**ST. MARY'S UNIVERSITY**

**SCHOOL OF GRADUATE STUDIES**

# Challenges in Applying Integrated Project Management System on Urban Infrastructure Projects: The Case of Addis Ababa Road Projects, Major Utilities Projects and Infrastructure Regulatory Authority.

Master Thesis Proposal Submitted to the Department of Project Management for the Partial Fulfillment of the Requirements for the Award of Master of Arts (MA) Degree in Project Management

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# CHALLENGES IN APPLYING INTEGRATED PROJECT MANAGEMENT SYSTEM ON URBAN INFRASTRUCTURE PROJECTS: THE CASE OF ADDIS ABABA ROAD AND MAJOR UTILITIES PROJECT

**BY**

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**A THESIS SUBMITTED TO ST.MARY UNIVERSITY COLLEGE, SCHOLL OF GRADUATE STUDENTS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PROJECT MANGEMENT**

# ST. MARY'S UNIVERSITY

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# FACULTIES OF BUSINESS

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**BY**

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# List of Abbreviations and Acronyms

**AAIICPCA** Addis Ababa City integrated Infrastructure construction permit and control Authority

**AACRA** Addis Ababa City Road Authority

**AAWSA** Addis Ababa Water and Sewerage Authority

**FIIDCA** Federal Integrated Infrastructure Development Control Authority

**GIS** Geographical Information System

**ERP** Enterprise Resource Planning

**PPP** Public Private Partnership

**PMS** Performance Management System

**IMI** Integrated Management Information

**IMS** Infrastructure Management System

# ABSTRACT

*The purpose of this study is to assess the key challenge in the implementation of integrated infrastructure project management system among major utilities service providers, AACRA and AAIIPCA, in the case of Addis Ababa. The need for this study is considered relevant and necessary for Addis Ababa as a capital city of Africa and significant contribution in reducing the scarce resource wastage. Although, integrated infrastructure project management system is a complex task which requires appropriate organizational capacity and cooperation between numerous stakeholders in the private and public sectors .The study scope mainly encompasses institutional, technological, planning and strategic aspect to identify the key challenges. The study employed both quantitative and qualitative research approaches. Data were collected through questionnaires, interviews, documentary review, and observation. The results revealed that current institutional poor information and technological capacity and lack of central database the tools which support the accelerated and informed decision making and effective information and data exchange has become significantly challenge in implementing effective and integrated infrastructure project management system.*

**Key words;** *Integrated, Project management system, Performance management, Technology, Planning, Infrastructure*

# CHAPTER ONE

# 1. INTRODUCTION

## *1.1 Background of the Study*

The rapid urbanization presents many challenges. One of the most urgent is how to provide infrastructure solutions that can cope with the stress caused by this massive expansion of populations in concentrated spaces (Thomas, 2017). Cities must build, maintain, and upgrade extensive transport, power, water and telecommunication networks, in order to keep up with the demands of economic development and population growth. Those infrastructures are necessary to continue to progress societies and improve living standards.

Infrastructure is a network of interrelated basic facilities and services that provides an adequate environment for human living. A city infrastructure is a system of connected utilities, basic facilities, and services of that city, from the smallest units of the community (houses) to the significant city structures and buildings that render services such as electricity, telecommunication, sewage and sewerage and water supply (Oluwole, 2017). Infrastructure project includes construction, installation, maintenance, upgrading -or rehabilitation of undertaken by the relevant implementing organanization (Mathewos Consult, 2006). Those infrastructure projects are not end up in themselves. Rather, their importance to the economy and the society as a whole derives from the service they offer: the opportunity to improve productivity or reduce cost (Roelich, 2014). Although the real output of infrastructure is service: the movement of people and goods, the provision of clean water, enables communication and exchange of information, electric supply and so on. Moreover, infrastructure encompass those activities without which there would be limited economic activity .In particular, most pubic works infrastructure projects share several charactestics : (1). high fixed costs (capital intensive), (2) a long economic life (3) dominate local markets (4) interaction with other infrastructure (James, 2015).

Projects Integration management involves making adjustments among the various objectives and supervising the interdependencies which exists between the knowledge areas (Invensis, 2017).

The concept as the Integrated Infrastructure Management System is as a computer-based management tool that will apply advanced information collection and management technologies to provide more efficient, accurate, and effective bases for making decisions about infrastructure. The IIMS will combine inventory, condition assessment, predictive modeling, scenario development, and user-friendly information-access capabilities (Andrew, 2008). According to Andrew (2008), a growing body of studies is helping professionals and policy-makers to

understand that infrastructure exists as an interconnected system, and that this system's efficient functioning is crucial to our environmental quality, economic well-being, and quality of life in general.

According to (Halfway, 2008) challenges and characteristics that needed solution for integrated infrastructure management system must support three main requirements: (i) efficient coordination and information flow between inter-dependent processes; (ii) efficient integration and management of infrastructure lifecycle data, within municipal departments and across utilities provider, in a unified and interoperable environment that maximizes the reuse and sharing of data; and (iii) integration of various software applications through the use of an open and modular software architecture. Satisfying these requirements would require addressing three main challenges: (i) the process systematization and coordination challenge, (ii) the data integration challenge, and (iii) the software integration challenge. Solutions to these challenges should be based on proper understanding of the organizational and operational aspects of municipal infrastructure management, as well as on an accurate characterization of the methods and technologies currently used to support various processes.

Therefore, it is crucial to acquire an integrated infrastructure development management system especially for infrastructure project: by pursuing such objective, when planning new infrastructure development and rehabilitation of existing utilities networks. And, it is possible to get advantages over such efficient scarce resource utilization, maintaining a high service level and minimizing the life cycle costs, the impact on environment, and the disruptions to traffic. Despite, integration in construction and maintenance of linear infrastructure is difficult, indispensable task which are characterized by ensuring the optimum use and management of scarce resources requires the application of sound strategies while at the same time, addressing a variety of constraints and challenges, for developing the infrastructure projects. Moreover, two primary benefits of integration: helps a utility to more effectively and strategically align improvements across a full range of management areas and enables a utility to leverage the continual improvement management infrastructure (Us environmental protection agency, 2007)

## *1.2 Statement of the Problem*

Addis Ababa, is a capital city of Ethiopia and, the city's population growth has radically increased and becoming much more dependent on major utilities infrastructure .And also, as the place where Africa Union sit and many international diplomats' residence providing quality utilities service is critical, for countries economic growth, by attracting Tourist and investment to the city and enhancing social status. Despite, the city faces big challenge arises from lack of

implementing the infrastructure development in an integrated way between Addis Ababa City Road Authority and major utilities provider.

As (Desta, 2017) recent disclosure, splashing billions of Birr and crafting development oriented policies, but lack of integration among different utility providers resulting in project delays and capital inflation besides creating chaos on the day to day activities."Utility services provider and other organization behind construction usually get each other's throats criticizing for damage caused dismantling each others' facilities while working on their respective projects"

Some previous study focus , as (Hailmareyam, 2011) indicated that despite the regulatory agency role is crucial and significant in reducing economic and engineering damage caused by lack of integration; as well as preparing ahead plan to new road and utilities to avoid further damages, but there is still frequent damages on road and utilities infrastructure. Some previous studies such as (Mahlet, 2014), (Shimeles, 2007) and (Yirsaw, 2012) ; reveal the existing practiced infrastructure integration management system is very poor ;municipalities are facing unprecedented challenges in the management of infrastructure assets due to the increasing number of aging infrastructure assets, the ever-increasing demand and sustainability requirements, increasing maintenance deficit, and declining or static maintenance budgets in relation to Addis Ababa City infrastructure development projects.

Therefore, purpose of this research is mainly to understand the existing city infrastructure integrated management practice and investigate the potential challenges from currently utilized tools and technology. Since, the above mentioned studies have gaps in showing what challenges the infrastructure project integration from the tools and technology respective.

## *1.3 Research Questions*

The study is going to be guided by the following research questions:

- What are the critical challenges for the effective implementation of integrated project management system for Addis Ababa city's infrastructure project?
- What are the tools being used for big data management and information exchange.

## *1.4 Research Objective*

### 1.4.1 General objective

The overall aim of the study is to assess and explore the existing challenge in applying the integration management system on infrastructure projects in Addis Ababa.

### 1.4.2 Specific Objectives

Specifically, the study tries to address the following key research objectives:

- To assess the practice of integrated project management system in infrastructure projects in Addis Ababa.
- To describe the challenge of implementing integrated infrastructure project management system among utility services providers(ethio telecom, ethio electric, AAWSA), Addis Ababa road project and infrastructure integration, permit and control authority.

## *1.5 Scope and Limitations of the Study*

This study focus to look through the fragmented infrastructure of new project, maintenance, rehabilitation and expansion projects and the system which are practiced by each utilities provider. Since, most fundamental concepts of integration management system emphasizes the necessity of integration and coordination among concerned actors at different hierarchal levels including the strategic, operational and technical level, as well as on an accurate characterization of the methods and technologies currently used to support various decision making processes (Andrew, 2008). And also due to strong interdependencies between information needs of various level inter and intra infrastructure sectoral support in the process of maintenance planning, budgeting and the operational and tactical management decision making, the study concerned in information exchange, communication and data management system in getting access to reliable, usable and timely information in the public and government authorities' domain.

This study will be carried out under the limitation of very few previous research studies published on the local context, limited access and availability actual historical data and the project complexity and multi-stakeholder and actors. Moreover, the common time and financial limitation are taken into consideration.

## *1.6 Significance of the Study*

This study is intended to explore the existing challenges which become barrier for the successful implementations of integrated project management system infrastructure projects in Addis Ababa

city. Integrated project management system is believed to bring efficiency and effectiveness of project management performances in reducing scarce resource wastage and avoiding frequent city road cut and to enhance quality utility service, contribution to city's growth development. Thus, this study tries to pinpoint by doing so it contributes the prevailing challenges that are confronting the technical, and operational collaborations among project implementing entities and suggest ways to ameliorate the challenges.

## *1.7 Organization of the Thesis*

This thesis will be organized with the preliminary pages of the thesis document consisted of the title page, approval sheet; acknowledgment, abstract, table of content; list of figures, tables and acronyms. The body part accounted five chapters, within each chapter there is different but interrelated subtopics. The first chapter contains the introduction part which comprised the background information, problem statement, objectives, Research questions, significance, scope, limitation, organization and description of the study area. The second chapter consisted of the literature review part. The third chapter is the research material and methods which covers the research methodology, research design, data source, data type, data gathering tools, data analysis and data presentation. The fourth chapter is the results and discussion part of the study which concerned about data presentation and discussions. This documented the analysis of the primary and secondary facts with the qualitative study approach. The last chapter provided the conclusion and recommendation of the study.

# CHAPTER TWO

# 2 REVIEW OF RELATED LITERATURE

## *2.1 Theoretical Review*

It is a general fact that integration is a process of bringing different tasks in to one harmonized system which seems very difficult and impractical.

### 2.1.1 The Concept of Integrated Management System

Integration involves analyzing project business value at the high level; mobilizing team performance and dynamics; monitoring projects to assure midstream adjustment and project recovery; resolving technical, resource, and interpersonal conflicts at every level; managing program interfaces and multitasking; identifying organizational constraints and exploiting them; keeping tabs on accountability; and reporting to avoid ethical and waste problems (Shimeles, 2007).

Integration means to look at all circumstances that might affect the plan or project in a holistic manner (Geyer 2006:2).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 (Oluwole, 2017). 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 l in order to achieve as given set of objectives (MATHEWOS Consult, 2006).

There are two types of integration and they are both essential success factors, particularly in a multi-project program environment. They are vertical and horizontal integration. Vertical integration looks inside and up and down into the business, program, project, and product service components. This kind of integration targets the program, project, and product, and builds a product or service with integrity. It looks downstream in the project process to product performance and customer satisfaction. Horizontal integration looks outside and around to the external, the environmental, and the organizational assets that support the project. It focuses on outside forces that create risk and opportunity, market forces that will shape the product or service. Vertical integration is program integration; it proceeds down the project, going deep into the project processes and product configuration. It focuses on performance. Vertical integration

is related to horizontal integration in the sense that a project that reflects outside factors and environmental scanning (Bruce, 2006).

Integration may take three forms (MATHEWOS Consult, 2006), which are: (1) 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),(2) Integration between infrastructure entities (inter-sectoral integration); integration between different sectors/infrastructure entities. and (3) 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. Data integration is defined as "the process of combining or linking two or more data sets from different sources to facilitate data sharing, promote effective data gathering and analysis, and support overall information management activities in an organization" (FHWA 2001). The main benefits of data integration and sharing include data availability/accessibility; timeliness; accuracy, correctness, and integrity; consistency and clarity; completeness; reduced duplication; faster processing and turnaround time; lower data acquisition and storage cost; informed and defensible decisions; and integrated decision-making (FHWA 2001).

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. The municipality must ensure that when the projects are identified they must be in line with the objectives and strategies of the municipality. The project must also be in line with the resource framework, and comply with the relevant legal requirements. The integration phase creates an opportunity for the municipality to harmonize the project in terms of content, timing and location, in order to arrive at the consolidated and integrated programme (lDP Guide Pack: 2001:16.).

(IDP Guide Pack: 2001:16.) The output of integration is an operational strategy which includes:

- Five-year financial plan.
- Five-year capital investment programme.
- An integrated spatial development framework.
- Integrated sectoral programmes.
- Consolidated monitoring/performance management systems.

- Institutional plan.

Reference to sector plans.

According to (Zamin.Z, 1998),traditionally, separate divisions within utilities service providers or public works agency use different management systems. Most systems were developed and operated originally as stand-alone applications specific systems. The data structures vary from one system to another, ranging from simple flat files to sophisticated relational databases. The incompatibility among these systems has caused serious problems in data sharing and management cooperation needed by various units at all levels. To solve this problem, integrated systems have been proposed by many researchers (Zhang 94, Hudson 94, NCHRP 94, Zhang 96, Hudson 97). In addition to these, 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. The concept of an integrated infrastructure management system is illustrated in Fig.2.1, where GIS is the integration platform using geographical location as the integrator of infrastructure management system.

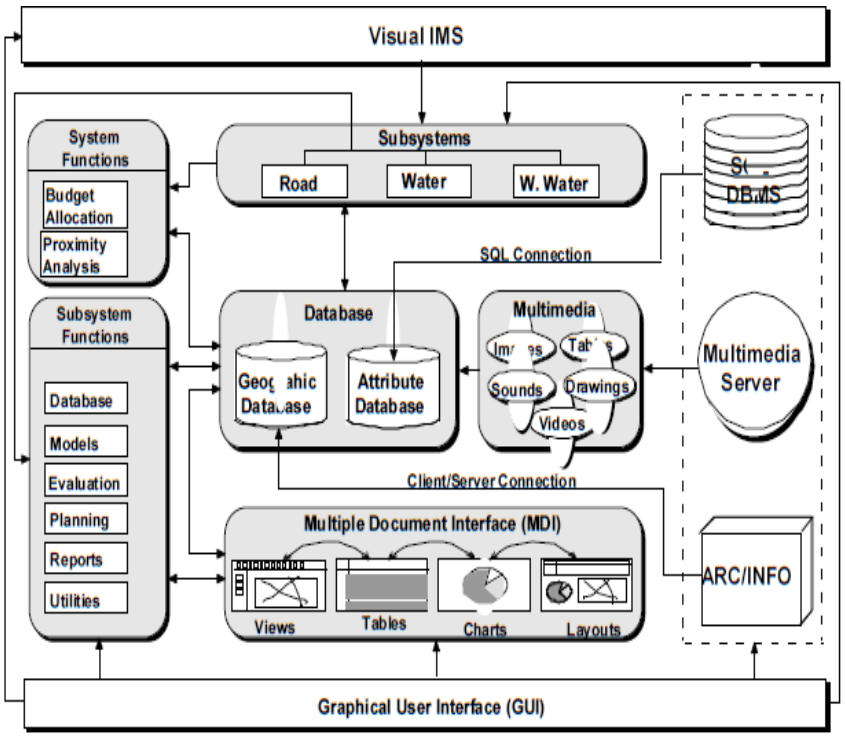


**Fig.2. 1 System Functional Framework Design for IMS**

Source ; Zamin.Z, (1998)

According to Zamin (1998) made his conclusion on advantage of using integrated information system

1. A new generation of infrastructure management system (IMS) is emerging to improve many aspects of traditional management systems. Among other things, the new generation of IMS is characterized with a higher level of integration, automation, and visualization.
2. Integrated information and management systems offer potential solution for more effective management of infrastructure systems. An integrated system is not only an excellent mechanism to meet the demands of data sharing and information exchange, but also helps administrators and engineers to achieve optimal decisions by coordinating all management activities among related subsystems.
3. Although the integration of infrastructure management systems can be accomplished with different mechanisms, GIS is one of the most desirable integration platforms. In addition, GIS can coordinate data from different databases and integrate traditional attribute data with spatial data to perform sophisticated spatial analysis.
4. Emerging technologies in data collection, processing, communications, analysis, and display can significantly improve the practice of infrastructure management. Multimedia, client-server architecture, and GPS are the most important ones. With proper integration and configuration, these technologies can make an IMS handle a wide variety of data visually, analyze them spatially, and present the results graphically, in a distributed computation environment.
5. The concept of generic models is practical for developing decision support systems for infrastructure management. Since Visual IMS is a general system rather than an application-specific system, generic models are used so that the system can be customized and implemented by many agencies. Users can easily modify generic models by changing parameters to reflect their local experience and practices while the structure of the model remains unchanged. The major decision models in Viusal IMS are generic in nature feature graphical model editors for easy and interactive model modifications.

### 2.1.2 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 (Zahmin.Z, 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.

### 2.1.3 Project Alignment and Integration

This phase deals with harmonization of the identified plans and projects with the municipality's objectives and strategies, the resource framework and legal requirements. It will examine the different sector plans and how they integrate to drive the municipality's development programme and other sector department's programmes such as the Local Economic Development, Spatial Development Framework, Disaster Management Plan, Institutional Plan, Sector Plans etc. Since the municipality will be amalgamating, the attempt will be to harmonize the existing plans starting with internal administrative plans followed by Sector Plans (DPLG, 2007).

### 2.1.4 Infrastructure Project Management System

The primary goal of an infrastructure management system is to reach and manage defined, updated and reliable data on the physical and performance characteristics of infrastructure assets, in order to allow the user a simple, quick and efficient access to data, by means of which to detect and predict the performance levels given by infrastructures, to plan the maintenance works and to allocate financial resources (Us enviromental protection agency, 2007). In particular, the necessity to share territory information among all subjects involved in the technology networks. Within the international context, it emerges the development of experiences aiming at overcoming such condition by means of a change in the geographic information sciences based on the development of open and distributed systems (Sivo, 2010). Integration management represents one of the most crucial requirements to guarantee a coordinated management, even though the problem of information system integration and interface is still one of the most difficult to overcome. It is a matter of fact that information technologies represent a crucial part in any supporting decisional tool within asset management (Sivo, 2010); an efficient data management becomes indeed a key element for the improvement of the decisional process related to municipal infrastructure management.

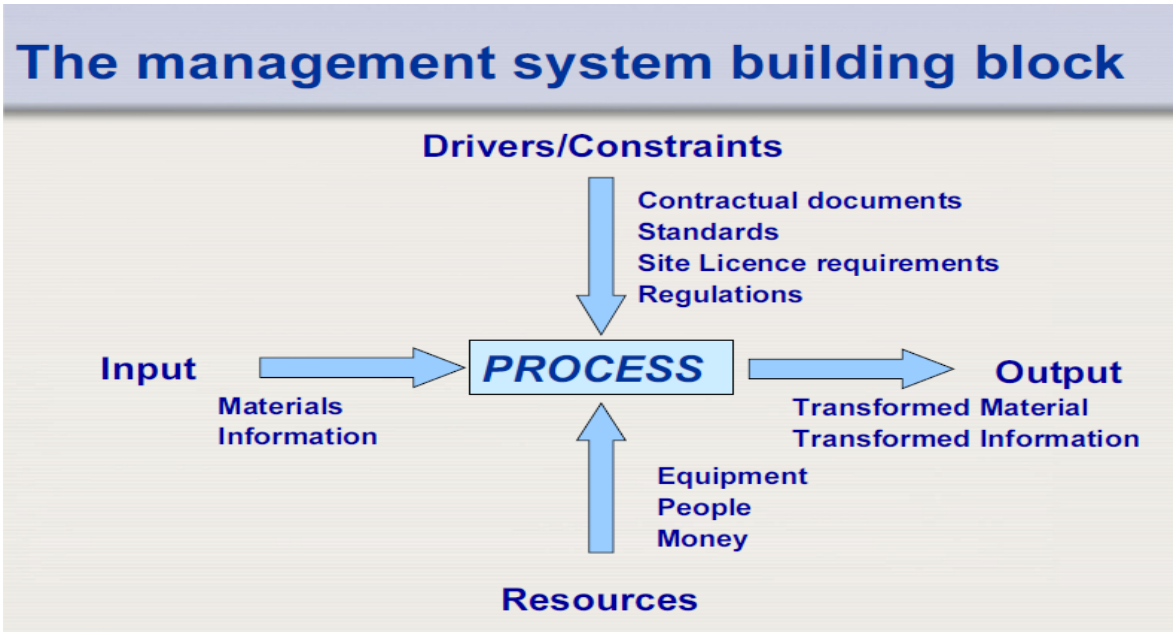


**Fig.2. 2 Management System Building Blocks**

Source: (Redman, 2007)

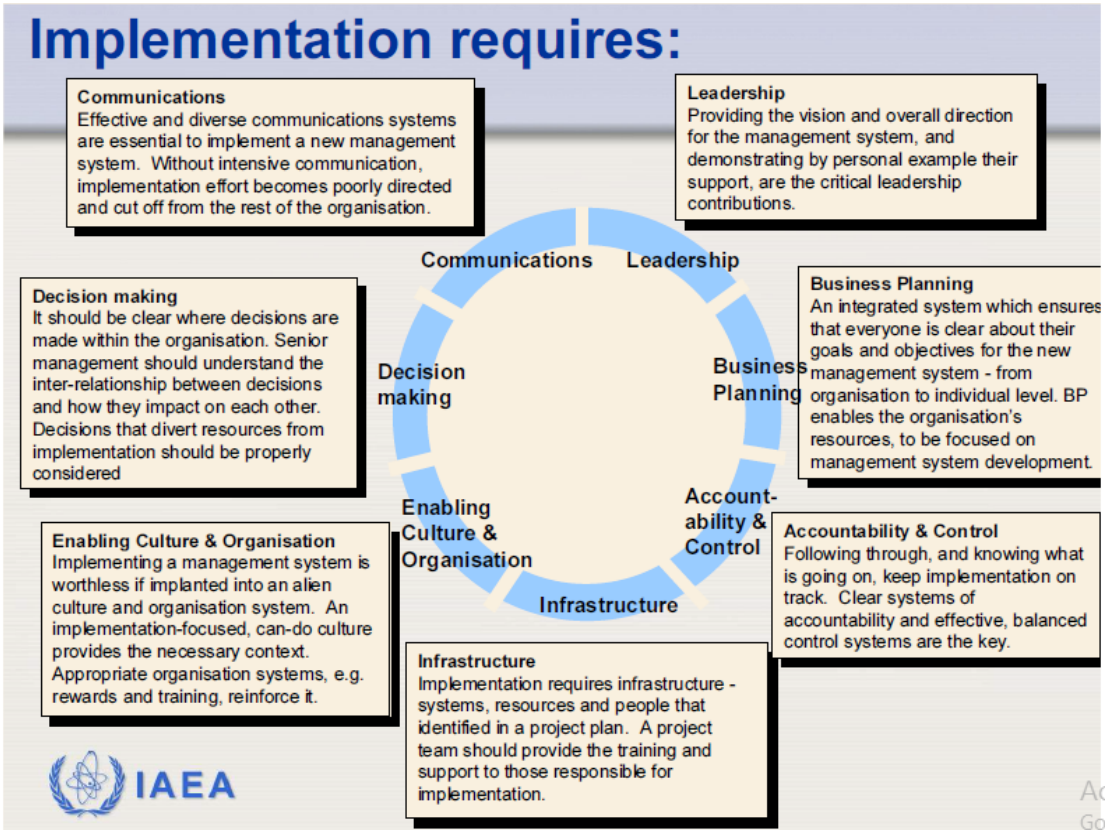


**Fig.2. 3 Implementation Requirement**
Source: (Redman, 2007)

### 2.1.5 Performance Management

Alignment of IIPDP and PMS ; according to Ethekwini Municipality (2008:10-15) explains that Performance Management is a process which measures the implementation of the organizations strategy. Performance Management provides the mechanism to measure whether targets to meet its strategic goals, set by the organization. (Attila, 2004)Performance Management is a process which measures the implementation of the organizations strategy. It is also a Management tool to plan, monitor, and measure and review performance of indicators to ensure efficiency, effectiveness and impact of service delivery by the infrastructure institution .And also defined as strategic approach to management, which equips leaders, managers, employees and stakeholders at different levels with a set of tools and techniques to regularly plan, continuously monitor, periodically measure and review performance of the organization in terms of indicators and targets for efficiency, effectiveness and impact (Bruce, 2006).

- **Objectives and Benefits of Performance Management System** (Attila, 2004)

a. Facilitate increased accountability and oversight between the political and administrative components of the municipality; and each sectoral department and the office of the municipal manager.
b. Provide early warning signals for each sector Heads of Departments, the Municipal Manager, Clusters, Standing Committees, Mayoral Committee and the Executive Mayor with a diagnostic signal of the potential risks that are likely to affect the realization of full infrastructure project implementation. It is important that the system ensures that decision-makers are timely informed of risks, so that they can facilitate interventions, where and when it is necessary and possible to do so.
c. Facilitate decision-making by providing appropriate management of information that will allow efficient, effective and informed decision-making, particularly in so far as indicating where the allocation of resources should be prioritized in order to meet institutional or strategic goals.

### 2.1.6 Project 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. (Bruce, 2006) Effective cross –secoral coordination and linkage requires compatible system in two domains (technological, competitive, legal) (MATHEWOS Consult, 2006). Development sectors have traditionally been institutionalized and addressed through separate government line functions. For operational purposes, each department has been allocated separate budgets and has been given responsibility for developing and implementing different legislation, policy and programmes. For municipal planning and delivery to be integrated, vertical and horizontal coordination or alignment needs to take place between and within the spheres of government.

### 2.1.7 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 (MATHEWOS Consult, 2006).

### 2.1.8 Public-Private-Partnership PPP Approach

The investment in infrastructure and public service delivery has traditionally been the sole domain of governments around the world. This is partly due to the huge cost of investment and the fact that the returns on such investments take a longer time to be realized (Christof, 2015). The state of infrastructure in many developing countries tends to be poor and inadequate to meet the rising demand. This reveals the constraints that governments in developing countries and especially in sub-Saharan Africa (SSA), face in terms of scarcity of funds, corruption, poor planning and project formulation, as well as inefficient capacities. Public Private Partnerships (PPPs) have emerged as one of the ways to overcome these constraints (James, 2015). By tapping into private sector finance and ingenuity, governments are able to finance critical infrastructure, improve project preparation, execution and management and deliver efficient services to the citizens.

#### 2.1.8.1 Definition and Concepts of (PPP )

The concept of public-private-partnership (PPP) has been defined differently in different contexts, and there is no broad international consensus on what constitutes a public-private partnership (PPP). Generally it refers to a collaborative arrangement between government or the public sector, and a private entity for better provision of public infrastructure and services. The classical definition of public– private partnership (PPP) describes it as a government service or private business venture which is funded and operated through a partnership of government and one or more private sector companies. In the context of the United Nations, PPP is defined as a voluntary and collaborative relationship between various parties, both state and non-state, in which all participants agree to work together to achieve a common purpose or specific task, and share risks and responsibilities, resources, and benefits (Hodge & Greve, 2011).

### 2.1.9 Independent Regulatory Agency (IRA) Approach

The term regulatory system is meant to be broadly encompassing. It includes all relevant laws, decrees, and regulations; all regulatory agency activities; all appellate processes; and relationships between regulatory agencies and all other organs of the state on policy and administrative matters relating to the sector that is being regulated. Independent regulatory agency refers to a specialized government organ that supervises the entry of private sectors in traditionally state-managed sectors, fixes standards, and oversees activities of partners in order

to ensure that terms of the contract are strictly followed and success achieved (Ethelbert, 2016). Many developing countries in Africa increasingly face issues of regulatory capacity, in relation to a relatively "weak" institutional environment. Building regulatory capacity is a challenge that should be always be taken into consideration when reforming the regulation of infrastructure and utilities.

### 2.1.10 Integrated management Information (IMI) Approach

Technological evolution has widened the scope of the network beyond the limits of telecommunication equipment. The information exchange system includes all communicating entities from the substation IED to the different management platforms of the power utility (power network management, energy management, enterprise applications, etc.). A more general concept of integrated management information can therefore become attractive. In this case, the NMC need not be a single geographical entity but a distributed platform serving the different functional layers of the infrastructure and the different functions in the utility organization (cable monitoring, system administration, telecommunication network management, security monitoring, etc.) (Cigre,2008).

At present, the different components of the communication network are connected and managed through dedicated vendor specific network management systems (NMS) generally located at a control centre. Many utilities desire to "integrate" their different NMS components, without a clear definition of the significance and extent of the integration and the functionalities to be obtained. An integrated management information system is a common platform that permits the different information processing, storage and exchange systems and other associated infrastructure components in the power utility to interact, in order to perform different tasks such as asset management, maintenance, condition and performance monitoring, administration, planning and supervision. It overcomes the problem of multiplicity of management systems in a multi-vendor, multi technology environment as exists in most telecommunication networks, IT infrastructures and different automation and system monitoring components. It also allows a global vision of the utility information infrastructure, relating the different layers and components, which are otherwise divided into separate worlds, and hence provides a better and faster understanding of the cause and consequence of different system events through sharing of management information on the utility scale. Web technology permits easy access to relevant information for the different users (Cigre, 2008). Current research focus in the construction industry is directed at implementation of an effective information management based integrated system environment. Construction organizations are developing methodologies of integrating information technology in the work environment of their operations. All construction process

improvement strategy is based on integration of effective project planning, monitoring and control techniques provided by an enterprise level of integration of all organizational parameters, functions, members and incorporated technologies. Creating an automated information system in computerized environments via networks using web-based technology enables top-level management to visualize various types planning information to support decision making (Attila, 2004)

## *2.2 Empirical Literature Review*

### 2.2.1 The Absence of System that Assures Accountability

A 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. According to (Hailmayam, 2011) the absence of responsible body is still the major cause for the poor nature of coordination. According to the AACRA, 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.

### 2.2.2 Decision Making Support

Infrastructure management decision-making is inherently an integrated process that requires the assimilation of a multitude of data, processes, and software systems. Current work practices have resulted in significant process and data fragmentation, which have subsequently created much inefficiency that impede the implementation of effective management strategies. There is a broad consensus in the industry that adopting integrated multi-disciplinary approaches is a key requirement for implementing efficient, sustainable, and proactive asset management programs (Halfawy, 2008). The integration among systems requires the first challenge to improve the efficacy. An unavoidable goal for future developments is undoubtedly the data integration. It is important that Public Administrations and Authorities - which are developing this kind of tools – share their own experiences and best practices (Jenifer, 2015). Integrated infrastructure management would facilitate information flow across various disciplines and activities, which in return would improve the availability, reliability, and consistency of infrastructure information, resulting in timely and more efficient decisions Ferreira and Duarte (2005). Infrastructure decision-making requires access to a multitude of data about infrastructure inventory, condition, risk levels, performance metrics, renewal options, etc. Efficient representation, integration,

management, and sharing of these data sets can only be practically achieved through the use of comprehensive and integrated databases. Data management services such as multi-user data access and editing, concurrency control, version management, data security and authentication, and other services critical for ensuring data integrity and consistency can only be realized using an integrated database (Halfawy, 2008).

### 2.2.3 Top Management Commitment

On the possibility of failure of an integrated management system in a real-world setting by investigating how and why the system gradually declined. On the way to answering the research questions the related risks are revealed. The withdrawal of top management commitment is initially identified as the main cause of the abandonment (Silva, 2016).

### 2.2.4 The complex relationship

The problem of infrastructure development by integrating technical, economic and operational aspects, as well as the interactions between the entities who jointly carry out the project. .As mentioned by (Aterina ,2015) the complex relationship between the sequential actions of players and the time-dependent behavior of a physical system is explored using a hybrid agent-based simulation model. The model is illustrated with several examples that show the versatility of the approach and its ability to accommodate the different decision strategies of the players (i.e., principal, agent) and the model of a physical infrastructure system.(David 1998) suggested that "managing complexity is a subject of a new wave of management thinking". His article stressed that the key to managing complexity is being able to deal with uncertain futures, through identifying and understanding relationships that embellish your organization or system.

### 2.2.5 Infrastructure Planning Challenge

Based on the investigation completed to date and experience from directly-related projects (Vanier and Lacasse, 1996; Lounis, Vanier and al., 1998), the authors recognize that there are a number of administrative, financial and technical challenges in the area of municipal infrastructure planning:

- Seamless data integration is difficult to achieve, but an essential feature of the software environment for a domain such as asset management.
- Currently available tools require enhancement and standardization to meet investment planning needs.
- Any software development should be done in partnership with software companies.
- There is no central repository or source for information for the domain of municipal

infrastructure planning.

- There is a need to share experience and "best practices" regarding municipal infrastructure planning.
- Life cycle analysis and long-term service life prediction form an integral part of the asset management of municipal infrastructure.
- There is little or no intercommunication between municipal infrastructure research and the field of service life research.

### 2.2.6 Sectoral -Coordination in urban infrastructure development and service provision

As stated (Mahlet, 2014) the study focus area on the four main infrastructure sectors of Addis Ababa; Water and sewerage, Electricity, Telecommunication, and Road sectors, the institutional, regulatory and financial arrangements, were mentioned as major factors to have strong relationships and significant influence on the process of infrastructure development and service provision as well as level of inter-sectoral coordination indicating an urge and need for the current governance arrangement to be made more effective and compatible for the existing infrastructure needs and requirements. to uncoordinated planning and design and weak institutional arrangements redoing faulty designs and rebuilding utility lines have wasted a significant resource.

### 2.2.7 Current Infrastructure Integration System

#### 2.2.7.1 Federal Control and Permit Authority

Recently, the Federal regulatory agency, integrated infrastructure development, construction permit and control, has been established with Proclamation (Ethipian Fedreal House of Public Representatives, 2014) As stated on this article, the Agency's main objective is to coordinate the execution of integrated infrastructure development works in accordance with roads master plan and to develop formula for the assessment of compensation for properties to be removed. and landholdings to be expropriated due to· integrated infrastructure development works. Some of powers and duties of the Agency is: to prepare, in collaboration with other relevant implementing organs, national integrated infrastructure development works plan and master plan; ensure that they are executed by the implementing organs; cause their implementation to be undertaken by regions, as may be necessary; as well as provide the necessary support for integrated infrastructure works undertaken by regions.

#### 2.2.7.2 Addis Ababa City Administration Control and Permit Authority

Pervious trend 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.

Currently, the Addis Ababa City Administration had established a new organ to conduct similar tasks as the FIIDCA. The Infrastructural Development Integration & Building Permit & Control Authority was formed after the city council approved its establishment with Proclamation (Addis Ababa City Council, 2017).Aside from issuing permits, the Authority collaborates, consult and implement alternative dispute resolution approaches during the early stage of project preparation. This allows the authority to revoke the permit if the utilities' owners are unable to comply with its condition.

# CHAPTER THREE

# 3 RESEARCH METHODOLOGY

## *3.1 Research Design and Approach*

The research was adopted qualitative and quantitative research approach .Thus the research is a descriptive and mixed research approach aimed at increasing reliability of information, thereby making qualitative complement the quantitative information. The data were collected from primary and secondary data source through using a combination of closed ended and open ended questioner. In addition, a review was conducted on published document and exploration of the reports to study the current state of infrastructure project management practice and the associated challenges.

## *3.2 Target population and Sampling Techniques*

The population of this study was on major utility services providers; such as Addis Ababa Water and Sewerage Authority, ethio telecom and ethio electric Utility, Addis Ababa City Road Authority and Addis Ababa City's Infrastructure Development, Construction Permit and Control Authority. The sample frame includes Directors, Managers, Expert and Supervisors, mostly from client side (government), as in the infrastructure industry, it is government organizations, as representative of the target population to gain a typical industry perspective and characteristics on the current state of integration man.

From those target population, by using convenience sampling technique the first strata was utilities institution in which four departments being selected purposively who have direct and indirect relation with the research issue. These departments are planning and budget, Construction and maintenance, sourcing and legal departments. The number of each sample unit such as; Director, Manager, Experts and Supervisor drawn purposively from pre-specified department, who are expected to have better knowledge in the area of the study. The second stata was the city's road infrastructure authority (AACRA), three departments were selected which were Construction, Operation and Maintenance and Contract Administration from which Director, Manager, Supervisor and expert were taken purposively in order to address the research issue. And from the last set, the city's infrastructure regulatory authority (AAIICPCA), the respondents were selected purposively from managerial to Director Level, since there are limited number management staffs.

**Table 3. 1 Distribution of samples by Organization**

| Organization | Sample Respondents |
|---|---|
| Ethio telecom | 12 |
| Ethio electric | 11 |
| AAWSA | 10 |
| AACRA | 13 |
| AAIICPCA | 5 |
| Total | 51 |

## *3.3 Data Collection Method*

### 3.3.1 Semi Structured Interview

The researcher used semi structured interviews to obtain detailed research-relevant information i.e. explore issues related to challenges in applying integration management system among utilities service provider organizations, Road authority and infrastructure regulatory authority. It also provided much more detailed information than what was expected through other data collection methods, such as it was mainly made up of a list of questions surveys. An interview protocol i.e the rules that guide the administration and implementation of the interviews were developed and followed while conducting the interviews.

### 3.3.2 Questionnaire

It is planned to use a tool for collecting and recording information about a particular issue of interest, but also included clear instructions and space for answers. The questioners were closed and semi-closed questionnaires were adopted in such away to have quantitative data which related to the objectives of the research, since the research is a mixed research approach. Ethio electric and ethio telecom. Other relevant data were collected from published and unpublished materials.

## *3.4 Data Analysis and Presentation*

Row data have passed through a process of analysis and interpretation. Accordingly, quantitative data analysis techniques were employed to analyze the data, thereby making qualitative complement the quantitative information. The data from Likert scale questionnaire were analyzed using descriptive statics such as frequencies and percentages and presented using tables.

# CHAPTER FOUR

# 4 RESULTS AND DISCUSSION

## *4.1 Introduction*

The results and discussion section is the most important part of the study. The section principally categorized based on the predefined research objectives and questions and conducting explorative survey in major utilities service providers through interview and questionnaire Directors / Managers of the utilities services providers and Directors /Officers in City's infrastructure regulatory authority.

The research results and discussion is provided based on four major sections and some other supportive subsections. These sections are: the Utility service providers, AACRA and AACIPC Authority current organizational capacity, and infrastructure projects integrated management practice and factors challenge infrastructure integrated mangemt system.

A set of interrelated concepts, definitions and propositions that presents a systematic view of situations derived from the literature review and secondary data for specifying and developing determinant variables and incorporating those variables in three dimensions for major association with the integrated infrastructure project management system. Those major dimensions are discussed based on three subsection i.e. 1) organizational structure dimension on supportiveness of the project alignment and decision making process with other sectors , the tools currently utilized for planning and budgeting and communication strategy 2) Institutional level project management dimension in collaboration , technology and project governances and data integration and 3) analyzing the major factors which challenges integrated infrastructure project management system.

## *4.2 Respondents Profile*

| Current position | Work Experience(Years) | | | Total |
|---|---|---|---|---|
| | <5 | 5-10 | 10-20 | |
| Director | 0 | 0 | 1 | **1** |
| D/Director | 0 | 2 | 2 | **4** |
| Manager | 4 | 10 | 14 | **28** |
| Expert | 2 | 6 | 4 | **12** |
| Supervisor | 0 | 3 | 3 | **6** |
| **Total** | **6** | **21** | **24** | 51 |

**Table4. 1 Respondents Current Position and Respondents Work Experience**

From Table 4.1 many of the respondents were on Manager Level positions which shows that the sample selection taking them as main actors to exploit what challenge they faced during infrastructure project management. In addition, the Experts in their respective organizations well distributed and hoped to share their significant experience. Similarly, Supervisors also made a significant contribution on the project implementation stage issue. However, the research agenda supposed to support the top management enabling them to make informed decision making process and tools during the project planning and implementation, the Director, and D/Director level of the respondents, made less effort to share their project experience and the critical challenge they faced. Moreover, the managers 28 and the experts 12 respondents were key role players in providing adequate and relevant data which determine the research result rationally and logically.

The respondents experience as illustrated on the above table 4.1 shows that the majority range from 10 years to 20 years. This indicates that at most respondents were long cumulated experience and many exposures to the project management challenge. It would create the chance to get the real challenge through their long professional carrier. Moreover, those experienced professional will have a significant contribution to the new project management system development.

## *4.3 The current Practice of Inter Sectoral level integrated infrastructure projects management system in Addis Ababa*

Assessment of current practice of project management systems current level of achievement for each selected major attributes. By considering the degree to which the current infrastructure project management systems effectively support each of the attributes such as; organization structure assessment, Stakeholder relationships and collaboration; operational optimization and technology and data Integration and Project governance and their component parts. This study is intended to analyzing the current each organizational infrastructure project management practice in the alignment of how challenge the effective integrated Utility's' infrastructure project management systems and the approaches for each attribute where contribute utilities service providers to improve their performance.

### 4.3.1 Organization Structure Assessment

Analyzing the organizational performance gap by focusing around structure, role and responsibility; the project strategy alignment with the other utilities service providers; utilized information technology and system; doing all this in the project definition stage as well as in the down-stream execution phases. In addition, the institutional capacity assessment incorporated with a model developed by (World Federation of Engineering Organization, 2010) ,which states that inherently very important for functionality environment in terms of three spheres, ability and resources; institutional and administrative arrangements; and, interlaid vision, goals, values.

**Table4. 2 Organizational Structure Capacity**

| Organization Struct | Response (Yes) | Organization Name | | | | |
|---|---|---|---|---|---|---|
| | | Ethio telecom | EELPA | AAWSA | AACRA | AAIICPCA |
| The organization structure support Visions ,mission &goal | Frequency | 9 | 6 | 7 | 8 | 0 |
| | % | 30.0% | 20.0% | 23.3% | 26.7% | 0.0% |
| The organization structure define project team role & responsibility | Frequency | 8 | 4 | 5 | 9 | 2 |
| | % | 28.6% | 14.3% | 17.9% | 32.1% | 7.1% |
| The organization structure shows project performance reporting ,communication & decision making level | Frequency | 4 | 6 | 6 | 6 | 1 |
| | % | 17.4% | 26.1% | 26.1% | 26.1% | 4.3% |

As shown on the table 4.2 all institution (Ethio-Telecom, Ethio electric, AAWSA, and AACRA) has unsatisfactory result in terms of organizations structural capacity with respect to integrated infrastructure project management system dimension. According to (MATHEWOS Consult, 2006) organizational structure should support infrastructure project management and create linkage to the organization's mission, strategy and values to create effective integrated and cooperative system among stakeholder. The survey result however shows that ethio telecom has maximum 30% organization structure support mission, vision and values .Thus; the result suggests that all the organization need to make fundamental reform. Unexpectedly, AAIICPCA has no clear and formal organizational structure, despite its establishment purpose requires comprehensive organizational structure to achieve the city administration objective and infrastructure regulatory authority institution mission, value and goal. Since the responsibility of coordination, integration, controlling and permission of infrastructure construction development projects nature are growing very complex. According to (Levent et aI., 2008) , organizational structure arrangement should consist the primarily concerned department which is build in legal and technological capacity for the coordination and integration of infrastructure project development and operational maintenance in the project level and institutional level. Based on the above result most organizations tendency are exclusive in setting up a focal department and its significant contribution for effective project management being neglected.

According to (World Federation of Engineering Organization, 2010) the enabling project environment sets the conditions under which capacity development are conducted for programmes and projects at the institutional. This includes policy frameworks, legal systems, regulations, political institutions,. The institutional level is comprised of leadership, administrative structure ,human resources system, decision-making processes), and system required to achieve externaland internal goals. Institutions are strongly influenced by the enabling environment.Despite, the result shows defining the project participant and key players' role and responsibility ranging maximum of 28.6 % and minimum 7.1 % ethio telecom and AAIICPCA respectively. It revealed that each organization are not taking full responsibility for their own development in capacity development, especially define roles and responsibilities to perform different tasks aligned with other stakeholder and to involve all parties in actively in decision-making and to enhance the collaboration and cooperation and partnerships. In general, those weakness or organizational capacity gap mentioned on the above implied that how the sector gave less emphasis on building organizational structure and capacity which is compatible and flexible for the current dynamic environment and very complex and interdependent nature of city's infrastructure project. It could be drawn how the infrastructure project management system

exposed for serious bureaucratic system which hinders the facilitated relationship and cooperation among stakeholders.

### 4.3.2 Strategic Planning and Budget Support for Integrated Infrastructure management System in Addis Ababa

Sector/Local planning must take into account global issues – "think global, act local" – as environmental sustainability is a global concern. Local actions, even those that do not seem harmful on their own, can have an impact on the wider region when combined with the impact of other developments (DPLG, 2007). Natural resources must be protected for the benefit of present and future generations. Resources are limited, and should be used efficiently to ensure sustainability. This principle cuts across all planning activities, from spatial planning where a sustainable urban form is striven for to project planning where resource use can be identified and managed at a more detailed level.

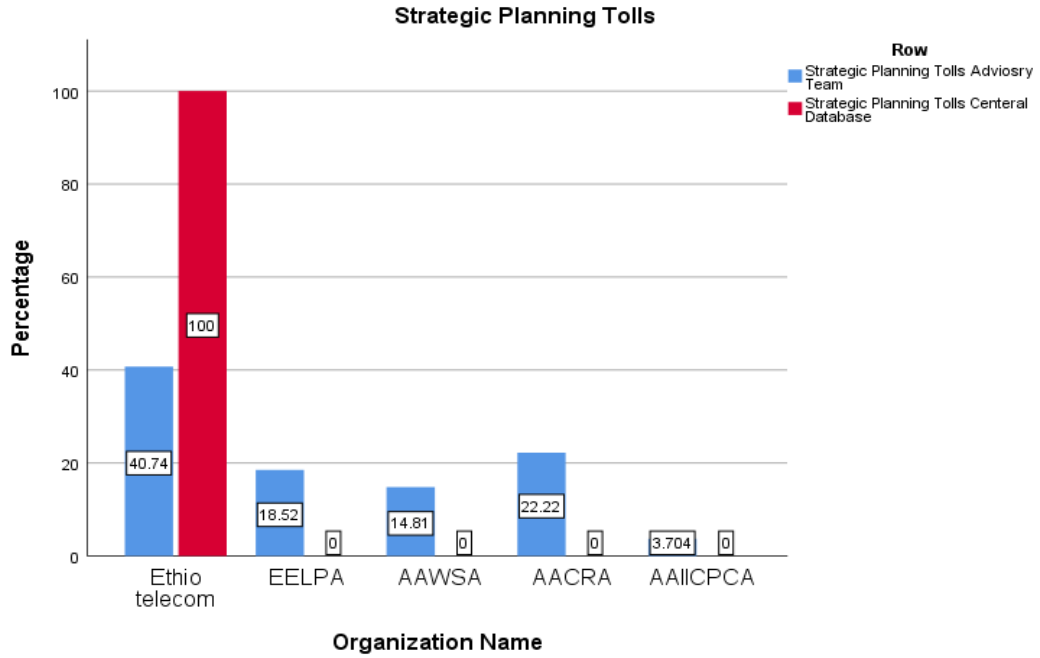


**Fig.4. 1 Organization Strategic Planning Supporting Tools**

From the above fig.4.1 majority current System of strategic planning shows that the institutions relied on the basis of the pre-existing documents and particularly ethio telecom applies central database system and advisory team 100% and 40.74% respectively. Whereas AACRA,EEPLA and AAWSA are using Advisory team ranging from 22.22% to 14.81%. The result indicates that all institution not utilized standardized tools for supporting the process of strategic planning of across sector and to create the common platform and avoid fragmentation. In addition to these, most respondents revealed that the process of assessment of infrastructure strategic planning

development is not so clear. According to (World Federation of Engineering rganization, 2010) highly linked between the stage of strategic planning and integrated the implementation of infrastructure projects relied on the effective planning tools.

As mentioned by the author (Andrew, 2008) the challenges in the development long term strategy planning of the city's infrastructure provision mainly due to uncertainty in the long term and lack of decision support tools to enable strategic analysis and planning of a city's infrastructure system. Therefore, it is widely debated to improve the system of strategic planning, consultation and development in the sphere of new forming solutions of territorial development in the city.

**Table4. 3 Use of Integrated Infrastructure management tools in planning and budgeting process by Organization in Addis Ababa**

| Organization | Response | Planning Tools | |
|---|---|---|---|
| | | ERP | GIS |
| Ethio telecom | No | 0.0% | 100.0% |
| | Yes | 100.0% | 0.0% |
| EELPA | No | 0.0% | 100.0% |
| | Yes | 100.0% | 0.0% |
| AAWSA | No | 100.0% | 100.0% |
| | Yes | 0.0% | 0.0% |
| AACRA | No | 100.0% | 100.0% |
| | Yes | 0.0% | 0.0% |
| AAIICPCA | No | 100.0% | 100.0% |
| | Yes | 0.0% | 0.0% |

Source: Own survey (2019)

From the above table 4.3 it shown that only ethio telecom and ethio electric organization used only ERP. The remaining organization don used both ERP and GIS. During the interview it is understood that GIS technology implementation is on progress on AACRA and on the other ethio telecom side it is mentioned ,despite GIS procurement proposal being launched to bid ,the bid process being canceled due to conflict between user department and the executive management . Different studies in this area, mentioned that a new generation of infrastructure management system (IMS) is emerging to improve many aspects of traditional management system by coordinating all management activities among related subsystems. In addition, (Zahmin.Z, 1998), suggests that the infrastructure management system directed towards new technology integration. Moreover, specifically the system requirements defined for developing

IMS and are involved with a wide variety of new technologies integrations are include: GIS capability integration,· ERP and Client/server architecture integration . More over (Zahmin.Z, 1998) mentioned the major benefit of implementing planning tools; ERP and GIS which offer potential solution for more effective management of infrastructure systems, excellent mechanism to meet the demands of data sharing and information exchange, and also helps administrators, top management and project manager to achieve optimal decisions and necessity using integrated infrastructure information tools.

Therefore, based on the research survey result, previous empirical studies and literatures the current integrated infrastructure project management system needs the new generation of information management system compatible with a higher level of integration, automation tools for effective and efficient the strategic level and project level planning and budgeting decision making process .

### 4.3.3 Communication Strategy Document Plan

As it could be seen below on the table 4.4 highest response rate (62.7%) indicate that no formal communication strategy document plan across the sector. It implies that how the alliance and integration for project management interaction and networking among other project environment and institutions being affected. Most respondents revealed that the communication made through formal way among the stakeholders, despite they mentioned that current used communication channels are not applying information and communication technology such as online electronic communication, networked web facilities and portals for accelerated decision making and proactive problem resolution. Moreover, most respondents emphasize the communication strategy disorganized, incomplete, lacking objectives, responsibility, timelines and dissemination mechanisms. The consequence are becoming critical on the current poor institutional condition of collaboration and cooperation and increasing the level of fragmentation in city's infrastructures. Thus, the result indicates that there is a serious need of modernizing the current communication channels and implementing comprehensive communication strategy among all stakeholders for cross-sectoral.

**Table4. 4 Communication Strategy at Specific Organization**

| Organization Name | Response | | | |
|---|---|---|---|---|
| | No | | Yes | |
| Ethio telecom | 12 | 100.0% | 0 | 0.0% |
| EELPA | 11 | 100.0% | 0 | 0.0% |
| AAWSA | 9 | 90.0% | 1 | 10.0% |
| AACRA | 11 | 84.6% | 2 | 15.4% |
| AAIICPCA | 5 | 100.0% | 0 | 0.0% |

### 4.3.1 Infrastructure strategy Performance

As shown below on the table 4.5 across the sector level the current strategic planning and performance practice resulted in weak. In separate institutional level measurement ethio-telecom perform 52.1% good, AACRA perform 48.1 % shows better than ethio-electric and AAWSA .Using these results as a starting point, ethio-electic providers and AAWSA should begin to improve through a strategic relationships. While analyzing applying effective planning tolls has direct linkage on achieving better the organizational strategic performance. Since, the Strategic planning performance framework relies on effective decision making and planning tolls for the future short and long term integrated infrastructure project development through interactions and benchmarking activities with other utilities, and through resources alignments created specifically as common database across the sector. Moreover, each sector should develop project implementation strategy that should be linked to with the other sector integrated infrastructure project development planning implementation framework.

**Table4. 5 Percentages and totals are based on responses**

| Organization Name | Response | Infrastructure Strategy | | | | Total |
|---|---|---|---|---|---|---|
| | | Poor | Weak | Good | Strong | |
| Ethio telecom | Frequency | 4 | 11 | 25 | 8 | 48 |
| | % | 8.3% | 22.9% | 52.1% | 16.7% | |
| Ethio electic | Frequency | 3 | 25 | 15 | 1 | 44 |
| | % | 6.8% | 56.8% | 34.1% | 2.3% | |
| AAWSA | Frequency | 8 | 22 | 10 | 0 | 40 |
| | % | 20.0% | 55.0% | 25.0% | 0.0% | |
| AACRA | Frequency | 0 | 19 | 25 | 8 | 52 |
| | % | 0.0% | 36.5% | 48.1% | 15.4% | |

. Source : Own survey (2019)

### 4.3.2 Collaboration and Technology

As shown below on the fig.4.2 and table 4.6 the result indicate that the major collaboration and technological components significantly weak. It ensures that the current project management practice needs ongoing, timely, cost-effective, reliable and sustainable performance improvements in all facets of its operations in managing utility and road infrastructure project management system. Makes effective use of data from automated and smart systems, and learns from performance monitoring. Minimizes resource use, loss, and impacts from day-to-day operations, and reduces all forms of waste. Maintains awareness of information and operational technology developments to anticipate and support timely adoption of improvements. Is aware of and adopts in a timely manner operational and technology improvements, including operational technology and information technology. Manages and utilizes data from automated and smart systems. . IT-based capacity building can be much more effective than traditional deployment practices.

**Table4. 6 Institutional Level Collaboration**

| Organization Name | Response | Collaboration &Technology | | | | Total |
|---|---|---|---|---|---|---|
| | | Poor | Weak | Good | Strong | |
| **Ethio telecom** | Frequency | 4 | 27 | 23 | 6 | 60 |
| | % | 6.7% | 45.0% | 38.3% | 10.0% | |
| **Ethio electic** | Frequency | 7 | 32 | 15 | 1 | 55 |
| | % | 12.7% | 58.2% | 27.3% | 1.8% | |
| **AAWSA** | Frequency | 12 | 31 | 7 | 0 | 50 |
| | % | 24.0% | 62.0% | 14.0% | 0.0% | |
| **AACRA** | Frequency | 5 | 26 | 31 | 3 | 65 |
| | % | 7.7% | 40.0% | 47.7% | 4.6% | |

**Source: Own survey (2019)**

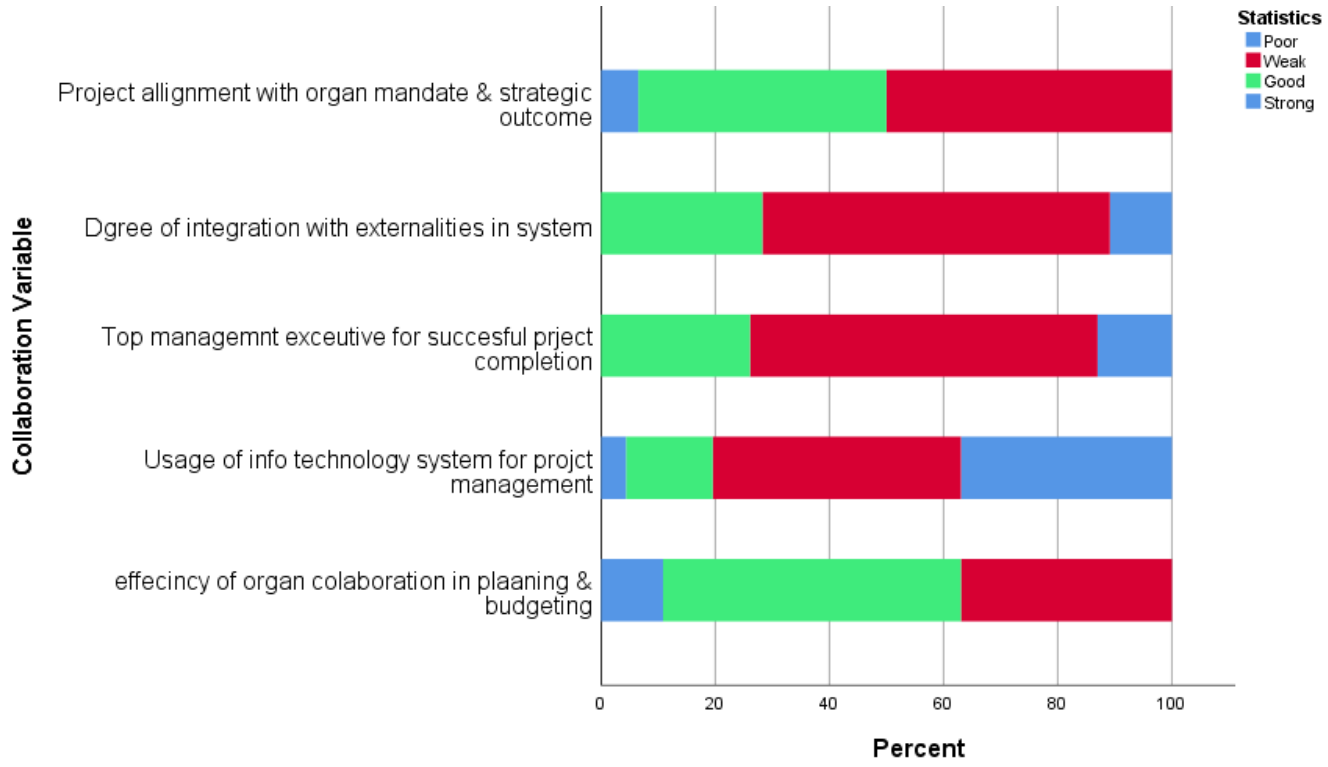


**Fig.4. 2 Collaboration &Technology**

Source: Own survey (2019)

The study shows that almost all institution has no proactive engagement with stakeholders early on can help identify sources of support and opposition systematically, and facilitate better alignment of project design and configuration, thereby aiding smoother implementation and to decrease the conflict created among the interdependence infrastructure projects and to create effective coordination and collaboration relationships among stakeholders .

From lesson learnt open ended questionnaire the respondents major opinion regarding; "What primary benefits would be derived from the utilization of integrated infrastructure project management system related technologies and methods" The most respondents mentioned the following summarized primary benefits would be expected:

- Increase flexibility to access different types of information from different situations across the organization
- Improved operation and maintenance performance
- Information format would keep standardization
- Improved use of resources
- Greater efficiency in information collection and in information use for accelerated decision making

- New functionality or improved visibility arising through integration of diverse information

### 4.3.3 Integration and Project Governance

As indicated below on the table 4.7 the majority of the respondents agreed on the construction stage for the current institutional integration with 62.2% and 42.2%on planning stage. The remaining maintenance stage result shows that almost no integration among institutions. While considering the recently increased city's urbanization has needed significant levels of investment to address the challenges of the ageing infrastructure and growing demand. But, the survey data implies that less practice in integrating at planning stage across the sector. Despite, institutional integration at planning stage has a significant role in combining resource across the sector, minimizing scarce resource wastage and creating good governance. At specific institutional level ethio telecom has more practice at planning stage with 66.7%.The other key Construction integration stage more implemented across the sector.

**Table4. 7 Institutional integration level**

| Integration Level | Organization Name | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Ethio telecom | | Ethio electric | | AAWSA | | AACRA | | Total | |
| | Count | Column Valid N % | Count | Column Valid N % | Count | Column Valid N % | Count | Column Valid N % | Count | Column Valid N % |
| At planning stage | 8 | 66.7% | 3 | 27.3% | 4 | | 4 | 30.8 % | 19 | **42.2%** |
| At construction stage | 5 | 41.7% | 9 | 81.8% | 5 | 55.6% | 9 | 69.2 % | 28 | **62.2%** |
| Maintenance stage | 0 | 0.0% | 2 | 18.2% | 1 | 11.1% | 0 | 0.0% | 3 | **6.7%** |
| Total | **12** | **100.0%** | **11** | **100.0%** | **9** | **100.0%** | **13** | **100.0 %** | **45** | 100.0 % |

Source : Own survey(2019)

Unexpectedly, the above survey result shows very poor (6.7%) level of institutional integration at maintenance stage which implies how the current intuitional practice has major contribution on frequent road and side walk way damage by utilities construction and damage caused one utilities on the other. Moreover, this poor maintenance practice has significant indirect impact on socio- economic related problem such wasted productive working time ,unplanned each utilities maintenance caused services interruption and serious quality problem the consequence critically affect the city's tax payer income it creates challenges on the municipality to collect the city's revenue through taxation for which it support the city's future infrastructure development program. Therefore, the current institutional integration practice should be improved to create effective integrated infrastructure project management system.

In drawing the findings the assessment indicate that institutions have a gap in strategic decision-making to supports the alignment of organization's capability to meet the challenges during initiation and delivery of a project and coordinating with other utilities project.

**Table4. 8 Data Integration Level**

| | Organization Name | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Ethio telecom | | Ethio electric | | AAWSA | | AACRA | | Total | |
| | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Between chosen information system module | 25.0 % | 75.0% | 45.5% | 54.5% | 10.0 % | 90.0% | 15.4% | 84.6% | 23.9 % | 76.1 % |
| At enterprise level | 58.3 % | 41.7% | 72.7% | 27.3% | 90.0 % | 10.0% | 100.0 % | 0.0% | 80.4 % | 19.6 % |
| Spatial data exchange | 100. 0% | 0.0% | 81.8% | 18.2% | 100. 0% | 0.0% | 61.5% | 38.5% | 84.8 % | 15.2 % |

Source : Own survey (2019)

As it could be seen on Table 4.8 68.3% data integration among stakeholder interaction are being made between a chosen information system modules. It ensures that fragmented way of data exchange and interaction since the data integration at enterprise level shows 17.65% only.

### 4.3.4 Infrastructure Project Delivery

As illustrated below on the fig 4.3 the percentage frequencies draw ranking Design-Build (32.61%),Design-Bid-Build (30.43%) and Public-Private Partnership respectively for the best fit infrastructure project delivery approach. According to (Christof, 2015) (investment in

infrastructure and public service delivery has traditionally been the sole domain of governments around the world and also to the huge cost of investment and the fact that the returns on such investments take a longer time to be realized which constraint the practice of PPP project delivery approach. On the other side DB and DBB mostly used on large and complex infrastructure projects mainly to minimize risk and reduce conflict of interest between project actors and stakeholders. Thus, from the above figure and literature review the DB and DBB are more preferred that fit the current complex project nature.

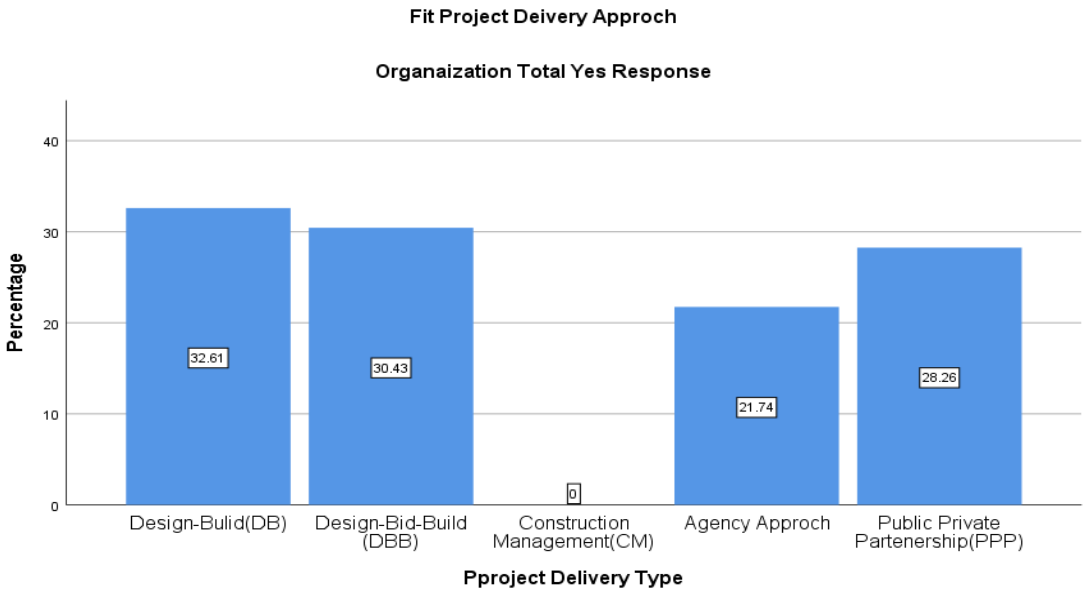


**Fig.4. 3 Infrastructure Project delivery**

Source: Own survey (2019)

### 4.3.5 Project Governance and Regulatory Authority

However, the city's infrastructure proclamation (Addis Ababa City Council, 2017) state two major needs for the establishement of reguatory from which (1)It is foud nessesary to ensure the compliance of works of infrastructure construction development permit and control,which is modernized ,efficient and synergized,does have a typical share in making the city's to paly internationnaly competive and attractive role as capital city of the country and also (2)to put in place the organizational structure that enables to solve the ill coordination that has been existing within the development actors operating in the city and other problem tampering with the

development of the city with the view to reaching this goal by realizing the medium term and long term spatial urban plan and socio-economic development of the city government, but from the interview and from the above organizational capacity assessment it is clearly indicates understood that the current regulatory body does have organizational structure and equipped with efficient technology which are necessary for supporting planning and decision making.

The regulatory respondents' from the regulatory authority claim against the utilities Service Providers on the integration issues for which they are responding to the coordination letters on time ,excavating roads and walk ways without construction permit and not delivering properly what they agreed on common memorandum of understanding. On the other side utility service providers revealed the regulatory authority does not have the institutional and technological capacity to collaboration coordinate and integrate the infrastructure project.

During the interview with the regulatory authority higher officials propose and mentioned that to create integrated infrastructure project management system there should be a common central budget plan database, all sector design come to regulatory authority built by sole contractor in design and build project delivery approach and from the nature of project complexity there should be political leaders support at sector level. Moreover, consolidated policy accounts lack of integrity and working culture, system that adapting regulation to address emerging problems, changing circumstances, and new information in regulated infrastructure sectors Therefore, one can draw the current statutory organ is weak institutional capability.

In general the finding shows that the regulatory authority does not has organized structure and no technological capacity which is compatible to integrate ,coordinate and control the infrastructure project construction . Besides, the permits given were not based on adequate information and database.

From lesson learnt questionnaire through open ended regarding "what the project lesson was taken from the existing infrastructure project management practice" the most theme raised by the most respondents generalized that the current as the organizational culture or norms do not have practice of taking lesson from previous completed project and making project performance review. Following these as individuals few respondents mentioned that mainly poor mind set up regarding using public resource utilization and it is exposed to high wastage, lack of commitments to coordination among each stakeholders and poor planning. And some of the respondents mentioned that using utility corridor structures has a potential benefits for are to provide easy access and known location for all utilities in the road corridor. This reduces the likelihood of damage during subsequent road construction or maintenance projects and flexibility

and economical for future expansion since the structure can easily provide additional space for future utility utilization and expansion without significant additional costs.

### 4.3.6 Major Challenge in Applying Integrated Project Management System on Urban Infrastructure projects

As indicated below on the table4.9 most of the respondents strongly agree lack of effective decision support tools, poor long term planning and lack of cooperation and coordination with the percentage of 60.9%, 80.4% and 52.2% respectively as a primary challenges for integrated project management system. The remaining variable such as limitation -of organ capacity in terms of technology and lack of central database system resulted the second most significant variable .The effect of these challenges was manifested on mainly resource wastage and poor utilities service provision and primary cause of the project delay.

**Table4. 9 Challenge for integrated project Management System**

| Major Challenge Variable | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|
| Poor long term planning | 0.0% | 0.0% | 39.1% | 60.9% |
| Limitation of organ capacity in terms of technology | 0.0% | 0.0% | 54.3% | 45.7% |
| Lack of central database system | 0.0% | 13.0% | 41.3% | 45.7% |
| Lack of effective decision support tools | 0.0% | 0.0% | 19.6% | 80.4% |
| Lack of cooperation & coordination across sectoral organization | 0.0% | 2.2% | 45.7% | 52.2% |
| Unfit project delivery approach | 2.2% | 43.5% | 45.7% | 8.7% |

Source : Own survey(2019)

# CHAPTER FIVE

# 5 CONCLUSION AND RECOMMENDATIONS

## *5.1 Conclusion*

The main goal of this study was to identify the critical challenges for the integrated infrastructure projects management system on major city's utility service providers (ethio telecom, ethio electric and water supply), AACRA and City infrastructure construction regulatory authority. Although, the nature of infrastructure project management comprised of multi stakeholder, interdependent and complex nature requires considerable time and participation of different stakeholder. The assessment made based on the predetermined major attributes which could affect the effectiveness and efficient of project management system and it is tried to identify the integrated project management system challenge in the context intuitions level, technical level infrastructure project management practice gap .Those factors constitute

intuitional current capacity which incorporates the organizational structure, project planning; communication and information technology in supporting decision making on budget and plan, central data base data and information exchange and the City's infrastructure integration, construction, permit and control authority with respect to its capacity to enforce the law and coordinate all project stakeholder during new project development and maintenance stage.

The current institutional capacity gap impinge with organizational structure almost all institutions do not have primarily concerned department for utilities infrastructure project implementation and maintenance and rehabilitation management .In addition, they have no clear project participants roles and responsibilities. These factors create inconsistency of utilities project administration and become a challenge for effective and integrated projects management inter and across the sector.

Most previous studies has identified that the information and communication technology related challenges has significant contribution for inefficient decision making, poor long and short term infrastructure development planning and data and information exchange barrier for intra sectoral coordination and cooperation. The research findings show that the current institutions technological capacity does not fit the current complex and interdependent of the city infrastructure project nature. Thus, it is found to be substantial the technological advancement which is compatible, cost effective and flexible and could be adopted contextually to create

effective and efficient integrated infrastructure project management system. Though, it requires a considerable time resource and cost,

Regarding the city's regulatory authority the research finding reveals that the regulatory authority's current institutional capacity lack organizational structure and also has no technological support and facilitate for decision making, planning and coordination. Thus, the finding clearly indicates that the regulatory authority needs institutional capacity building to achieve its establishment mission and objective. Unless, the regulatory authority enforce the law and project compliance during project development and each project execution stage, the utilities institutions' poor awareness of integration and coordination, lack of top management commitment become a serious challenge for integrated infrastructure project implementation.

In general, the study findings identified the major challenges infrastructure project management which provides an important insight to utility service providers, policy makers and Regulatory authority. In addition, the study characterized the current project management system as disorganized and fragmented utilities infrastructure project implementation across the sector which cannot be successfully executed using traditional project management system and unfit project delivery approach which are often rely on high bureaucracy organizational structure, poor technological support and inflexible project management processes.

Moreover, while the study compared against the previous studies, it shows different dimension in terms technological decision making supportive tools and shared common database system adoption for creating common platform. Despite, different literature and empirical studies mentioned delivering infrastructure projects has been challenging because of the enormous degrees of uncertainty, complexity, lack of integration among institutions and stakeholder and urgency and poor planning often associated with them. Their consequence caused a growing frequent road and road walk way side damage and huge resource wastage including adverse impact on city socio-economic.

Therefore, the Government (City administration /Municipality and Regulatory Authority), Project Sponsors (owners and operators of the assets),and their Project delivery stakeholder (prime contractors and Consultants) and research institute need to explore innovative new ways of managing large infrastructure projects to achieve successful outcomes and add value over the whole life cycle, from design through project execution to operations. It would be recommended that the further research to explore how to implement the compatible information technology developments in partnership with private IT- Technology Company and adopting contextually and the institutional level.

## *5.2 Recommendations*

Implementing effective integrated infrastructure project management system across the sector requires a reasonable approach to tackle those identified critical challenges could be recommended as key constituents including:

I. **Utilities service providers Institutional Capability Dimension**, as the findings implies that almost all institutes lack strategic direction to enable each institutional capacity harmonized level of integration.

- There should be delineating the strategies, structures, and capabilities of new forms of organizations involved in infrastructure project delivery such as systems integrators, owner/operators, delivery partners, joint ventures, and PPPs.
- There is a definite need of establishing new forms of cooperation and coordination to deliver infrastructure projects, such as integrated projects teams, relational contracts, and partnering arrangements.
- There should be elaborated the transformational potential of digital information communication technology such central database for an appropriate data sharing and exchange platform; Planning, budgeting and scheduling; networked website to create effective and efficient infrastructure project management system.
- There should be provided an effective decision making tools for defining and managing the risks, uncertainties, stakeholders, and complexities encountered in infrastructure delivery, from front-end planning to project execution
- There is a critical need of joint performances and top management commitment within the overall process of utility infrastructure project implementation in the city's development program.
- The organizational structure of every institution should be rearranged that enable to give space for efficiency and effectiveness to facilitate lateral relation among different stakeholders.
- Willingness and commitment to work jointly among infrastructure authorities should be enhanced.
- There should be continuous awareness and organizational capacity building workshop among different stakeholders.

**Addis Ababa City Road Authority**

- Currently, there is a definite need for constructing major underground utilities infrastructure by integrating with the new city's road project development within the utility corridor, despite the strategic partnerships between utility providers and AACRA based on only memorandum of understanding which creates contractual complication and challenge in controlling the cost, relevant project data and specifically institutional business strategy does not be taken into consideration.
- AACRA should established effective road corridor management system which accommodates utilities development, operation and management of urban infrastructure for future expansion and maintenance. Since the current system wide process gap between AACRA and major utility service providers.

**Technological Recommendation**

- There is a need of free flow of information to yield integration greater compatibility which allows data and information to be accessed and/or transferred from one system to another and from one sector to another.
- There is critical needs of decision-making tools to support administrators and engineers in making objective management decisions effectively and efficiently in order to achieve the ultimate goal of an infrastructure project management system.

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- There should be a better technological solution which is cost effective ,flexible and adaptive infrastructure project management and maintenance to create effective integration which reduces the overall resource wastage and coordinated and standardized system development costs through software coding.
- There should be Agency-wide standardization of software to make the future integration system more effective.
-

**Regulatory Authority**

- The first most important implication is that the establishment of a regulatory entity that is responsible to integrate construction, permit and control of infrastructure projects at a city level. Despite, the regulatory entity has required the full power that enforces laws pertaining to disruption of projects.
- The other important issue the regulatory authority needs be organized with other utilities service providers in a clear strategic alignment and well technologically equipped to enable and facilitate its core integration, controlling and permitting activities while

integrating construction of infrastructure projects by different service rendering organizations.

- Moreover it would be better if the regulatory authority creates partnerships with national and international research institute and IT-companies to support the organizational and human resource capacity buildings with the primary focus to produce a useful management tool which designed to support informed decision-making for development of infrastructure project planning budgeting, design and implementation across each sectors. It could be most important for chief executives, mayor and council, and other top management of major institutions in the city to adopt the best practice and infrastructure project management.

- It needs emphasized the necessity for Regulatory authority t to produce such a holistic plan that is able: to capture dependencies between sectors, and balance requirements for new project development, maintenance, rehabilitation, and renewal of existing infrastructure.
- The capacity gap in planning calls for creating structured coordination and facilitation mechanisms for the coordination and exchange of information, insights and priorities during the course of the consultations phase for plan preparation.
- The regulatory authority needs transformational improvement in its coordination power of the city's infrastructure planning .Since, the research result shows that high discrepancy between demand for coordination vs. coordination practices.
- A high level and virtual co-ordination committee with the necessary legal background, procedures and mechanisms that can work actively should be re-established and decentralization of works and power has to be practiced at different level.
- Develop the appropriate organizational structure and systems to realize the vision and mission;

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# 7 APPENDICES

Appendix I: Questionnaires

Appendix II: Declaration

Appendix III: Endorsement

# Appendix I Questionnaire

## St. Mary's University

**SCHOOL OF GRADUATE STUDIES**

## Questionnaire

### Introduction

Thank you in advance for your valuable inputs. The objective of this study is to assess the **current challenge on integrated infrastructure project management system inter and intra sectorial level among major utility service providers** (i.e. ethio -telecom ,ethio – electric ,Addis Ababa Water Supply ) ,Addis Ababa City Road Authority(AACRA) and Addis Ababa City Integrated Infrastructure Permit and Control Authority. This questionnaire is addressed inter sectoral Utility Service Providers' departments (Planning, Budget and Finance, Construction and Maintenance Management) This questionnaire only used for academic purpose.

- If you need further explanation, you can contact me through the address indicated below:

**Tibebe Seife Mobile Number: +251-0911502421 Email: tibeseife@gmail.com**

| **Part -I RESPONDANT SPECIFIC QUESTIONS** | | | | | |
|---|---|---|---|---|---|
| | Educational Qualification | ☐ Diploma | ☐ First Degree | ☐ Masters | ☐ Other (Specify) |
| | Work Experience | | | | |
| | Organization Name | | | | |
| | Current Position | | | | |
| | your primary area of work | ☐ Design | ☐ Construction | ☐ Operations &Maintenance | ☐ Other(Specify) |
| | What discipline do you work in | ☐ Planning | ☐ Utilities | ☐ Contract Admin. | ☐ Other(Specify) |

| Part II ORGANIZATIONAL CAPACITY QUESTIONS | | | | |
|---|---|---|---|---|
| **Capacity Area 1 : Organizational Structure & Coordination** | | | | |
| | **Questions** | **Yes** | **No** | If your answer is **No**, please explain the reasons in the space provided below |
| | Does the Organizational structure support the organization's mission, vision, and values? | | | |
| | Does the Organizational structure clearly define project management team roles and responsibilities? | | | |
| | Does the Organizational chart clearly shows project performance reporting levels and communication channels, the decision making levels within the organization? | | | |
| | Is there a focal department/division primarily concerned to the new infrastructure development project and rehabilitation and maintenance project? | | | |

| | | | |
|---|---|---|---|
| | Does your organization has aligned organizational and administrative structure which support accelerated decisions making with other sector? | ☐ **If Yes**, what level of decision level?<br>☐ On sharing information among stakeholders,<br>☐ On accelerate the response time,<br>☐ On interdependency-related system awareness, | **If No, What method used ?** |
| | **Capacity Area 2: Over all Planning Process** | | |
| | Does the organization incorporate an Integrated Infrastructure management tools in planning and budgeting process? | ☐ **If yes** what are the tools?<br>☐ Usage of ERP system (type, processing of data, intended support for the project)<br>☐ Usage of GIS tools for ascertaining project impacts and making decisions<br>☐ If others (Specify) | ☐ **If No, why** ? |
| | Does the organization currently utilized tools for support strategic planning decision for future new project development, rehabilitation and maintenance? | ☐ **If Yes** (Specify)<br>☐ Advisory team<br>☐ A central infrastructure database system<br>☐ Other(Specify) | **If No** how such decision being made? |

| | | | |
|---|---|---|---|
| | **Capacity Area 3: Communications Strategy** | | |
| 14 | Is there an integrated communication plan for Integrated infrastructure project development that contains external and | ☐ **If Yes,** what are the communication techniques for :<br>**Internal**<br>☐ **Email** | ☐ **If No,** What guide for communication |

| | | | |
|---|---|---|---|
| | internal strategies of communication? | ☐ **Formal Letter**<br>☐ **Telephone**<br>**External**<br>☐ **Formal Letter**<br>☐ **Website**<br>☐ **Joint Meeting** | |

**Level of Current Practice Performance**

0) **N/A** (Not applicable) )
1) **Poor**, requires substantial improvement
2) **Weak,** requires improvement
3) **Good**, will benefit from improvement
4) **Strong**, meets present needs

**Part III Assessment of current Practice integrated infrastructure projects management system** **(Please answer by putting "✓" mark in the table below boxes)**

**Assessment Area 1: Relationship with stakeholder and Regulatory Authority**

| | Question | Poor | Weak | Good | Strong | N/A |
|---|---|---|---|---|---|---|
| 1. | What level your organization in performing strategic alliances relationships with other Utilities, Road Authority and Regulatory Authority? | | | | | |
| 2. | How well your organization has established relationships with stakeholder in solving the root causes problems of the integrated infrastructure project implementation? | | | | | |
| 3. | How efficient your organization possessing project communication plan, information sharing, and dissemination strategies to inform, accelerated decision making? | | | | | |
| 4. | How routinely your organization shared the Information about current or planned utilities services and results with project beneficiary and other stakeholders. | | | | | |

**Assessment Area 2: Project design and implementation practice**

| | | | | | | |
|---|---|---|---|---|---|---|
| 5. | Does the organization develop and submit proposals, budgets, and implementation plan summit timely for Addis Ababa infrastructure integration Authority? | | | | | |
| 6. | To what extent your organization collaborated with other utility service providers'actors to design and implement projects with complementary services? | | | | | |
| | **Assessment Area 3 : Integrated Project Management System Practice : (Collaboration, Technology, project governance and data integration)** | | | | | |
| 7. | How efficient the current collaboration across Utilities institution and Road Authority and Regulatory agencies system in Planning, Implementing and data exchange | | | | | |
| 8. | How effective the organizational information technology system for infrastructure project management for human resources, budgets and data storage/archiving? | | | | | |
| 9. | How effective the current legal instruments and the established Addis Ababa City's regulatory authority capacity to create integration of infrastructure projects? | | | | | |
| 10. | How extensive is the commitment of the organization executive management to timely and successful completion of the project? | | | | | |
| 11. | What degree of integration with externalities, such as other project, system or organization? | | | | | |
| 12. | How well and clearly the projects align with organization's mandate and strategic outcome? | | | | | |
| 13. | For which project factors does the new established project governance structure and regulatory authority extensively support? | ☐ Appropriate representation for stake holder management<br>☐ Planning and budgeting decision making process<br>☐ Determining role and responsibilities of the main actors<br>☐ information sharing | | | | If any challenge (Please describe) |
| | Are there potential difficulties to access and share the required quality and timely | ☐ **If yes**, what are the factors ? | | | | ☐ **If No**, explain what strategy |

| | | | |
|---|---|---|---|
| 14. | available data? | ☐ Lack of technologies<br>☐ The antitrust ,<br>☐ Confidentiality and privacy issue<br>☐ Liability issues,<br>☐ the law enforcement<br>☐ Other please describe | you are applying ? |
| 15. | What is level of data integration? | ☐ Between chosen information system modules.<br>☐ At the enterprise levelSpatial data exchange between organizations | what challenges during data integration |
| 16. | What current level of integration with other stakeholder? | ☐ At planning Stage<br>☐ At construction stage<br>☐ Maintenance<br>☐ If other(Specify) | What do you propose (explain) |
| 17. | Are there a prior effort to develop a central data base system among utility providers, City Road Authority and Regulatory Authority? | **If yes,** what is the current status? | **If No** what is the future plan? |
| 18. | Which project delivery method/approach do you think is best suited for infrastructure project management? | ☐ Design -Build,<br>☐ Design -Bid-Build ,<br>☐ Construction Management<br>☐ Agency Approach<br>☐ Public Private Partnership(PPP) | Explain Why? |

19. What are major Challenge in Applying Integrated Project Management System on Urban Infrastructure projects?

| Major Challenges | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|
| a. Poor Infrastructure Project long term Planning | | | | |
| b. limitation organization capability in terms of system ,technology and strategies | | | | |
| c. Lack of cooperation and coordination | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | across sectoral organizational | | | | |
| | d. Lack of central database system for data & information exchange , planning and decision ,making | | | | |
| | e. Lack of effective decision support tools to enable strategic analysis and planning. | | | | |
| | f. Poor/unfit project delivery approach | | | | |

**Part IV : BEST PRACTICE**

20. If you have any lesson learnt from with respect to current project management practice?

21. In your view, what are the primary benefits derived from the utilization of integrated infrastructure project management system related technologies and methods?

22. What gaps do you identified during integrating the infrastructure regarding the Addis Ababa infrastructure integration permit control authority?

# Appendix II:

# Declaration

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of .All sources of material used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

_____ _____

Name Signature

St. Mary's University College, Addis Ababa May, 2019

# Appendix III:

# Endorsement

This thesis has been submitted to St. Mary's University College, School of Graduate Studies for examination with my approval as a university advisor.

_____ _____

Advisor Signature

St. Mary's University College, Addis Ababa May, 2019