 Effects on service providers

Besides the local residents, utility service providers and road authority are also victims of the absence of disintegrated infrastructure development works. Stakeholders incur a huge amount of unnecessary cost due to lack of coordination and communication among themselves. Among the most prominent problems of lack of coordination; repetition of works, delays in projects, unnecessary costs, accidents and injuries, decreased revenue due to service interruption, time disorder in execution of projects, property damages, customer dissatisfaction and lower service quality have been mentioned by stakeholders.

For instance ACCRA has paid 4,208,326.02 birr and 10,878,045.79 birr for relocation to Wingate – Enkulal Fabrica road project and Atikilt tera – Autobistera LRT projects respectively to ETC.

Findings on design preparation and use of master plan

- Interviews with experts also revealed that even if all service providers are obliged to refer the master plan while planning, the application is not commonly practiced in the city of Addis Ababa mainly due to the less emphasis given to utilities in the master plan, what is depicted in the master plan and the reality in the ground doesn't always match and there are places which are out of the master plan.
- It was found out that utility coordination mainly has been a reactive undertaking, often only occurring towards the end of a design project and the beginning of construction, rather than a proactive process that begins at project conception and early design stage.
- Apart from the master plan, each utility service provider as well as AACRA and ERC have their own manuals which they refer procedures and standards while preparing their designs but these manuals and standards are not common to all of them.
- It was also realized that utility service providers or AACRA do not communicate each other's plans or designs unless one asks the other during implementations. The usual trend is that they each prepare their own designs individually without referring to the others plans or designs then they go to the city administration for permission to implement what they have planned. Hence, there is no communication or coordination between service providers during designing which is more likely to create disparities and conflicts in the next stages.

Findings on the legal dimension of the problem

- The responses from experts of the legal departments of each institution revealed that there are no clearly stated rules or regulations or any legal conditions which suggest coordination among service providers at any stage so far. But there are legal conditions to hold stakeholders accountable for property and other damages occurred during construction in the form of compensations. This suggests that the rules and regulations are mainly reactive undertakings in which institutions claim and sue each other for compensations after the damages are done, rather than a proactive process which suggests those institutions to work in coordination beginning from project conception.

Findings on the current level of sectoral integration

- Regarding the current level of integration between service providers, it was agreed by all interviewees that the current status of integration among service providers is said to be low. However, there were an efforts made to introduce an integrated approach but were not successful due to various reasons such as lack of strong legal enforcement, lack of capacity, lack of interest and commitment of service providers, absence of responsible body to do the job and lack of long term plan which is practical on ground than on papers etc.
- Consequently, majority of the respondents from urban service providers as well as AACRA and ERC agreed that, there should be strong and independent governmental organization to coordinate the effort. While some other suggested that there should be a committee organized with representatives from each institution.

Findings on utility mapping and record

- It was found out that AACRA is the only institution which always uses surveying instruments to keep alignments which is likely one of the causes for the failure of service providers to accurately indicate the locations of their underground facilities.
- Interviewees from the three utility service providing institutions ascertained that even if the accurate location of the entire lines and other facilities are not known, almost every line, pipe or pole is registered either in hard or soft copies or both depending on the category.
- The experts from the operation department of AACRA on the other hand complained that the majority of construction delays are caused by the surprise discovery of underground utility lines which they did not receive any information about and they also said that they usually do not receive accurate information especially underground utility lines. This clearly implies that there is a lack of communication and coordination between the service providers.
- Among the main reasons indicated by experts from AACRA for the delays in project implementation is failure of utility providers to relocate their facilities on time. On the other hand, utility service providers complain that the time period they receive for

relocations is not sufficient because AACRA or ERC only care for the timely completion of their own projects.

Challenges and effects of relocations

- Among the challenges faced by utility service providers during relocations, shortage of poles, lack of supplies to replace damaged materials, limitations of human resource, shortage of time provided to relocate, lack of proper place to relocate the network, lack of cooperation from residents to relocate, shortage of materials, problems related with right of way, lack of equipment, lack of space to place poles and lines to relocate are the main were indicated during interviews.
- The possible effects of relocations were analyzed based on four categories. The first one being effect on the property such as lower quality and damages, the second category was to the local residents as to the frequent service interruption, effect on the quality of service was identified as the third and finally effects to the service providers such as unnecessary costs and wastage of other resources.
- The results from community survey suggests that residents of both the study areas do not receive announcements before services are cut while service providers argue that they always announce service cuts earlier unless service interruptions are caused due to line damages or relocations.
- It was found out that almost all of survey respondents are dissatisfied with complaint handling mechanisms of service providers especially EEPCo. They further complained that they have to bribe the technicians and employees of the corporation to get immediate responses. Especially business establishments are suffering from such problems.

Effects of poor sectoral integration

- Among the main problems of disintegrated urban infrastructure development works indicated by business owners and institutions; frequent service interruptions, property damage, time loss, loss of data, machinery damage, lower productivity and bankruptcy were rated as the most significant in both construction sites.
- Among the main problems faced by residents in the two study areas, the most significant once as indicated by the respondents are; additional transport costs, time loss, physical

injury, damaged property, increased incidence of dust induced lung diseases, traffic jams, lack of transport services, environmental pollution and noise pollution.

- Government utility offices as well as road and LRT construction authorities incur a huge amount of unnecessary cost due to lack of coordination and communication among themselves. Moreover, among the most prominent problems of lack of coordination; repetition of works, delays in projects, unnecessary costs, accidents and injuries, decreased revenue due to service interruption, time disorder in execution of projects, property damages, customer dissatisfaction and lower service quality have been mentioned by service providers.

Findings on safety

- Field observations revealed that there are no signs or other measures taken by the contractors or ACCRA in both construction sites to keep residents and pedestrians out of the construction corridor. Furthermore, utility service providers leave their wires everywhere and ditches filled with sewer wastes unprotected.
- Interview with AACRA revealed that there are no appropriate measures undertaken to ensure the safety of people from accidents caused by machinery and from falling in to trenches. Consequently, almost all of the survey respondents from both case study areas agree that the current environment is not safe at all either for children or disabled people. Some of them even ascertained it not safe for anyone let alone children and disabled people.

5.2 Conclusions

The overall objective of this research was to make an overall assessment of the causes and consequences of the absence or low level of inter sectoral linkage in infrastructure development works of Addis. The aim was to identify the root causes for the absence of institutional coordination in urban infrastructure development works, and to examine the economic, social and environmental effects of the problem on local residents, institutions and the nation at large and possible lessons that could be learnt.

With this in mind, both primary and secondary data were exhausted to come up the following conclusions.

In relation to the first objective, the existing level of integration among stakeholders was confirmed to be poor. Different budget sources and institutional structure were found as one of the causes for the loose integration among stakeholders.

The second objective of the study was to identify the root causes of the problem. From the designing dimension, it was found out that stakeholders design their own projects independently and do not communicate their designs with each other unless one asks or construction is started. Moreover, there are no standards or manuals which are common to all stakeholders.

Lack of clearly stated rules or regulations or any legal conditions which suggest coordination among service providers were also found to be causes for the lack of strong integration between stakeholders. The findings also confirmed that there is still loose communication during implementation due to lack of accurate information about the location, size and type of utility lines and negligence and carelessness of service providers to communicate. In general lack of strong legal enforcement, lack of capacity, lack of interest and commitment of service providers, absence of responsible body to do the job and lack of long term plan were identified as the root causes for the absence of inter sectoral integration.

The third objective was to identify the economic, social and environmental effects of the absence of inter sectoral integration. The economic effects on service providers are characterized by property damages, high cost of compensation, cost of carrying out repairs and relocations, cost for any temporary service arrangements necessary, and the possible loss of "product" and revenue reduction during service interruptions. Effects on utility customers include, frequent service interruptions, business may be stopped and data lost, and for industrial properties production may be halted and machinery damaged, low productivity, decrease in number of customers, low profit etc. the second most important effect is the social effect which can be characterized as lost time, business opportunities and additional fuel consumption, spoiling of food because of refrigeration failure, injuries and traffic accidents, traffic congestion, safety hazards and lack of transportation access. The third broad effect is environmental. Hygiene problems may arise because of water supplies being contaminated, sewage backing up, flooding and storm water inundation, noise pollution, air pollution, and dust induced lung diseases are identified by the study.

For operation/implementation department

1. What are the main responsibilities of your department?
2. How did you keep the alignments to follow the street standards?
   (Using surveying instruments, with a simple rope, rod and measuring tape)
3. Do you communicate with the other stakeholders during implementation (operation)?
4. With which one of utility service providers does your institution has better integration? Why?
5. Do you record and notice if your organization damages the others utility?
6. How long is the standard time that your institution provides for utility relocations?
   For electric pole or line relocation .....
   For telephone pole or line relocation .....
   For water supply line relocation .....
7. Which utility provider is the most delaying in relocations?
8. What are the main reasons for the delay in project implementation?
9. How often do you receive information from utility service providers regarding the location of utility lines and other underground infrastructures?
10. How sufficient is the information you get form utility service providers regarding the size, type and location of utility lines?
11. What are the major problems your agency is facing due to the disintegrated way of infrastructure construction works?

injury, damaged property, increased incidence of dust induced lung diseases, traffic jams, lack of transport services, environmental pollution and noise pollution.

- Government utility offices as well as road and LRT construction authorities incur a huge amount of unnecessary cost due to lack of coordination and communication among themselves. Moreover, among the most prominent problems of lack of coordination; repetition of works, delays in projects, unnecessary costs, accidents and injuries, decreased revenue due to service interruption, time disorder in execution of projects, property damages, customer dissatisfaction and lower service quality have been mentioned by service providers.

Findings on safety

- Field observations revealed that there are no signs or other measures taken by the contractors or ACCRA in both construction sites to keep residents and pedestrians out of the construction corridor. Furthermore, utility service providers leave their wires everywhere and ditches filled with sewer wastes unprotected.
- Interview with AACRA revealed that there are no appropriate measures undertaken to ensure the safety of people from accidents caused by machinery and from falling in to trenches. Consequently, almost all of the survey respondents from both case study areas agree that the current environment is not safe at all either for children or disabled people. Some of them even ascertained it not safe for anyone let alone children and disabled people.

5.2 Conclusions

The overall objective of this research was to make an overall assessment of the causes and consequences of the absence or low level of inter sectoral linkage in infrastructure development works of Addis. The aim was to identify the root causes for the absence of institutional coordination in urban infrastructure development works, and to examine the economic, social and environmental effects of the problem on local residents, institutions and the nation at large and possible lessons that could be learnt.

With this in mind, both primary and secondary data were exhausted to come up the following conclusions.

In relation to the first objective, the existing level of integration among stakeholders was confirmed to be poor. Different budget sources and institutional structure were found as one of the causes for the loose integration among stakeholders.

The second objective of the study was to identify the root causes of the problem. From the designing dimension, it was found out that stakeholders design their own projects independently and do not communicate their designs with each other unless one asks or construction is started. Moreover, there are no standards or manuals which are common to all stakeholders.

Lack of clearly stated rules or regulations or any legal conditions which suggest coordination among service providers were also found to be causes for the lack of strong integration between stakeholders. The findings also confirmed that there is still loose communication during implementation due to lack of accurate information about the location, size and type of utility lines and negligence and carelessness of service providers to communicate. In general lack of strong legal enforcement, lack of capacity, lack of interest and commitment of service providers, absence of responsible body to do the job and lack of long term plan were identified as the root causes for the absence of inter sectoral integration.

The third objective was to identify the economic, social and environmental effects of the absence of inter sectoral integration. The economic effects on service providers are characterized by property damages, high cost of compensation, cost of carrying out repairs and relocations, cost for any temporary service arrangements necessary, and the possible loss of "product" and revenue reduction during service interruptions. Effects on utility customers include, frequent service interruptions, business may be stopped and data lost, and for industrial properties production may be halted and machinery damaged, low productivity, decrease in number of customers, low profit etc. the second most important effect is the social effect which can be characterized as lost time, business opportunities and additional fuel consumption, spoiling of food because of refrigeration failure, injuries and traffic accidents, traffic congestion, safety hazards and lack of transportation access. The third broad effect is environmental. Hygiene problems may arise because of water supplies being contaminated, sewage backing up, flooding and storm water inundation, noise pollution, air pollution, and dust induced lung diseases are identified by the study.

REFERENCES

Alain Bertaud (2013) The use and value of urban planning, HYPERLINK "HTTP://alain-bertaud.com" HTTP://alain-bertaud.com.

Arenas, A. G. (n.d.). Analysis of Infrastructure provision in low-income. MASTER OF SCIENCE THESIS NR 02-002 ISSN 1651-0194.

Central Statistical Office (2006) Statistical Abstract, January 2007. Addis Ababa.

David Pickering, J. M. (1993). utility mapping and record keeping for infrastracture. Washington D.C.: World Bank.

Gray, D. (2009) *Doing Research in the real world,* London: SAGE Publications Ltd.

Goodbee and Associates, (2012). Retrieved December 25, 2013, from WWW.GOODBEEASSOC.COM

Hailemariam Mulugeta (2001). The Intra and Inter Sectoral Integration of Urban Services planning, with particular emphasis of Road, Water and Sewerage, Telecommunication and Power Supply: The case of Inner city, Addis Ababa, Master Thesis, UDMT

http:// HYPERLINK "http://www.aawssa.gov.et" www.aawssa.gov.et , visited on July 2013

Ian D. Bishop, F. E. (n.d.). SPATIAL DATA INFRASTRUCTURES FOR CITIES IN DEVELOPING COUNTRIES: LESSONS FROM THE BANGKOK EXPERIENCE. 4.

Illinois APWA (2010). Utility Coordination For capital improvements project Best Management Practices, Bureau of Design and Environment, Manual Chapter Six Utility Coordination.

Knaap, G. & Talen, E., 2003. 'Infrastructure Finance and Urban Development in Illinots': Does Negotiation Exacerbate sprawl?' Ennis Frank (ed.) .Infrastructure Provision and the Negotiating process. MPG Books Ltd, Bodmin, Cornwall, p.155.

MaineDot. (2013). Local Project Administration Manual & Reference Guide. *utility coordination.*

Mathewos. (2006, September). INTEGRATED URBAN INFRASTRUCTURE AND SERVICES PLANNING MANUAL. *MINISTRY OF WORKS AND URBAN DEVELOPMENT*. Addis Ababa: Federal Urban Planning Institute.

Meheret Ayenew, December, 1999: The City of Addis Ababa: Policy Options for the Governance and Management of a City with Multiple Identities, FSS Discussion Paper No. 2 Forum For Social Studies, Addis Ababa

Ministry of Works and Urban Development (2006). Cities infrastructure development MoFED (March, 2012). Ethiopia:

Growth and Transformation Plan (GTP) 2010/11-2014/15, Federal Democratic Republic of Ethiopia (FDRE), Addis Ababa, Ethiopia.

MoFED (November, 2010). Ethiopia: Growth and Transformation Plan (GTP) 2010/11-2014/15, Federal Democratic Republic of Ethiopia (FDRE), Addis Ababa, Ethiopia.

Mulugeta, H. (2011, June). The Intra and Inter Sectoral Integration of Urban Services planning, with particular emphasis of Road, Water and Sewerage, Telecommunication and Power Supply: The case of Inner city, Addis Ababa. Addis Ababa University . Addia Ababa.

Nwuba, C. C. (November 2010). Planned and Integrated Approach to Maintenance of Urban Infrastructure in Nigeria. Environ-Tech Vol. 1 No 1,.

Neutz, M (1997) Funding Urban Services: Options for Physical Infrastructure, Allen & Unwin, Sydney.

PERTH, G. (August 2003). INFRASTRUCTURE COORDINATION. Perth, Western Australia: Western Australian Planning Commission, Albert Facey House, 469 Wellington Street.

Tellis. W, (1997) 'Application of a case study methodology'. The qualitative report, http:/www.nova.edu/ssss/QR/QR3-3/tellis2.html

Yirsaw Zegeye (2012). The problem of urban infrastructure provision in Ethiopia: The case of Bahirdar city, MSC Thesis, urban design and development

Zhanmin Zhang and W. Ronald Hudson. (1998). DEVELOPMENT OF AN INTEGRATED INFRASTRUCTURE MANAGEMENT SYSTEM. 4th International Conference on Managing Pavements, 2-3.

Appendix A

Interview Questions for AACRA

Addis Ababa University
School of Graduate Studies
Collage of Development Studies
Urban Development and Management Masters Program

This study is being undertaken as part of the requirements for the Master of urban development and management. The overall purpose of the project is to understand the Impact of Inter Sectoral Linkage in Infrastructure Development Work particularly Road and Light Rail Construction in Addis Ababa. Representatives from institutions, agencies and organizations that have direct relation with the issue under review are being sought and your organization happens to be one of them. Organizational, not personal views are being sought.

While organizations may be identified, no individual will be named in the published data. There are no known risks or immediate benefits associated with taking part or not taking part in the interview or filling questionnaires.

The data is being collected for the purpose of the completion of a thesis research project which is required for completion of the Master of Planning degree. Only the student researcher (Mahlet Gebreegziabher) and the academic supervisor (Dr. Wondimu Abeje) will have access to the raw data.

The results of the project may bc published and will be available in the University of Addis Ababa (Akaki campus). You are most welcome to request a copy of the results of the project should you wish.

Thank you very much for your participation!

For design department

1. What are the main responsibilities of your department? Please elaborate
2. Who prepares the plans/designs of new road projects in Addis Ababa?
3. Are your plans/designs in line with the master plan of the city?
4. For how long do you usually plan?
5. Are there any procedures or standards you follow while planning?
6. Are these standards common for all utility service providers, AACRA and ERC?
7. Are you aware of the other stakeholders' plans?
8. Do you communicate your agencies plan with the other stakeholders?
9. If yes when do you usually communicate?
10. What mechanisms do you usually use to communicate your plan with the other stakeholders?

11. Are there any mechanisms where utility service providers, AACRA and ERC plan together?

    If yes please elaborate

12. Level of integration with utility service providers

	high	Medium	low	None
EEPCo				
ET				
AAWSA				

13. Are/were there any efforts made to introduce integrated approach for infrastructure development between stakeholders?
14. If your answer is yes, were they successful?
15. If your answer to the above question is no, what do you think are the reasons for the failure?
16. Does your institution have future objectives for institutional coordination?
    If yes, please state
17. Major problems faced by your institution as a result of the disintegrated way of infrastructure development works
18. Who should take the responsibility to coordinate? Why?

For legal department

1. What are the main responsibilities of your department?
2. Are there any rules or regulations or any legal conditions which suggest coordination among stockholders? Please explain
3. Are there any legal conditions to hold stakeholders accountable for property and other damages occurred during construction? Please explain if any
4. How would you rate these conditions?
5. How content are you with enforcement mechanisms of those rules and regulations?
6. Are there any legal conditions for households or business establishments to claim compensation for damaged properties?
7. Would you please explain the legal procedures for claiming compensation for damaged or lost properties among stakeholders?
8. Who should take the responsibility to coordinate? Why?
9. Have your institution ever been sued by the other stakeholders (utility service providers) for property damage?
10. Has your institutions claimed utility service providers for delays in relocation (in birr)
11. How often do you get complaints related with corruption or bribes against technicians?

For operation/implementation department

1. What are the main responsibilities of your department?
2. How did you keep the alignments to follow the street standards?
   (Using surveying instruments, with a simple rope, rod and measuring tape)
3. Do you communicate with the other stakeholders during implementation (operation)?
4. With which one of utility service providers does your institution has better integration? Why?
5. Do you record and notice if your organization damages the others utility?
6. How long is the standard time that your institution provides for utility relocations?
   For electric pole or line relocation .....
   For telephone pole or line relocation .....
   For water supply line relocation .....
7. Which utility provider is the most delaying in relocations?
8. What are the main reasons for the delay in project implementation?
9. How often do you receive information from utility service providers regarding the location of utility lines and other underground infrastructures?
10. How sufficient is the information you get form utility service providers regarding the size, type and location of utility lines?
11. What are the major problems your agency is facing due to the disintegrated way of infrastructure construction works?

4. With which one of utility service providers does your institution has better integration? Why?
5. Do you record and notice if your organization damages the others lines and properties?
6. Are the size, type, location and other information of your facilities documented and available?
7. If your answer to the above question is yes, in what format?
8. Do you announce service cuts earlier to your customers?
9. What are the main reasons for the frequent service interruptions in the city?
10. What are the main reasons for the frequent service interruptions in Wingate to Enkulal Fabrica road project and Atikilt tera to Autobis tera LRT project
11. How long is the standard time that your institution receives for utility line relocations?
12. Do you think it is sufficient (time period) to relocate your properties?
13. What are the main reasons for delays in relocation?
14. What are the possible effects of relocation on:
    - The properties .....
    - Quality of service .....
    - Urban dwellers .....
    - The service provider .....
15. What are the major challenges you face during relocation?
16. Do your service or network lines serve the time period they are planned to serve? If No Why?
17. Do you have any follow up or controlling mechanism to make sure weather your properties are providing the necessary service and are in a good status to consistently do so?
18. If your answer to the above question is yes, how often do you monitor the status of your properties?
19. Who is your institution accountable to?
20. Who is your source for capital budgets for line installations?
21. What are the major problems your agency is facing due to the disintegrated way of infrastructure construction works?
22. What measures have been taken by the agency to solve these problems?

Appendix D

Survey of community members (households)

Addis Ababa University
School of Graduate Studies
Collage of Development Studies
Urban Development and Management Masters Program

This questionnaire is designed to collect information regarding the Impact of Inter Sectoral Linkage in Infrastructure Development Work particularly Road and Light Rail Construction in Addis Ababa to fulfill the requirements of the Master of urban development and management specialization in Urban Environment and Livelihood. The result of this questionnaire will be utilized for research purpose only.

To this end, we kindly request that you complete the following short questionnaire regarding the stated objective. It will take no longer than 10 minutes of your time. Your response is of the utmost importance to the researcher.

Therefore, your genuine, honest, and prompt response is a valuable input for the quality and successful completion of the project.

There are no known risks or immediate benefits associated with taking part or not taking part in the questionnaires.

Thank you for your participation!

1. Location _____
2. How do you rate the conditions of water services before the construction works
   A. Excellent B. Very good C. Good D. Bad E. Very bad
3. How do you rate the conditions of water services after the construction works
   A. Very good B. Good C. Bad D. Very Bad E. No change
4. How often does water service gets cut
   A. Very often B. Often C. Sometimes D. Occasionally E. Rarely
5. For how many days /weeks/ was the longest water service outage? _____
6. In what ways have the frequent water service cuts affected you?
   .....
7. How do you rate the conditions of electric power services before the construction works
   A. Excellent B. Very good C. Good D. Bad E. Very bad
8. How do you rate the conditions of electric power services after the construction works
   A. Very good B. Good C. Bad D. Very Bad E. No change

9. How often does electric power service get interrupted?
   A. Very often B. Often C. Sometimes D. Occasionally E. Rarely
10. For how many days or weeks was the longest electric power service outage? _____
11. In what ways have the frequent electric power service cuts affected you?

    .....

12. How do you rate the conditions of telecommunications (Network) services before the construction works
    A. Excellent B. Very good C. Good D. Bad E. Very bad
13. How do you rate the conditions of telecommunications (Network) services after the construction works
    A. Very good B. Good C. Bad D. Very Bad E. No change
14. In what ways have the frequent telecommunication (network) service interruptions affected you? .....
15. Do you receive any announcements on mass media before the services are cut?

	Always	Sometimes	Rarely	Never
EEPCo				
ET				
AAWSA				

16. How do you raise your complaints?
    A. through phone calls
    B. by going to the offices in person
    C. through mass Medias
    D. other .....
17. Do you think employees of utility service providers are corrupted?

	Yes	No	Don't know
EEPCo			
ET			
AAWSA			

18. How often do you get immediate responses to your complaints?
    A. Always B. Sometimes C. Rarely D. Never
19. How content are you with the complaint handling mechanisms of:

	Very satisfied	Satisfied	Not satisfied	dissatisfied
EEPCo				
ET				
AAWSA				

20. Significance level of challenges faced due to the construction works?

	Most significant	significant	Less significant	Not significant
Additional transport costs				
Time loss				
Physical injury				
Damaged property				
Inspiratory disease				
Traffic jams				
Lack of transport services				
Environmental pollution				
Noise pollution				

Others please specify .....

21. The extent which the current environment is safe to children

A. Safe B. Not safe C. Dangerous D. Very dangerous

22. The extent which the current environment is safe to disabled people

A. Safe B. Not safe C. Dangerous D. Very dangerous

23. What is not safe about the environment/the construction area, road, utility lines, etc. /?

.....

Appendix B

Interview Questions for utility service providers

Addis Ababa University
School of Graduate Studies
Collage of Development Studies
Urban Development and Management Masters Program

This study is being undertaken as part of the requirements for the Master of urban development and management. The overall purpose of the project is to understand the Impact of Inter Sectoral Linkage in Infrastructure Development Work particularly Road and Light Rail Construction works in Addis Ababa. Representatives from institutions, agencies and organizations that have direct relation with the issue under review are being sought and your organization happens to be one of them. Organizational, not personal views are being sought.

While organizations may be identified, no individual will be named in the published data. There are no known risks or immediate benefits associated with taking part or not taking part in the interview or filling the questionnaire.

The data is being collected for the purpose of the completion of a thesis research project which is required for completion of the Master of Planning degree. Only the student researcher (Mahlet Gebreegziabher) and the academic supervisor (Dr. Wondimu Abeje) will have access to the raw data.

The results of the project may be published and will be available in the University of Addis Ababa (Akaki campus). You are most welcome to request a copy of the results of the project should you wish.

Thank you very much for your participation

For design department

1. What are the main responsibilities of your department? Please elaborate
2. Who prepares the plans/designs of your institution?
3. Are your plans/designs in line with the master plan of the city?
4. Does the master plan or physical plan give adequate emphasis for utilities?
5. For how long do you usually plan?
6. Are there any procedures or standards you follow while planning?
7. Are these standards common for all utility service providers, AACRA and ERC?
8. Are you aware of the other stakeholders' plans?
9. Do you communicate your agencies plan with the other stakeholders?
10. If yes when do you usually communicate?
11. How do you integrate your utility design with other sectors?

12. Level of integration with utility service providers

	high	Medium	low	None
EEPCo				
ET				
AAWSA				

13. Are/were there any efforts made to introduce integrated approach for infrastructure development between stakeholders?
14. If your answer is yes, were they successful?
15. If your answer to the above question is no, what do you think are the reasons for the failure?
16. Does your institution have future objectives for institutional coordination?
    If yes, please state
17. Major problems faced by your institution as a result of the disintegrated way of infrastructure development works
18. Who should take the responsibility to coordinate? Why?

For legal department

1. What are the main responsibilities of your department?
2. Are there any rules or regulations or any legal conditions which suggest coordination among stockholders? Please explain
3. Are there any legal conditions to hold stakeholders accountable for property and other damages occurred during construction? Please explain if any
4. How would you rate these conditions?
5. How content are you with enforcement mechanisms of those rules and regulations?
6. Are there any legal conditions for households or business establishments to claim compensation for damaged properties?
7. Would you please explain the legal procedures for claiming compensation for damaged or lost properties among stakeholders?
8. Who should take the responsibility to coordinate? Why?
9. Have your institution ever been sued by the other stakeholders (utility service providers) for property damage?
10. Has your institutions claimed utility service providers for delays in relocation (in birr)
11. How often do you get complaints related with corruption or bribes against technicians?
12. Amount compensated for utility service providers in the last three years
13. Amount compensated for utility service providers in the specific project areas

For operation/implementation department

1. What are the main responsibilities of your department?
2. How did you keep the alignments to follow the street standards?
3. Do you communicate with the other stakeholders during implementation (operation)?

Appendix E

Survey of business establishments and institutions

Addis Ababa University
School of Graduate Studies
Collage of Development Studies
Urban Development and Management Masters Program

This questionnaire is designed to collect information regarding the Impact of Inter Sectoral Linkage in Infrastructure Development Work particularly Road and Light Rail Construction in Addis Ababa to fulfill the requirements of the Master of urban development and management specialization in Urban Environment and Livelihood. The result of this questionnaire will be utilized for research purpose only.

To this end, we kindly request that you complete the following short questionnaire regarding the stated objective. It will take no longer than 10 minutes of your time. Your response is of the utmost importance to the researcher.

Therefore, your genuine, honest, and prompt response is a valuable input for the quality and successful completion of the project.

There are no known risks or immediate benefits associated with taking part or not taking part in the questionnaires.

Thank you for your participation!

1. Location _____
2. Type of business/institution _____
3. How do you rate the conditions of water services before the construction works
   B. Excellent B. Very good C. Good D. Bad E. Very bad
4. How do you rate the conditions of water services after the construction works
   B. Very good B. Good C. Bad D. Very Bad E. No change
5. How often does water service get cut?
   B. Very often B. Often C. Sometimes D. Occasionally E. Rarely
6. For how many days /weeks/ was the longest water service outage? _____
7. How do you rate the conditions of electric power services before the construction works
   B. Excellent B. Very good C. Good D. Bad E. Very bad
8. How do you rate the conditions of electric power services after the construction works
   B. Very good B. Good C. Bad D. Very Bad E. No change
9. How often does electric power service get interrupted?
   B. Very often B. Often C. Sometimes D. Occasionally E. Rarely

10. For how many days or weeks was the longest electric power service outage? _____

11. How do you rate the conditions of telecommunications (Network) services before the construction works

B. Excellent B. Very good C. Good D. Bad E. Very bad

12. How do you rate the conditions of telecommunications (Network) services after the construction works

B. Very good B. Good C. Bad D. Very Bad E. No change

13. How often do telecommunication services (network) get interrupted?

A. Very often B. Often C. Sometimes D. Occasionally E. Rarely

14. For how many days or weeks was the longest telecommunication network service outage? .....

15. Do you receive any announcements on mass media before the services are cut?

	Always	Sometimes	Rarely	Never
EEPCo				
ET				
AAWSA				

16. How do you raise your complaints?

B. through phone calls B. by going to the offices in person C. through mass Medias Other .....

17. How often do you get immediate responses to your complaints?

A. Always B. Sometimes C. Rarely D. Never

18. How content are you with the complaint handling mechanisms of:

	Very satisfied	Satisfied	Not satisfied	dissatisfied
EEPCo				
ET				
AAWSA				

19. Do you think employees of utility service providers are corrupted?

	Yes	No	Don't know
EEPCo			
ET			
AAWSA			

20. How do you rate your profit level after the construction work?

A. Increasing B. Decreasing C. No change D. Can't judge

21. How do you rate the number of customers after the construction work?

A. Increasing B. Decreasing C. No change D. Can't judge

22. Which service/s is your business/institution is highly dependent on?

A. Water services B. Electric power C. Telecommunications network

23. Main problems you faced due to the construction works:

	Most significant	significant	Less significant	Not significant
Service interruptions				
Property damage				
Time loss				
Loss of data				
Machinery damage				
Lower productivity				
Bankruptcy				

Others:

.....

24. What are the main problems you faced due to frequent interruption in service/s which your business/institution is highly dependent on?

.....

.....

25. Have you received compensations for property damages (if you had any)

A. Yes B. No C. Didn't claim

26. If your answer to the above question is No why?

.....

27. If your answer to question No 26 is 'didn't claim' why?

A. Don't know the legal procedures B. Bureaucracy C. Weak enforcement

Other .....

Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented or submitted partially or in full by any other person for a degree in any other university, and that all sources of materials used for the purpose of this thesis have been duly acknowledged.

Declared by:

Name: Mahlet Gebreegziabher

Signature _____

Date 20-06-2014

Confirmed by Advisor

Name: Wondimu Abeje (Ph.D.)

Signature _____

Date 25/6/2014