

Assessment of Horizontal and Vertical Integration among Stakeholders in the Sustainability of Infrastructure Projects in Addis Ababa City

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Abstract This research aimed at assessing and investigating the effects of horizontal and vertical integration among the key stakeholders and thereby the sustainability of infrastructure projects in Addis Ababa. The research employed a mixed method approach in collecting and analyzing data. This approach uses both qualitative and quantitative strategies in the collection of data for the study. The study used purposive sampling technique to collect data from the sample respondents. Thus the selection included project owners or managers of respective service providers, project managers, other professionals' consultants and representatives of the community who are close to all stages in the functioning of the projects. The data were obtained from 86 sample respondents taken out 110 total population size. Data were analyzed and interpreted using descriptive statistics using SPSS20.0 version and qualitative technique. The study revealed that integration between service rendering organizations in the provision of sustainable infrastructure projects is essential and further showed that project integration has a positive effect on sustainability of socioeconomic and environmental development. On the other hand the finding of the research also showed that lack of integration has brought tremendous undesirable effects on the social, economic and environmental realities.

Keywords Integration, Sustainability, Infrastructure projects, Service rendering organizations

1. Introduction

Infrastructure refers to the fundamental facilities and systems serving a country, city or area, including the services and facilities necessary for its economy to properly function. It typically characterizes technical structures such as: roads, bridges, tunnels, water supply, sewers, electric grids and telecommunication. It can also be defined as, the physical components of interrelated systems providing commodities and services essential to enable, sustain or enhance societal living conditions, [1] Little (2005).

Ethiopia is predominantly a country without extensive infrastructure developments such as rail networks and road transportation that could have connected its provinces with the center and dearth of electrical utility, potable water and telecom services. Nearly over the last decade, there has been a massive increase in funds allocated for infrastructure constructions such as road, electrical utility and others. This reflects the government's recognition of the importance of the infrastructure projects for national economic growth and for profiting to a maximum from the country's assets. The

intention of launching roads' maintenance, rehabilitation, upgrading was to connect the regions on the five main arteries radiating from Addis Ababa. Moreover, Ethiopia was faced with a task of dramatically increasing the number of existing telephone lines and extending the service into rural areas, where most of the population live. In 1996, the Ethiopian telecommunication authority became responsible for regulating the industry, while the job of telecommunications corporation (ETC) became expanding and improving the services and revitalizing the infrastructure [2]. In line with the policy of devolving power to the regional states, ETC has been decentralized so that the individual states would be responsible for providing their own telecom services, decision making, which now takes place at local level. The main objective is to support the free market economy and investment ventures and satisfy the demands of the private sector and to fully participate in the rural development program.

Addis Ababa, which is in the capital city of the country, is by far the largest urban centre. Infrastructure projects that are undertaken in Addis Ababa are in the framework of interdependent network, including institutions (comprising people and procedures) and distribution capabilities that provide a reliable flow of essential services and facilities. Civil infrastructures are inherently interconnected and are interdependent; they are also observed, with regard to the

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ongoing projects in Addis Ababa, that they hamper sustainability imperatives. It is, therefore, important to scrutinize the details of these problems.

1.1. Statement of the Problem

As it is quite evident from various literature and prevailing reality on the ground, infrastructure systems are essential in providing the range of services necessary to support the nation's economic wellbeing. For instance Ingram and Fay (2008), [3] pointed out that infrastructure is a key determinant of economic growth, and that sustainable economic growth requires accelerated infrastructure investment.

Projects and their management are interrelated with multifaceted issues where sustainability is salient and most prime among other things which are in play. It is one of the utmost importance's to government, service rendering authorities and the general populace if these services are sustained over a long term except for periodic renewals and maintenances. If attempts of an integrated approach among various stakeholders are made envisaging the sustainability of infrastructure development projects in all stages of the project life cycle: initiation, planning, designing, and implementation, such projects not only become effective and reliable but also deliver long-lasting benefits to the target beneficiaries.

There are challenges that attributes of the efficacy of sustainability of projects that emanate from lack of coordination and integration among stakeholders. These are due to the fact that infrastructures development projects are complex systems that are vulnerable to failures or service degradation in other systems because of their interconnected and interrelated nature [1].

There is scarcity of literature that portrays the assessment of horizontal and vertical integration among organizations involving in the development and construction of infrastructure projects. The prevalence of lack of synergy among the key players in such projects not only affects the service delivery system but also the optimizations of national scarce resources which are meant for infrastructure development.

The lack of emphasis given to issues pertaining to horizontal and vertical coordination and integration among stakeholders engaged in the development and construction of development projects, functioning independently from one another in all phases of the project life cycle has far reaching implications unless addressed. Thus, it has been become evident these days that many infrastructure projects are facing sustainability problem or challenge due to lack of horizontal and vertical coordination and integration among stakeholders who fail to work in partnership.

The central problem on which this study embarks is the problem of sustainability of infrastructure projects due to lack of horizontal and vertical coordination among stakeholders, especially with reference to road and utility

infrastructure projects in Addis Ababa. Therefore, it is this notion and research gap that has attracted the researchers' attention.

meeting new demands, realizing new opportunities or to overcome the challenges faced due to very frequent change of organisation's environment then it is more likely that problems could occur during execution of the project.

1.2. Research Questions

In order to assess and explore the subject of the study, the researcher poses the following research questions.

- ◀ How is the project integration among stakeholders managed to sustain infrastructure projects in A.A City Administration.
- ◀ What are the challenges of service rendering organizations faced on the sustainability of infrastructure projects?
- ◀ What must be done to enhance horizontal and vertical integration of stakeholders to sustain infrastructure projects?
- ◀ What are the effects of horizontal and vertical integration towards the sustainability of infrastructure projects in the social, economic and environmental development of a country?

1.3. Objectives of the Research

This study set the following general and specific objectives;

1.3.1. General objective

The major objective of the research is to assess and explore the prevalence of horizontal and vertical coordination and integration among key stakeholders in sustaining infrastructure projects in Addis Ababa.

1.3.2. Specific Objectives

The specific objectives of the study were to:

- a) identify the salient features or specific characteristics of sustainable infrastructure projects and their contribution to economic, social and environmental improvement of a country,
- b) explore the challenges of horizontal and vertical integration among different stakeholders in the sustainability of infrastructure projects,
- c) elucidate on what is ought to be done in developing and sustaining infrastructure projects in the city from the very inception to the closure of these projects and give detailed emphasis on the challenges and prospective solutions.
- d) look into the management of the existing horizontal and vertical integration among key actors (stakeholders) engaged in the development and sustainability of infrastructure projects in Addis Ababa.

1.4. Scope of the Research

Basically the study is destined to look the synergy of imperatives of sustainability pertaining to infrastructure projects, and the roles that are needed to be played by stakeholders to realize it. Since most fundamental concepts of sustainability attempt to depict the necessity of integration and coordination among concerned actors, the present study focused on getting access to reliable, usable and timely information in the public and government authorities' domain. Evidently, no attempt has been made to explore the private sector. With regard to the spatial coverage of the study, the current attempt is limited to four utility services providers within Addis Ababa City Administration only. These utility service providers are: Addis Ababa City Administration Road Authority, Ethiopian Electric Utility, Addis Ababa City Administration Water and Sewerage Authority and Ethio-telecom Addis Ababa region. And again, spatially covers projects which are implemented in some selected areas of the city of Addis Ababa.

As it is discussed in the problem statement there are many causes that affect the performance of a construction project. This study mainly focuses on the effectiveness of project management processes on performance of building construction project. The research is thus confined to the construction project specifically to the building construction project, and whilst the conclusions has made an effort to generalise the findings.

Even though the research aimed on the national level, due to time and financial limitation, it focused on building construction projects in Addis Ababa.

1.5. Significance of the Study

This study intended to contribute to the understanding of constraints pertaining to sustainability of infrastructure projects that are undertaken in Addis Ababa. It also aimed at providing empirical evidence on the depth of the problem so that all actors can endeavor to ameliorate the prevailing challenges that are confronting sustainability of infrastructure projects.

Apart from its academic contribution, the result of this study is expected to contribute to enhance the existing positive practices and sanction the negative ones if any. Since infrastructure is the focus of development objective, knowledge about its impairments would act as input for successive development plans. Therefore, this research intended to provide information which can assist in the planning and development of infrastructure projects. Moreover, it can also be of significant importance for it would serve as a spring board for those who are interested to undertake further study in the field.

Considering the importance of project management in the construction companies, specifically in building construction, and the booming of construction activities in Ethiopia, it is assumed that these research output contributes in identifying which project management processes has effect on performance of building construction projects in Addis

Ababa.

Since project management is an area with a growing body of knowledge, this research can contribute in adding some concepts to the existing body of knowledge with a particular emphasis on construction practices being currently implemented. Even though the research focuses on construction projects, the findings and the outcome could be relevant to practitioners in other types of projects.

2. Literature Review

2.1. Over View of Sustainability and Sustainable Development

The term "sustainability", which literally means ability to keep going, is currently a major concern that seems to have an imprecise interpretation by many scholars and practitioners.

Sustainability has been defined in many ways by many groups. Of the many definitions available perhaps the most applicable to infrastructure is that of the world Commission on Environment and Development (1987) cited in [1] which states that, "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Similarly, [4] have also made efforts to define the concept which is also consistent with the aforementioned definition of sustainability. [5] asserted that sustainable development is still seen as a complex issue that defies definition for practical purposes. As they have indicated, "it is generally agreed that the real challenge lies in understanding how to put it in practice, that is, operationalizing sustainability. These general concepts and definitions of sustainability are in concordance with overarching principles which my thesis ascribes to sustainability. Sustainability is not just about the environmental considerations associated with energy conservation and alternative energy generation; it is the inseparable integration of the environment, society, and economic attributes that need to be managed at the project level to be effective and successful [6].

As stated by [7] "... infrastructure sustainability is about minimizing impacts and maximizing opportunities across economic, social and environmental dimensions during the delivery of infrastructure." The authors have also stated that sustainability assessment seems to focus on the planning stages of an infrastructure project, as opposed to project delivery as a whole [7]. The need for alleviation of social, economic and environmental challenges has become increasingly complex in infrastructure projects. [8] uphold and highlight the importance of including variables of sustainability in activities related to phases of project as collaborate to improve the quality of projects which best fit to researchers' intention of the problem of sustainability in infrastructure projects. As the authors, described the need for studies on the convergence of sustainability issues and project management, coupled with the increasing importance of success of projects triggered my interest to probe in to the

issue for it sought to contribute to the development ascribed to sustainability issues in project management and success of projects as well.

As stated by El - Harans et- al, (2007) and Thomson et- al cited in [9], "sustainability is increasingly perceived as a necessary tool for understanding the social, economic and environmental consequences associated with the way that projects and their support systems are designed, constructed, operated, maintained and eliminated. However, there are literatures that are expounding sustainability, the lack of common structure and language for analyzing sustainability which is prevailing elsewhere that leads to the lack of useful and applicable methods of project management. [9] have also described the three dimensions of sustainability (environmental, social and economic), though these pertain to my work in terms of conceptual elucidation but never purport with my intent of finding ways and attributes to integration of stakeholders for sustainable infrastructure project management and its success. [10] underscored that, original theories of sustainable development focused on ecological issues related to protection of environmental and the natural resources.

However, there is a need for the emphasis on a holistic approach that integrates ecological, economic and social dimensions when making decisions in organizations and societies. It is under such circumstances that I was interested to bring together sustainability with infrastructure. With regard to sustainability performance measurement, [11] emphasized sustainability as it is complex and multi-faceted; covering a broad spectrum of topics from habitat conservation and energy consumption to stakeholder's satisfaction and financial results. Sustainable development is an adaptive dynamic system which is not easy to monitor its performance level. Systematic information is required to change the conditions sufficiently in the right direction. Indicators such as economic, social and environmental development provide comprehensive information about the systems shaping sustainable development. As Bossel (1999) cited in [12] state, a popular measurement approach to sustainable development is to select and enumerate a number of indicators for each of the three dimensions: economic, environmental and social aspects of it. [13] highlighted that sustainability indicators and a composite index are increasingly recognized as useful tools for policy-making and public communication in conveying information on countries and corporate performance in fields such as environment, economy, society or technological improvement. Likewise sustainable development nowadays represents a contemporary context of any business activity [14].

We, therefore, claim that in order for projects to meet or exceed stakeholder needs and expectations in the future, project management must be done in the context of sustainable development. On the basis of the aforementioned conceptual assertions, I argue that the existence of project stakeholder problems reported in empirical studies may relate to lack of inclusion of developments within general

stakeholder management and sustainable development considerations.

Sustainability has become one of the prime issues that the current Infrastructure projects need to respond to. Though the application of sustainability in built assets is beneficial, it often involves major capital investment. Costs always become the impeding factor for stakeholders when they contemplate on sustainability initiatives in infrastructure projects. While profit is still the main concern in highway investment, there is increasing social awareness of concerns relating to global warming and climate change. Thus, it is important to balance the financial benefits with sustainability deliverable in high way infrastructure development [15]. To achieve such a balance, however, needs an integration of different stake holders involvement in building infrastructure projects. This is the missing gap which the present undertaking tries to fill.

Various types of sustainability-based programs and implementation tools have been developed and executed by road transportation agencies to help integrate sustainability-based philosophies, concepts, and actions at the program and project levels. These tools can take the form of a list of sustainable actions or the development of sustainability rating systems that rely on specific criteria for project team consideration and potential adoption [16]. However, the mentioned actions to be taken and sustainability rating systems didn't consider how much an integration of project stake holders contribute to the achievement of sustainability of infrastructure projects in the study (source). This gap have to be filled using an approach that can help promote sustainable infrastructure projects, that is, comprehensive sustainability rating systems for infrastructure projects for example road, water and waste and telecomm projects in our context. Embedding sustainability principles and best practices into road projects in low- and middle-income countries has been a challenge for several reasons, such as changing or varying degrees of commitment and limited financial resources. In addition, there is often lack of understanding about sustainability concepts and how to address them, given country and project specific characteristics.

2.2. Sustainability and Project Management

As stated by [7] "... infrastructure sustainability is about minimizing impacts and maximizing opportunities across economic, social and environmental dimensions during the delivery of infrastructure." The authors have also stated that sustainability assessment seems to focus on the planning stages of an infrastructure project, as opposed to project delivery as a whole [7]. The need for alleviation of social, economic and environmental challenges has become increasingly complex in infrastructure projects.

A starting point for all aspects of project sustainability and its management is the recognition of the context of the project. Sustainability is crucial in using projects for development imperative. Hence, integrating the dimensions of sustainability in project management inevitably implies a

broader consideration of the context of the project [17, 18]. Both the time and the spatial boundaries of the context are stretched when considering sustainability

Unsustainable project management, the context of the project is addressed in relation to the organization's strategy, but also in relation to society as a whole. The preceding section identified the impact of the dimensions of sustainability of project. Considering these impacts provide new or additional perspectives on the content and the process of a project. Several authors conclude that integrating sustainability requires a scope shift in the management of projects from managing time, budget and quality, to managing social, environmental and economic impact [19, 17].

I argue that, though these affirm the vital synchrony and sustainability of project management, projects endeavors mainly in line with infrastructural projects are found to be very much constrained when observed from the practical point of view. My intended research is, therefore, trying to fill the lacuna and assess the degree to which there are alignments in the process of management by taking the imperatives of sustainability.

2.3. Sustainability and Infrastructure Systems

A primary objective of sustainable infrastructure is to improve the harmony between the built and natural environments by mitigating negative environmental and enhancing social as well as economic consequences related to infrastructure performance. Thus, it is not difficult to appreciate the relationships between infrastructure and sustainable Development objectives. Indeed, there is a clear relationship between infrastructure and all three aspects of sustainable Development (social, economic and environmental).

In terms of the economic aspect, many authors have emphasized the relationship between infrastructure and economic growth. [3], for example, pointed out that infrastructure is a key determinant of economic growth, and that sustainable economic growth requires accelerated infrastructure investment. Further, [20] reported that for every one percentage point increase in the infrastructure stock, there was an associated one percent increase in gross domestic product.

The economic aspect represents part of the story as the social aspect is also involved. Certainly, [21], in my opinion gives a comprehensive view of aspects of sustainability by stating that well-functioning infrastructure in a country is essential for its sustained economic growth, international competitiveness, public health and overall quality of life. In the same way, infrastructure development plays a significant role in determining environmental sustainability since it is closely intertwined with consumption patterns of natural resources as well as pollution issues.

[22] defined sustainable infrastructure as “physical assets that provide net benefits to a community, its neighbors, and the environment on a long-term basis.”

Thus, the primary objective of sustainable infrastructure is to improve the harmony between the built and natural environments by mitigating negative environmental impacts and enhancing social as well as economic consequences related to infrastructure performance. Thus, it is not difficult to appreciate the relationships between infrastructure and sustainable development (SD) objectives.

Most previous studies have referred to the macro level of sustainability of Civil Infrastructure System (CIS), i.e. the interaction between the CIS and the economic, environmental and social systems. Thus, to ensure reaching the true meaning of sustainability, we should look through a holistic perspective which includes both macro and micro levels. Such an approach would give a better understanding of the true meaning of sustainability within the context of both levels. The next section reviews sustainability of CIS at the micro level.

In the literature, there is disagreement on the definition of system sustainability at the micro level, which made it until now a questionable concept [23]. As sustainability is related to the future, so system sustainability can be viewed from the perspective of longevity and survivability. In general, for instance, [24] defined system sustainability as “the probability that a particular system will not meet specified criteria for failure during a particular future period”. In a more comprehensive manner, [25] defined infrastructure system sustainability as: the ability to maintain infrastructure systems at some desired level of performance or to change their performance at some desired rate and direction.

Therefore, the sustainability of an infrastructure system depends on its ability to perform and to provide the service for which it is created. From a system point of view, an infrastructure might be affected by external factors that make changes in its performance, for instance, a natural or man-made disaster [26, 27]. Internal factors might also affect CIS performance, such as the management, operational and maintenance systems [28]. However, to achieve sustainability objectives one should start by defining the meaning of sustainability of CIS at both macro and micro levels. Consequently, my research tries to explore sustainability of CIS (Civil Infrastructure System) and consider performance assessment which should take into account unified definition as starting point to assess CIS performance in a more comprehensive way.

Therefore, the infrastructure systems that the researcher trying to examine in connection to their sustainability attest the validation of this literature to study infrastructure sustainability in a more comprehensive and illustrative way in order to obtain the desired outcome.

[6] discussed in detail the environmentally sustainable road criteria that are separated into four main road transport project phases the sustainable road transportation system planning associated with road system planning consisting 41 criteria which includes short-term and long-term planning and 109 sustainable road transportation project planning and design criteria. Where these 109 criteria are associated with

road planning and design, including project coordination and design actions (conceptual through final design, including road rehabilitation) based on transportation plans, community needs, environmental impact assessments, and development of contractor subcontracts, specifications, and preconstruction documents. 94 sustainable road transportation construction criteria associated with the construction of new roads or rehabilitation of existing roads. 88 sustainable road operation and maintenance criteria that are associated with road operation and maintenance activities, including operation and maintenance actions to maintain safe, effective, and efficient operations for roads and associated facilities, such as rest areas and maintenance shops. However, in all of the phases of sustainable road building projects discussed the criteria associated with the contribution of integration of road projects with other projects as a criterion didn't mentioned. This study will try to explore integration as criteria in the sustainability of infrastructure projects. (First put the four points of consideration and then elaborate on each).

Therefore, the infrastructure systems that I am trying to examine in connection to their sustainability attest the validation of this literature to study infrastructure sustainability in a more comprehensive and illustrative way in order to obtain the desired outcome.

2.4. Sustainability and Stakeholders' Participation

Stakeholders theory is a central part of the strategic management discourse [29-32]) Stakeholder management has been seen as a core activity for creating project success. Project stakeholders are defined as "the people and groups affected by the project or in a position to influence it". Every organization needs to make contributions from at least some of its stakeholders. This represents an instrumental approach to stakeholder management which is characteristic for many stakeholder management theories (of which [29] may be the most well-known. Stakeholders are seen as means to specification the organization, and managers must figure out how to influence the stakeholders to procure resources for the benefits of the organization [33].

As it has been indicated, stakeholder is a partnership and it is about relationships between different parties to come to an agreement. This is quite different from the more traditional approach to manage urban infrastructure projects. At least authorities should consider how they can provide 'common' map scale, referencing and standard symbols. Commonly accepted data standardization will reduce the 'duplicity' and redundancy of data. [34], indicated that full information have to be gathered from all utility infrastructure providing partners.

This type of partnership prevailed everywhere in both developed and in developing countries for telecommunications, power generation and transmission, railway-, ports, water supply and sewage treatment. Consequently, many countries have begun to reform these entities to achieve greater efficiency and accountability

through commercialization, and corporatization [35]. Sustainability is about stakeholder participation considering and respecting the potential interests of stakeholders that is key to sustainability. Stakeholder participation, as [36] puts, requires "a process of dialogue and ultimately consensus building of all stakeholders as partners who together define the problems, design possible solutions, collaborate to implement them, and monitor and evaluate their outcome".

Several authors (for example [37-39]) emphasize the importance of stakeholder participation in projects. This principle logically impacts the stakeholder management and the communication processes in project management. However, the intention behind 'participation' goes beyond the identification of some specific processes. Stakeholder participation isn't so much a specific process as it is an attitude with which all project management processes are performed.

[40] link sustainable development, projects and the role of stakeholders, and conclude that there is a need for "incorporating stakeholders and their interests in more project management activities". Sustainable project management would imply involving stakeholders proactively in project activities, such as the definition of requirements, assessment of costs and benefits, project planning and scheduling, identification and assessment of risks, handling of issues, and project reporting.

As can be observed from recent literature, stakeholder management has been explicitly or implicitly set in the context of sustainable development. There is a need for a principle of shared value creation for a society by addressing its needs and challenges [41]. I agree with this view of the authors for the imperative of addressing the needs and challenges of a society which otherwise impedes stakeholders critical involvement in the process of project design, planning, augmentation, control etc. for its effectiveness, and by and large, for its sustainability.

At this juncture, I argue that though the available literature is intended to shade light on such issues of crucial importance, in our context, the reality on the ground is different and need very close attention to be explored and examined. Thus, this is what I am trying to investigate in my research. As there is an emphasis on the issue of sustainability in various literatures, the issue of how different projects which are being run with different objectives should undergo integration need to be taken into account.

2.5. Conceptual Overview of Integration

Different scholars have been critical and astute in defining Integration. Integration has been defined in Merriam-Webster dictionary as "the harmonious functioning of parts for effective results". Moreover, integration refers to the action of coordinating; harmonious combination of agents and functions towards the production of results. [42] also, defined integration as, "a systematic relationship between decisions which include positive outcomes for participants and avoidance of negative consequence." Since

integration required consistency within product to manage dependencies within the work flow, Minear, cited in [43], defined integration slightly differently to which I also concur wholly, "These definition thus runs," integration is multilayered, involving the orchestration of relationships, not only at headquarters but also at the regional, national and field levels." Though I have provided a variety of definitions of coordination, I believe it is proper to end this abstract concept with [44], definition integration as the management of dependencies among activities.

Integration is a significant issue not only at the stage of augmentation of projects but also at the initial stage and the process. In other words, coordination is an important key factor that enables the success of the provision of infrastructural projects. Writers like [43], indicated the complexity of urban infrastructure provision which necessitates coordination. Amin as cited in [43] asserts that urban infrastructures are more than just an aggregation of constitutes; a collection elements which are interacting with one another and the surrounding environment. [45] put, '...all urban infrastructures have one common property, they are all complex aggregations of interacting elements in which changes often happens as a result of their interaction both vertically and horizontally as well'.

"Vertical" integration can in general be defined as the promotion of efficiency and resilience in multi-tiered systems. It can take a wide variety of forms [46]. Its most traditional accepted practice is the exercise of authority, as higher level bodies and units exert authority over lower level ones, and thereby impose strategic choices in view of ensuring an overall coherence of actions and outputs. In these processes, authority plays a limited role; the focus is on dialogues, circulation of ideas and the capacity of different stakeholders to participate in decision-making processes and to contribute to the implementation of policies. This evolution contributed to the paradigmatic shift in regional policy, from funding infrastructure and other regional investments to encouraging regions and localities to autonomously identify clusters of industries and endogenous potentials [47]. Individual localities and regions are approached on the basis of their assets and potentials, which are not determined by their geographic location or position in urban hierarchies. It is within this framework that new approaches of horizontal and vertical integration have been developed. These approaches are built around three notions: The idea that the main role of public authorities is to bring together stakeholders and organize a dialogue among them in view of ensuring that their actions are better coordinated. This "communicative" or "argumentative" turn in planning policies [48, 49] would imply that public authorities abandon the ambition of determining the exact form of development to be promoted. Instead, they limit their role to the defense of some core principles as part of the facilitation of dialogues and cooperative actions, if needed promoted with the help of financial incentives.

As it is quite evident from the existing literature,

infrastructures are interconnected and mutually dependent in complex ways at several points of integration both vertically and horizontally. Concomitant to this view of the writers which agrees with my observation of infrastructure projects, it is true that untimely stoppage of one project results in a cascading failure for multiple independent infrastructures and trigger huge impact. Thus my research attempts to assess and strengthen what is stated with regard to the dimensions of integration on an empirical basis.

2.6. Review of Empirical Literature

With due regard to the empirical investigation, [50] in his study of urban utilities infrastructure of Bahr Dar, gives a detailed accounts of the water supply, sewerage facilities, drainage systems, power distribution networks, communication transmissions and other related underground, surface and overhead services and facilities. He has also indicated by citing [34] that the economic and efficient delivery of infrastructure service depends on effective planning and management systems. The author empirically observes four major sections and other sub sections pertaining to urban utility infrastructure in Bahr Dar city. These are: the process of urban utility infrastructure provision, the real dimensions, the cause and effect of the problem and the role of the municipality authorities.

[50], has also indicated the link between the land use and utility infrastructure planning, plan implementation and management and process across institutions. He asserts that the most common factors that affect the compatibility of utility and urban land use functions are the incompatibility of activities resulting in an overlap of utilities and land use boundaries. As the author's findings indicate, the understanding of such factors and incompatibilities of utilities are considered as a solution to the problem. The author's work attests the real and empirical problem of utility infrastructure in the city under discussion, the reality in Addis Ababa is quite different in. Though these issues can be considered as input in the literature, there is a need to fill the lacuna by way of rigorous research in the area selected for the research.

[51] work entitled, *An Assessment of Sustainable Rural Water Supply: The Case of Ofla Wārāda in Tigray Region*, cited in [52] is another empirical study that attests sustainability and infrastructure for integrated approach. It clearly depicts different views ascribed to sustainability and clearly examined them on the trajectory of sustainability. The thesis operate these issues in two ways, viz. pre project and post project analysis. This study demonstrates that one's view of sustainability and its determinant factors, including when and where these are implemented in the life of a project, affect sustainability outcomes.

[52] examined how changing conditions may affect the sustainability of a community rural water supply project over the long term in their brief account of sustainability of a community water supply project in Kenya. The study has examined and took for granted, various strands which are

attributed to sustainability such as: supply, rainfall patterns, new project withdrawals, water knowledge management, and so forth, and concludes that the initial assumption for sustainability should be explicitly identified during planning and design. This assertion is consistent with my intent of synergizing sustainability with infrastructure projects in my area of study. Moreover, a need for a recognition of the dynamic nature of sustainability due to its changing nature need to be taken in to account and be considered in all phases of the project cycle. This assertion has concurrence with my intended research which epicentres sustainability as a crux in infrastructure projects. Be that as it may, this work only focused on water projects and dealt with in the Kenyan context. Thus, it doesn't take the reality in our area into account.

In a nutshell, fundamental lacunas as related to the reviewed literature which are aimed at filling the gaps include: issues which are indicated with regard to sustainability of projects comports with the allocation of budget to consider sustainability than integration of concerned stakeholders in both dimensions to attain sustainability.

The available literature attempts to indicate sustainable development is overwhelmingly one sided which disregard other sectors and gives emphasis to aspects pertaining to transportation. Other sectors, viz. water, electricity telecommunication etc. which are the crux of my research objective are given less emphasis.

Moreover, there is dearth of empirical materials which comports to the context of Africa and our country for all the others point to the rest of the continent mainly Europe, USA and Asia. Thus African contexts in general and the Ethiopian context, in particular, need to be taken into account. That is what my study undertakes.

2.7. Conceptual Framework

In the above research articles cited, an attempt has been made to demonstrate that there is a correlation between integration and infrastructure projects (IS) projects and the social, environmental and economic developments of a country. Such a broad view is commonly considered to be an essential aspect of sustainability.

The idea of sustainable development (SD) as an explicit concept can be traced back to 1987 when the World Commission on Environment and Development defined it as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [53]. The most common general assessment framework is based on the three pillars of sustainability: Environmental, Economic and Social.

This study has been framed in such a way that, integration between service rendering organizations in construction of infrastructure projects has an effect in socio economic development of a country. Sustainability of infrastructure projects can be measured on the impact that could be seen on economic, social and environmental developments of a country. As illustrated in figure 2.8.1 below, the independent variables necessitate the integration between service rendering organizations during construction of infrastructure projects. These are Addis Ababa Road Authority (AARA), Ethio Telecom (ETC), Addis Ababa Water and Sewerage Authority (AAWSA), Ethiopian Electric Utility (EEU) and the role of project controllers and implementers. The dependent variable would be the effect of sustainability of infrastructure projects that were observed on the factors: economic, social, environmental and technological developments.

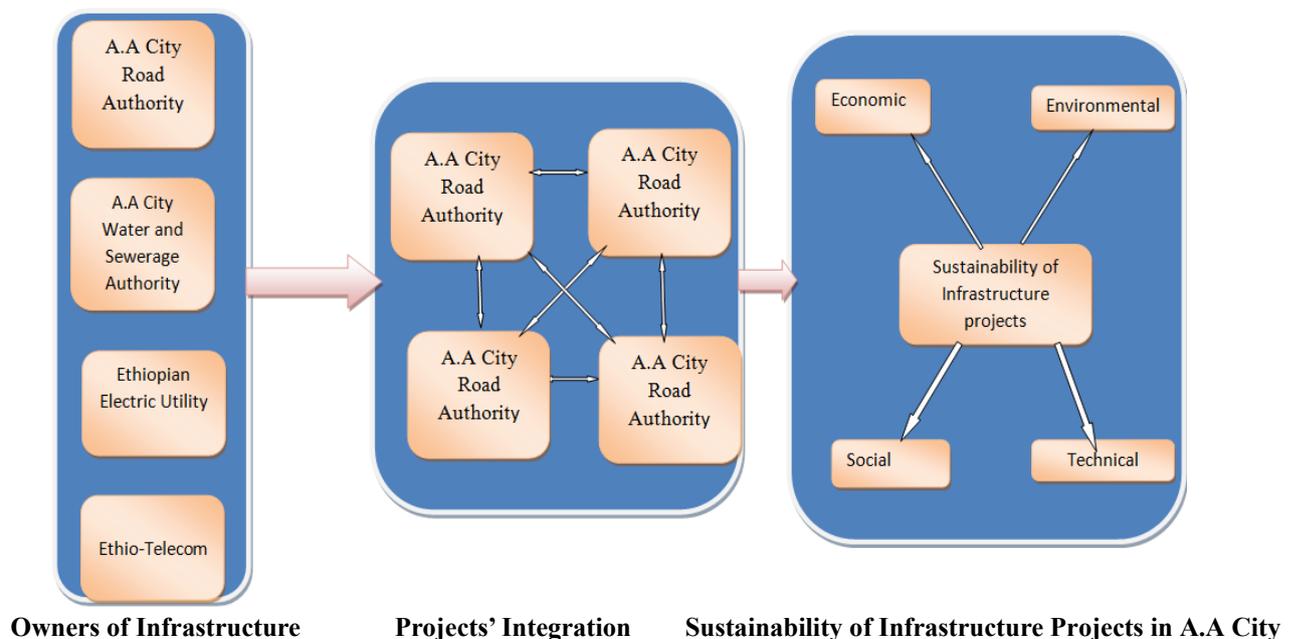


Figure 2.8.1. The Framework for the effect of stakeholders Integration toward the sustainability of infrastructure Projects

3. Research Methodology

3.1. Methodology

This research employed a mixed method approach in collecting and analysing data. Both qualitative and quantitative strategies are used in the collection of data for the study. The concept of mixing different methods probably originated. The method gives an opportunity for the researcher to use both closed and open ended question to gather information from the respondents. Since all methods have limitations, the researcher felt that biases inherent in one of the methods could neutralize or cancel the biases of other methods. Also the research employed this mixed method approach to support one of the methods with the other to triangulate data obtained by one method, the qualitative, with the other, the quantitative. Triangulating data sources-a means for seeking convergence across qualitative and quantitative methods-were born [54].

The researcher here has converged quantitative and qualitative data in order to provide a comprehensive analysis of the research problem. In this design, the investigator collected both forms of data at the same time during the study and then integrated the information thoroughly to help in the interpretation of the overall results.

For the qualitative method, the researcher used structured interviews, and site observation that are optimal for collecting data and generating broad overviews of the research questions related to horizontal and vertical integration among service rendering institutions involved in constructing sustainable infrastructure projects.

On the other hand questionnaires were used to collect data for the quantitative one. In this method a questionnaire is sent (usually by post) to the persons concerned with a request to answer the questions and return the questionnaire. A questionnaire consists of a number of question sprinted or typed in a definite order on a form or set of forms.

3.2. Research Design

To uncover problems that are attributed to sustainability of infrastructure projects, the researcher has used “cross-sectional study design” The reason behind selecting this design is for it is the most convenient and commonly used design in researches where there are different entities to be examined in the process of the study. Moreover, it best suites to studies aimed at finding out the prevailing realities among various enterprises, institutions, and organizations etc.

3.3. Selection of the Research Setting

As Addis Ababa is home to many international organizations and seat for African Union on top of her being the capital of the federal government Ethiopia, various projects are growing to realize interconnected objectives. By virtue of these opportunities, suitability for the current selected theme and taking feasibility issues into account, the city is selected as a research setting.

3.4. Sources of Data

For the study there were two types of data sources: primary and secondary data sources. The Addis Ababa city infrastructure providing authorities and on site observation were taken in to account as the primary source of information. Secondary data were collected from the respective infrastructure providing authorities, and nearby communities who are close to all stages in the functioning of the projects.

3.5. Target Population

The population of this study consisted of professional employees, consultants engaged in the construction of infrastructure projects of the four service rendering institutions: Ababa Road Authority, Addis Ababa Water and Sewerage Authority, Ethio Telecom and Electric Utility and representatives of the community who are close to all stages in the functioning of the project. These four organizations are selected for the study since they are governmental organizations and they are easily accessible for the collection of data.

After a profile of all involved in the construction of infrastructure projects under study was evaluated; the selection of the sample for the study from the four organizations was purposively completed.

3.6. Data Type, Sampling and Size

3.6.1. Data Type

The study uses both primary and secondary data types. The primary data types are collected through interviews, questionnaires, field observations and pictorial data collection. On the other hand, secondary data types are collected from published and unpublished sources, such as documents, plans, reports, official statistical data and information and other related materials collected from different sources.

The questionnaire had helped to provide data about the effects of integration between the service rendering institutions on the sustainability of the infrastructure projects, however; the structured interview helped to assist in explaining and interpreting the findings of a quantitative study and overcoming the weaknesses in using one method with the strengths of the other.

3.6.2. Sampling Technique

The study employed purposive sampling technique to collect data from the selected samples.

Here among the different types of purposive sampling methods the researcher had used an expert sampling method. An expert sampling is used because this technique enables the researcher to glean knowledge from individuals that have particular expertise [55].

The purposively selected sample respondents in the study were project owners, professional staffs; design and planning engineers, project managers or site engineers, environmental experts and other professional project staffs.

3.6.3. Sample Size

In this study for the data collected from interviews, four project owners or representatives of the owners of the four service rendering organizations, and four consultants of the projects, two project site managers and two householders, representatives of the community who were close to all stages in the functioning of the project under consideration were interviewed and site observations on the four road projects were also made.

On the other hand the data from questionnaires was collected from the four service rendering institutions with a total population 110 that 86 samples were derived.

In the determination of the sample size for the quantitative study, the three criteria; level of confidence, risk and degree of variability [56]) were important to gather the required data from sample respondents. These enabled the researcher to determine appropriate sample size.

3.7. Data Collection Tools

3.7.1. Instrument Development

Instruments were designed in such a way that they would enable the researcher to attain the objectives of the study set, following the principles of survey questionnaires. The survey instruments: questionnaires and interviews' protocol were prepared in English. The following are the data collection tools employed in the study.

3.7.1.1. Structured Interview

The researcher used structured interviews to obtain detailed research-relevant information i.e. explore issues related to horizontal and vertical integration among service rendering organizations and individuals in infrastructure construction projects. 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.

3.7.1.2. Survey_ Questionnaire

This was simply a tool for collecting and recording information about a particular issue of interest, but also included clear instructions and space for answers. The questionnaires prepared had a definite purpose that was related to the objectives of the research, since the research method employed in this study was a mixed type the structured questionnaires here were associated with quantitative research, i.e. research that is concerned with numbers (how many? How often? How satisfied?).

3.7.1.3. Observation

Under this method, the information sought by way of investigator's researcher's direct observations without asking questions or explanations from the respondents.

Observation technique was used by the researcher by spending some time in places where infrastructure projects of the city are being undertaken and conjectured how their intersection affected their sustainability either positively or otherwise. The researcher observed the reality on the ground where he witnessed that one project being affected by the other upon the order of the other authority due to the non-existence of integration and coordination in project implementation.

3.7.2. Instrument Validity

Validity is the degree to which a test measures what it purports to measure and the validity of the questionnaire data depends in a crucial way on the ability and willingness of the respondents to provide the information requested [57]. The questionnaire employed was adapted from [58] and made suit for the existing research environment. Furthermore the questionnaires adapted were pilot tested by the selected respondents and found out to be valid.

3.7.3. Instrument Reliability

In this study each statement of the questionnaires is rated on a 5 point Likert response scale which included strongly agree, agree, undecided, disagree and strongly disagree. Based on this, an internal consistency reliability test was conducted. Based on this an internal consistency reliability test was conducted. So, the instruments are found to be consistent with the objectives of the study.

3.7.4. Ethical Considerations

All the research participants included in this study were appropriately informed about the purpose of the research and their willingness and consent was secured before the commencement of distributing the survey questionnaire and asking them to give their responses to the interview questions. The other ethical consideration of this research is in keeping the findings not to be disadvantageous to participants. The author shall not intentionally misreport findings which would be disadvantageous to the participants.

3.8. Data Processing

Data processing was made in two phases namely: data clean-up and data reduction. During data clean-up the collected raw data were edited to detect anomalies, errors and omissions in responses and checked that the questions were answered accurately and uniformly. The methods of data processing in this study were manual and computerized. In the data processing procedure editing, coding, classification and tabulation of the collected data were done.

3.9. Data Analysis

This is the further transformation of the processed data to look for patterns and relationship between and/or among data groups by using descriptive and inferential (statistical) analysis. The Statistical Package for Social Science (SPSS) version 20 was used to analyze the data obtained from

primary sources. Specifically, descriptive statistics (mean, standard deviation) and inferential statistics (correlation and regression) are taken from this tool.

3.9.1. Descriptive Analysis

Descriptive analysis was used to reduce the data into a summary format by tabulation (the data arranged in a table format) and measure of central tendency (mean and standard deviation). Moreover, pie charts were used to describe the general characteristics of enterprises.

3.9.2. Inferential Analysis

Inferential statistics allows inferring from the data through analysis the relationship between two or more variables and how several independent variables might explain the variance in a dependent variable. In this study, an inferential statistical model General Linear Model (GLM) was used for quantitative method of analysis.

4. Data Presentation and Analysis

4.1. Data Presentation and Analysis of Survey Questionnaires

4.1.1. Introduction

In connection with this, the study has attempted to see the effects of horizontal and vertical project integration toward the sustainability of infrastructure projects in terms of environment, economic and social development.

The questionnaire analysis consists of three parts; the first part refers to the demographic characteristics of the respondent population, the second part deals with the core subjects of the research which depicted the relationship between the dependent and independent variables. The dependent variables (DV) demonstrated the sustainability of economic, environment and social development of the projects under consideration. Under these core variables, the researcher had incorporated other factors to measure the effects of project integration on the DVs. The third parts of the questionnaire dealt with the technical dimensions of the project management such as performance, reliability, durability and flexibility.

4.1.2. Response Rate

From the distributed 86 survey questionnaires, the researcher collected 70 questionnaires, the rest 16 were not returned. Due to this, the study has a response rate of 81.4%, which referred to as excellent response rate.

4.1.3. Data Analysis Procedures

In order to accomplish the appropriate analysis, the study deployed SPSS version 20 tools. The statistics method employed to conduct the data analysis included frequency distribution, general linear model and descriptive statistics.

Pursuant to this, the frequency distribution was applied for the “Demographic Pattern Analysis”, and since the data was characterized by the nominal scale of measurement, the “General Linear Model” specifically multivariate GLM (MANOVA) was used for the analysis of the effects of “Project Integration” towards the “Sustainability of infrastructure projects economically, Socially and environmentally” development. The general linear model (GLM) is a flexible statistical model that incorporates normally distributed dependent variables and categorical or continuous independent variables. The statistical confidence level for the analysis was estimated to be 95% and with the probability error of 5%. If the probability of error (P) value was found out to be below 0.05 the result could be said significant. On the other side if p value is > 0.05 the result will be statistically insignificant. The study applied this method because of the reason that Multivariate GLM is a technique used to conduct Analysis of Variance for tests having more than one dependent variable. Following this analysis, the last part, which measured the technical dimension of the project, employed a method of “Descriptive Statistics”.

4.1.4. Demographic Pattern

The demographic pattern includes the demographic characteristics of the respondent population to which the survey questionnaires were distributed including the sex, age, educational level, current position and work experience of the respondents. The researcher believed the demographic pattern has effects on the quality of the study to evaluate their responses. For instance:

4.1.4.1. Distribution of the Respondent Population

Table 4.1.4.1. Name of your institution/project

	Frequency	Percent	Valid Percent	Cumulative Percent
Addis Ababa Road Authority	18	25.7	25.7	25.7
Ethiopian Electric Utility	17	24.3	24.3	50
Addis Ababa Water and Sewerage Authority	17	24.3	24.3	74.3
Ethio-Telecom	18	25.7	25.7	100
Total	70	100	100	

Source: Survey result

As could see from the table and Pi-chart, the number of respondents of was well distributed across the service rendering organizations selected for the study. The researcher hoped that the information obtained would be fairly balanced which in turn enable him to draw a fair conclusion at the end.

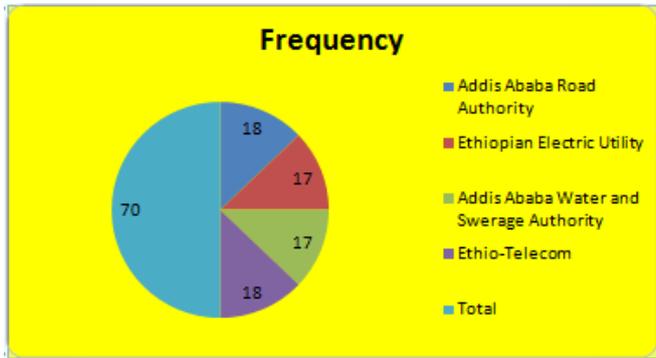


Figure 4.1.4.1. Frequency Distribution

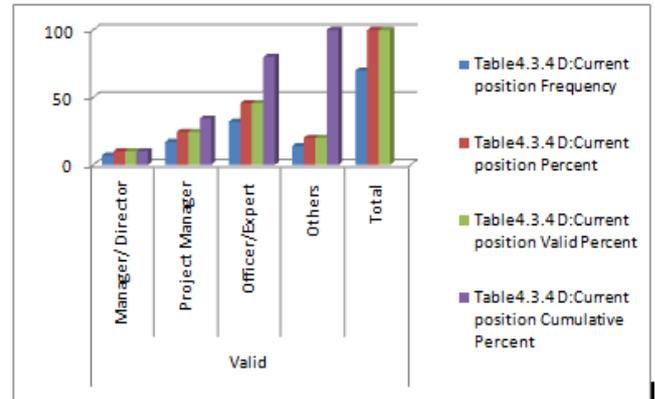


Figure 4.1.4.3. Current position of Respondents

4.1.4.2. Educational level of Respondents

Table 4.1.4.2. Educational level of Respondents

		Frequency	Percent	Cumulative Percent
Valid	MA/MSc	38	54.3	54.3
	BA/BSC	31	44.3	98.6
	others	1	1.4	100.0
	Total	70	100.0	

Source: Respondents Information

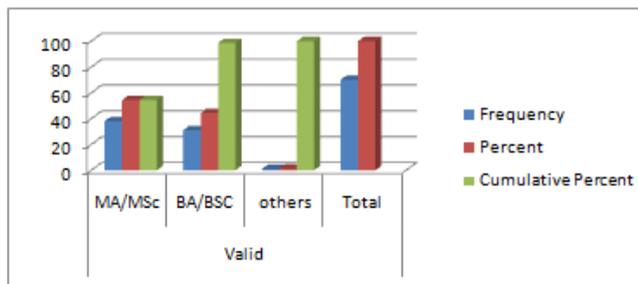


Figure 4.1.4.2. Educational level of Respondents

As could be seen in the table and bar graph 4.1.4.2, out of 70 respondents 31 of them were first degree holders while the 38 were second degree holders and one respondent was unclassified. This attest that the sample population was education wise well qualified and were believed to provide adequate and pertinent information, concerning the subject under study.

4.1.4.3. Current Position of Respondents

Table 4.1.4.3. Current position of respondents

		Frequency	Percent	Valid percent	Cumulative Percent
Valid	Manager Director/ Coordinator	7	10.0	10.0	10.0
	Project Manager	17	24.3	24.3	34.3
	Officer/ Expert	32	45.7	45.7	80.0
	Others	14	20.0	20.0	100.0
	Total	70	100.0	100.0	

Looking at the table and bar graph 4.1.4.3 many of the respondents were not only qualified, experienced and skilled but also hold key positions in their respective organizations. For instance 7(10%) of the respondents were General Managers, or Deputy Managers or Directors, while 49 (70%) of them were either project managers or experts or officers. Although the rest 14 (20%) respondents were not given rank, they were not by any means less experienced and skilled.

4.1.4.4. Work Experience of Respondents

Table 4.1.4.4. Current position of respondents

		Frequency	Percent	Valid percent	Cumulative Percent
Valid	Below 2 yrs	3	4.3	4.3	4.3
	2-6 yrs	11	15.7	15.7	20.0
	7-11 yrs	24	34.3	34.3	54.3
	12 yrs and above	32	45.7	45.7	100.0
	Total	70	100.0	100.0	

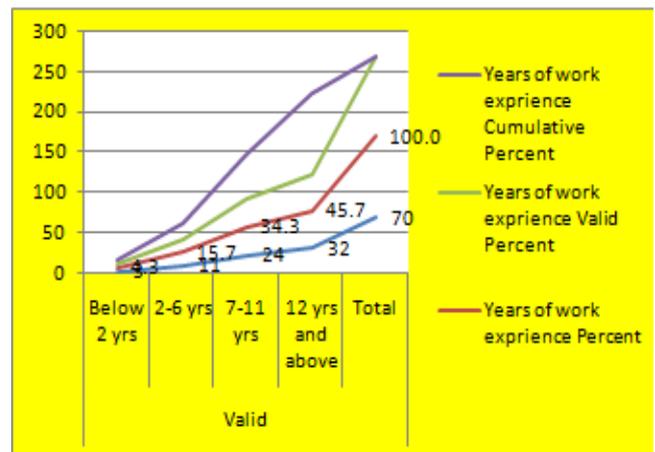


Figure 4.1.4.4. Years of work experience of Respondents

As could be seen in the table and line graph 4.1.4.4 the work experience of the respondents range from below 2 years to above 12 years. This indicates that at most

respondents were not only qualified but also well talking. The novice as could be seen in the table and line experienced to know a gist of what they were doing and graph was very few.

4.1.5. The effect of Project Integration (Independent Variable) on the Sustainability of Social Development (Dependent Variable)

General Linear Model

Table 4.1.5B. Multivariate Test^a

	Effect	Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power ^d
Intercept	Pillai's Trace	.983	267.151 ^b	11.000	51.000	.000	2938.656	1.000
	Wilks' Lambda	.017	267.151 ^b	11.000	51.000	.000	2938.656	1.000
	Hotelling's Trace	57.621	267.151 ^b	11.000	51.000	.000	2938.656	1.000
	Roy's Largest Root	57.621	267.151 ^b	11.000	51.000	.000	2938.656	1.000
SSD1(IV)	Pillai's Trace	1.535	3.058	44.000	216.000	.000	134.563	1.000
	Wilks' Lambda	.101	3.666	44.000	197.068	.000	152.089	1.000
	Hotelling's Trace	3.987	4.485	44.000	198.000	.000	197.346	1.000
	Roy's Largest Root	2.877	14.126 ^c	11.000	54.000	.000	155.383	1.000
a. Design: Intercept + QN9								
b. Exact statistic								
c. The statistic is an upper bound on F that yields a lower bound on the significance level.								
d. Computed using alpha = .05								

Source: Respondents Information

As seen above in Table 4.1.5.B the general linear model test displayed that the effect of the IV of SSD1 on the DV that described from “SSD 2” up to “SSD 12”. This showed that the IV “There are a number of issues related to services rendering agencies/organizations that have integrated to sustain infrastructure projects constructed in A.A” had a significant effect on the dependent variables with the value of $P < 0.05$. This implied that the integration of project rendering organizations (Ethio-telecom, EEU, AARA and AAWSA) have affected positively the social development of the community.

4.1.6. The Effect of Project Integration on Sustainability of Economic Development

General Linear Model

Table 4.1.6B. Multivariate Tests^a

	Effect	Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power ^d
Intercept	Pillai's Trace	.989	423.135 ^b	9.000	42.000	.000	3808.211	1.000
	Wilks' Lambda	.011	423.135 ^b	9.000	42.000	.000	3808.211	1.000
	Hotelling's Trace	90.672	423.135 ^b	9.000	42.000	.000	3808.211	1.000
	Roy's Largest Root	90.672	423.135 ^b	9.000	42.000	.000	3808.211	1.000
SED1	Pillai's Trace	2.099	5.519	36.000	180.000	.000	198.683	1.000
	Wilks' Lambda	.027	7.197	36.000	159.131	.000	234.325	1.000
	Hotelling's Trace	7.703	8.665	36.000	162.000	.000	311.953	1.000
	Roy's Largest Root	4.240	21.199 ^c	9.000	45.000	.000	190.787	1.000
SED2	Pillai's Trace	1.329	2.488	36.000	180.000	.000	89.557	1.000
	Wilks' Lambda	.164	2.743	36.000	159.131	.000	90.993	1.000
	Hotelling's Trace	2.634	2.963	36.000	162.000	.000	106.661	1.000
	Roy's Largest Root	1.561	7.807 ^c	9.000	45.000	.000	70.266	1.000
SED1 * ED2	Pillai's Trace	3.085	2.898	81.000	450.000	.000	234.711	1.000
	Wilks' Lambda	.007	4.025	81.000	280.395	.000	207.489	1.000
	Hotelling's Trace	9.776	4.855	81.000	362.000	.000	393.230	1.000
	Roy's Largest Root	4.456	24.753 ^c	9.000	50.000	.000	222.780	1.000
a. Design: Intercept + SED1 + SED2 + SED1 * SED2								
b. Exact statistic								
c. The statistic is an upper bound on F that yields a lower bound on the significance level.								
d. Computed using alpha = .05								

Source: Respondents Information

Table 4.1.6 B suggested the multivariate analysis between the DVs (SED3 –SED11) and the IVs (SED1 and SED2) respectively. According to the report the two IVs SED1 (“There is horizontal and/or vertical integration between our projects and other service rendering organizations’ projects in sustaining infrastructure projects”), and SED2 (“There are a number of issues related to services rendering agencies/organizations that are integrated to sustain infrastructure projects constructed in A.A.”) had a significant effect i.e. $P < 0.05$. This result indicated that there is proper integration of project work among the four organizations to enhance economic sustainability.

4.1.7. The Effect of Project Integration on the Sustainability of Environment Development

General Linear Model

Table 4.1.7B. Multivariate Tests^a

	Effect	Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power ^d
Intercept	Pillai's Trace	.928	87.009 ^b	8.000	54.000	.000	696.068	1.000
	Wilks' Lambda	.072	87.009 ^b	8.000	54.000	.000	696.068	1.000
	Hotelling's Trace	12.890	87.009 ^b	8.000	54.000	.000	696.068	1.000
	Roy's Largest Root	12.890	87.009 ^b	8.000	54.000	.000	696.068	1.000
EVD1	Pillai's Trace	1.116	2.758	32.000	228.000	.000	88.263	1.000
	Wilks' Lambda	.247	2.895	32.000	200.737	.000	84.067	1.000
	Hotelling's Trace	1.799	2.951	32.000	210.000	.000	94.434	1.000
	Roy's Largest Root	.820	5.842 ^c	8.000	57.000	.000	46.738	.999
a. Design: Intercept + QN9								
b. Exact statistic								
c. The statistic is an upper bound on F that yields a lower bound on the significance level.								
d. Computed using alpha = .05								

Table 4.1.7B indicated the multivariate test (MANOVA) for four different tests. In this test, they are all significant ($P < 0.05$), so the study disclosed that the collection of IV did have a significant effect on the DVs (environment development).

4.1.8. Effects of Challenges of Service Rendering Organizations Faced, Enhancement of Project Integration, and Management of Project integration on Sustainability of Economic, Environmental and Social Development

4.1.8.1. Effects of Challenges of Service Rendering Organization Faced on Economic, Environmental and Social Development

Table 4.1.8.1B disclosed a report on the effects of the IVs, i.e. EFSRO 1 & 2 (“There are challenges which our organization faced due to lack of coordination between infrastructure projects”, and “The challenges we faced could have been minimized and or eliminated if certain follow ups were made available from project owners or agencies.”) on the DVs that are described in the table as SD (“Social development”), ECD (Economic Development) and ENVD (Environmental development).

According to the result, the effect of the first independent variable, i.e., EFSR1 (IV) had no significant effect on the DVs, however; on the contrary to this, the second independent variable had a statistical significant effect on social development (SD), economic development (ED), and environmental development (ENVD).

This enabled the researcher to imply that there are challenges that organization faced due to lack of coordination between infrastructure projects which have negative effects on social, economic, and environmental development.

Based on the responses provided by the respondents on the open ended question which says, “Briefly explain the challenges your organizations faced in sustaining infrastructure projects you constructed in the city in the last two years?”, most of the respondents mentioned as common challenges issues such as right of way, effecting compensation related problems, provision of timely supplies of material, scarcity of human power, timely delivery of project design affect projects sustainability negatively.

For instance the effect of these challenges was manifested on additional cost incurred for the project contractor due to the unnecessarily prolonged life of the project.

Table 4.1.8.1B. Multivariate Tests^a

Effect		Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power ^d
Intercept	Pillai's Trace	.946	152.311 ^b	6.000	52.000	.000	913.866	1.000
	Wilks' Lambda	.054	152.311 ^b	6.000	52.000	.000	913.866	1.000
	Hotelling's Trace	17.574	152.311 ^b	6.000	52.000	.000	913.866	1.000
	Roy's Largest Root	17.574	152.311 ^b	6.000	52.000	.000	913.866	1.000
EFSRO1(IV)	Pillai's Trace	.399	1.381	18.000	162.000	.147	24.863	.860
	Wilks' Lambda	.644	1.378	18.000	147.563	.150	23.282	.826
	Hotelling's Trace	.486	1.369	18.000	152.000	.155	24.644	.854
	Roy's Largest Root	.293	2.639 ^c	6.000	54.000	.026	15.832	.816
EFSRO2(IV)	Pillai's Trace	.593	2.215	18.000	162.000	.005	39.873	.985
	Wilks' Lambda	.470	2.504	18.000	147.563	.001	42.163	.989
	Hotelling's Trace	.994	2.797	18.000	152.000	.000	50.348	.998
	Roy's Largest Root	.843	7.590 ^c	6.000	54.000	.000	45.543	1.000
EFSR1 * EFSR2	Pillai's Trace	.535	1.952	18.000	162.000	.015	35.133	.968
	Wilks' Lambda	.542	1.985	18.000	147.563	.014	33.466	.956
	Hotelling's Trace	.712	2.003	18.000	152.000	.013	36.050	.971
	Roy's Largest Root	.460	4.140 ^c	6.000	54.000	.002	24.838	.962
a. Design: Intercept + QN4 + QN5 + QN4 * QN5								
b. Exact statistic								
c. The statistic is an upper bound on F that yields a lower bound on the significance level.								
d. Computed using alpha = .05								

4.1.8.2. Effects of enhancement of Project Integration on Social, Economic and Environmental Development

Table 4.1.8.2B. Multivariate Tests^a

Effect		Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power ^d
Intercept	Pillai's Trace	.960	188.324 ^b	6.000	47.000	.000	1129.944	1.000
	Wilks' Lambda	.040	188.324 ^b	6.000	47.000	.000	1129.944	1.000
	Hotelling's Trace	24.041	188.324 ^b	6.000	47.000	.000	1129.944	1.000
	Roy's Largest Root	24.041	188.324 ^b	6.000	47.000	.000	1129.944	1.000
EFPI1	Pillai's Trace	1.049	2.962	24.000	200.000	.000	71.084	1.000
	Wilks' Lambda	.265	3.187	24.000	165.173	.000	65.016	1.000
	Hotelling's Trace	1.736	3.292	24.000	182.000	.000	78.997	1.000
	Roy's Largest Root	.938	7.815 ^c	6.000	50.000	.000	46.888	1.000
EFPI2	Pillai's Trace	.958	2.626	24.000	200.000	.000	63.014	.999
	Wilks' Lambda	.281	3.017	24.000	165.173	.000	61.627	.999
	Hotelling's Trace	1.797	3.406	24.000	182.000	.000	81.746	1.000
	Roy's Largest Root	1.347	11.225 ^c	6.000	50.000	.000	67.348	1.000
EFPI1 * EFPI2	Pillai's Trace	1.297	2.049	42.000	312.000	.000	86.044	1.000
	Wilks' Lambda	.196	2.212	42.000	223.902	.000	69.795	.998
	Hotelling's Trace	2.109	2.276	42.000	272.000	.000	95.605	1.000
	Roy's Largest Root	.891	6.621 ^c	7.000	52.000	.000	46.349	.999
a. Design: Intercept + QN1 + QN3 + QN1 * QN3								
b. Exact statistic								
c. The statistic is an upper bound on F that yields a lower bound on the significance level.								
d. Computed using alpha = .05								

Source: Respondents Information

Table 4.1.8.2B described the effect of the enhancement of project integration on the three dependent variables that were categorized as social, economic and environmental development aspects. The finding indicated the existence of statistically significant effect. Pursuant to the report, the effect of the IVs, i.e. EFPI1 & 2 (“The issue of sustaining projects was incorporated starting from planning stage of infrastructure projects”, and “Continuous management effort was made in our organization to sustain the projects done by our organization”) on the DVs (that were coded as SD3&4, ECD5&6, ENVD 7& 8) were found to be statistical significant figures i.e. $P=0.000<0.05$.

Based on this result, the study highlighted that the enhancement project integration as a whole had positive effect on social, economic and environmental development.

4.1.8.3. Effects of Management of Project Integration on Social, Economic and Environment Development

Table 4.1.8.3B depicted the multivariate analysis of the three IVs, MPI1, 2 &3 (“There is a legal entity that is responsible to coordinate infrastructure projects in A.A. City Administration”, “The body that is responsible to coordinate infrastructure projects contributed a lot in sustaining infrastructure projects in A.A”, and “There is institutional collaboration /coordination /dialogue/ experience sharing between agencies in sustaining infrastructure projects”) effect on the DVs SD3 (“The project has planned a compensating package to those affected parties during demolition process”), SD4 (“Appropriate costs were considered for the compensation made for the damaged environment to the local residents, land, water, and ecosystems during the project”), ECD5 (“The project has evaluated local, regional, national, and even global market supply and demand of current similar projects and in the future”), ECD6 (“The feasibility analysis done have given more emphasis to total cost for building-up, operating, maintaining, and disposing a construction project over its life), ENVD7 (“The project considered waste produced from project operation in the planning stage”), and ENVD8 (“Examined potential water pollution from the proposed project, including both surface and ground water, and project’s consumption of water resources).According to the result the IVs had a significant effect ($P<0.05$) on DVs as seen in group.

This implies the IVs have a statistical significant effect on group of DVs.

Table 4.1.8.3B. Multivariate Tests^a

	Effect	Value	F	Hypothesis df	Error df	Sig.	Noncent. Parameter	Observed Power ^d
Intercept	Pillai's Trace	.986	438.454 ^b	6.000	37.000	.000	2630.725	1.000
	Wilks' Lambda	.014	438.454 ^b	6.000	37.000	.000	2630.725	1.000
	Hotelling's Trace	71.101	438.454 ^b	6.000	37.000	.000	2630.725	1.000
	Roy's Largest Root	71.101	438.454 ^b	6.000	37.000	.000	2630.725	1.000
MPI1	Pillai's Trace	.792	2.331	18.000	117.000	.004	41.958	.987
	Wilks' Lambda	.370	2.459	18.000	105.137	.002	41.290	.984
	Hotelling's Trace	1.292	2.561	18.000	107.000	.001	46.097	.993
	Roy's Largest Root	.909	5.907 ^c	6.000	39.000	.000	35.444	.994
MPI2	Pillai's Trace	1.274	3.116	24.000	160.000	.000	74.774	1.000
	Wilks' Lambda	.170	3.586	24.000	130.288	.000	72.474	1.000
	Hotelling's Trace	2.658	3.932	24.000	142.000	.000	94.362	1.000
	Roy's Largest Root	1.714	11.429 ^c	6.000	40.000	.000	68.573	1.000
MPI3	Pillai's Trace	1.291	3.178	24.000	160.000	.000	76.275	1.000
	Wilks' Lambda	.131	4.302	24.000	130.288	.000	86.451	1.000
	Hotelling's Trace	3.728	5.515	24.000	142.000	.000	132.354	1.000
	Roy's Largest Root	2.838	18.921 ^c	6.000	40.000	.000	113.526	1.000
a. Design: Intercept + QN6 + QN8 + QN10 + QN6 * QN8 + QN6 * QN10 + QN8 * QN10 + QN6 * QN8 * QN10								
b. Exact statistic								
c. The statistic is an upper bound on F that yields a lower bound on the significance level.								
d. Computed using alpha = .05								

Source: Respondents Information

Descriptive Statistics

Table 4.1.9A. Descriptive Statistics Analysis

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
The project performance	70	0	5	257	3.67	.974
Reliability of the project	70	0	5	251	3.59	.985
Durability of the project	68	0	5	240	3.53	1.203
Flexibility and adaptability of the project	70	0	5	228	3.26	1.270
Flexibility to recover of the project	70	0	5	211	3.01	1.291
The project vulnerability to failure	70	0	5	145	2.07	1.407
Valid N (listwise)	68					
Aggregate Mean		0.00	5.00	222	3.19	1.19

Source: Respondents Information

4.1.9. Technical Dimension of the Project

The technical aspect of the project has incorporated the factors project performance, reliability, durability, flexibility and adaptability, flexibility of the project to recover and vulnerability to failure. In order to measure the technical dimension, the study deployed 6 Likert scales that range from “Excellent”, “Very good”, “Good”, “Poor”, “Very poor and “I do not know”.

Accordingly, the study tried to analyze these factors using descriptive statistics to measure the technical dimension of the project and produced the following reports using SPSS 20 version. To compare the results 3 is taken as hypothetical average.

As seen in the Table 4.1.9 A the study report disclosed that descriptive mean of the technical dimensions of the project in terms of six variables, project performance, reliability, durability, both flexibility & reliability of the project, flexibility of the project to recover and vulnerability of the project from failure. Based on the evaluation, all variables had attributed a positive effect toward the technical dimensions of the project which referred; the project had good performance, reliability, durability, flexibility and adaptability, easy recover, and poor vulnerability of the project to failure. This output of the study implied that there is a satisfactory technical dimension in four organizations (AAWS, Ethio-Telecom, EEU and AARA) and this has affirmative contribution toward the social, economic and environmental development.

4.2. Interview Analysis Based on the key Points of Discussion

i) Integration of projects as a vital element to enhance sustainability

Service rendering organizations under study who are engaged in the construction as well as maintenance of infrastructural projects are invariably convinced about their contribution to the national development launching infra-structural projects that they had embarked upon. An issue of integration, vertical and horizontal as well, is of paramount importance to foster effective and efficient infra-structure

project as it is indicated by responses from each of the respondents. Though these infrastructural projects are totally different in their functions, they are launched because they are found to be crucial to satisfying the economic and social needs and create favourable environmental conditions.

As responses from each of the respondents indicated, there is vertical integration of each organization channeled through its structure as the case may be. Though there were attempts, it was not realistic and practical. In this regard, the Addis Ababa Road Authority disclosed that there was vertical integration for there was (still there is) a kind of steering committee which consisted of members from both federal and city administration levels and there is also a technical steering committee that works at the city level. Though there was vertical integration, it is worth noting its contribution in fostering sustainability of infra-structure projects was minimal since a significant economic damage was observed due to lack of real integration among stakeholders.

ii) Implication of challenges that service rendering organizations encountered due to lack of synergizing their functions.

Nothing is more preponderant than right of way issue when one discusses pertinent challenges that obstruct sustenance of infra-structure projects. As it is well known, the road construction is the epicenter in the process of maintaining integration by taking into account different projects such as water, electricity and telecom services. This research revealed interesting stories exhibited due to lack of integration vis-a-vis right of way and other pertinent factors.

The view observed from a respondent who was in charge of running service delivery in electric utility was informative of the prevailing economic damage done. He stated that the organization had made a deal with a French company to maximize the capacity of electrical power in a project which cost some 2 million dollar by interconnecting electric sources as a ring form in the city. But all what had been tried and done became fiasco when the rail way project had been totally dismantled for it was considered more important than the project which was grounded. The respondent was also anticipating damage again when currently envisaged Rail

way project which would be crossing the city north –south would be implemented.

Another story of damage resulting from lack of integration vis-à-vis right of way was indicated by a coordinator of project. He observed that there was a damaged road by telecom while laying their infrastructure. Though Telecom tried to maintain the damaged road, it showed a sign of submerged. Thus, it was hardly possible for this road to render its service. Moreover, since telecom as given the right to detain anyone who cut the fiber structured underground network due to security reason, contractors often faced predicaments of enhancing projects. Thus, this kind of lack of integration also contributed to the delay of project completion as per the schedule set and delivers services to the community there by contributing to the development endeavor.

All respondents mentioned the right of way issue as a central problem in sustaining projects as it was critical. Things were interrelated and interdependent. Thus, the failure of one activity of the project would result in waning the activities of others unless integrated actions are taken. The issue of relocating the already reestablished service giving infrastructure and issues pertains to payment of compensation was problematic and there was an arduous and time consuming argument to settle the bills within a given period of time.

This research revealed that whenever the Road Authority which was expected to be a center for integration of projects was ready for the construction new infrastructure, problem invariably there was a failure from other stake holders because of lack of efficient and organized preparedness to run the envisaged project. At this juncture it is very important to enumerate these points by taking in to account the response obtained from the manager who was running road service. Firstly, organizations almost fail to avail their design timely and were not well cognizant of what they plan to implement in the next five years.

Secondly organizations engaged themselves in construction of infrastructure projects whenever they obtained loan and fund from funding organization. Thus what they were always doing was firefighting.

Thirdly, service rendering organizations frequently changed their supervisors and by doing so they contributed to lack of continuity/flow or disruption work progress because the newly assigned supervisors lack adequate knowledge of the history of the projects. As observed from the head of road authority of the city, he had openly disclosed that no organization could provide a strategic plan that did not entail problems that were detrimental to the economic, social and environmental benefits that the city could have gained from sustainable projects.

iii) Legal entity a paramount concern for sustainability to projects

All respondents invariably agreed on the importance of having legal entity. The absence of legal entity was one

major factor for lack of integration of projects from their design level. There was a view by the road section to organize projects that needed to be considered by all stakeholders. At the earlier stage the road section was expecting other stakeholders to avail their design and plan so that projects were viable for integration. They disclosed that every organization should be accountable for any delay or failure or disruption of projects. This view was upheld but the road section was affected by what happened because of failure of integration. This was true when seen from the vantage point of the road authority's endeavors. All the persons I talked to on this issue agree on the need for establishing a legal entity and the ground for the creation of the legal entity has to paved by government directive'. It is believed that this would enforce laws pertaining to disruption of projects. Otherwise, the result would be economically damaging, socially disarranging and environmentally disruptive.

As the research endeavor indicated, the task of the legal entity would be to coordinate and organize all stakeholders including the community starting from its initial planning level. This would help to forge an agreement between project owner and other public organizations and the community who have stake regarding the project. The agreement need to be law binding to control, monitor and even obliterate project which signaled failure at various stage.

iv) Measures to be taken to enhance sustainability

As it has been indicated by respondents from Road Authority, the would be established/ legal entity should require organizations to provide their plan. Concomitant to this service rendering organization could use the duct to put their line. Since there is evident problem of scheduling in each of the organization running infrastructure projects, what need to be finalized at feasibility stage and identifying risks and mitigation is proceeding to the implementation stage. Thus projects need to foresee ahead of time by encompassing the mentioned plans than fire fighting when problems are arise in order to realize the objectives of projects integration become very crucial to expedite, and to sustain projects for the benefit of the nation. In order to realize integration of projects, legal entity is paramount importance without which the realization of the objectives of Economic, Social and Environmental development could have been possible.

In a nutshell, the interview administered to either heads of projects or consultants of the organizations selected for the study, revealed that there was a positive effect of horizontal and vertical integration of projects. It also revealed that the challenges of disruption or delay of completion was faced by service rendering organization while running their respective projects without notifying other stakeholders. And a way out from this kind of problem and to foster integration as well as the establishment of the issue of legal entity which was significantly of paramount importance needed to be sought out.

4.3. Observation Analysis

The researcher spent some time visiting each of the projects under study, that is “Hultegha Police station –Kidist Mariam–Janmeda project, Lideta-tsebel-AfricaUnion-Bulgeria-Meskel flower project Kidus-Gebriel-Abo mazoria and East West project,” and he observed the following real challenges faced by the projects owners during implementation period.

The research primarily observed that all the utility projects were put in place under the excavated pedestrian road made ready by the road projects. In realizing the excavation work and putting utilities in place all the service rendering organizations were expected to let their share of work go hand in hand in an integrated way.

However, the researcher observed the following major problems that hindered the construction of infrastructure projects due to lack of integration between the projects stake holders.

1. One of the main problems observed was the trespassing of the right of way problem. For instance, Houses, fences, electric poles, utilities found underground were not cleared or relocated in time by the concerned authorities. All projects under study were not to the schedule because of the right of way problems that hampered the smooth construction of infrastructure. (See Appendix D)
2. Due attention was not given by the project owners, “Wereda” and “kebele” administrators regarding the payment of compensation for the houses and fences of the community members found around the infrastructure projects or relocating these people to other area such as condominium houses did not occur. Due to this fact the houses and fences to be demolished were seen as they were for long period of time after the projects constructions started.
3. There were shortages of resources to mobilize or absence of resources to be installed for the construction of utility projects on the projects site.
4. Members of the community who were near to the projects were seen encountering numerous problems,

that is, they were unable to get in to or out of their house due to the holes excavated to bury utilities in front of their main gates; they also faced health problems because the holes were covered with dirt and filled with polluted water..

5. In one of the road projects named “Lideta-tsebel-AfricaUnion-Bulgeria-meskel flower” project Ethio-telecom dug the road to install telephone line after the first phase road construction was completed This happened due to lack of integration between these two organizations, the Road Authority and Ethio-telecom. Moreover the installation of the telephone line was seen not implemented on time. Due to this lack integrate approach two major problems surfaced, that is, additional cost was incurred to rehabilitate the construct road and the livelihood of the community was put at risk.

5. Summary of Findings and Conclusions

5.1. Summary of Findings

The preceding findings of the research showed that Integration between service rendering organizations in the provision of sustainable infrastructure projects is essential to make their endeavors more harmonious in the interest of efficiency, effectiveness and quality. From this point of view, inter-organizational integration is the topmost prerequisite when different government agencies seek to provision infrastructure projects in A.A. The reason for this is that when those service rendering agencies required acting on constructing certain project independently, coordination challenges may occur, to wit, the organizations activities of the infrastructure projects may overlap. The results from the analysis of the IS provision in A.A showed this process suffers from lack of integration, especially inter-government organization integration, during all phases of IS provision, planning, implementing and closure phases.

Table 5.2.1. Summary of Quantitative findings

Variables	Sig	Result	Judgment	Remark
The effect of Project Integration on the Sustainability of Social Development	0.23	$P=0.23>0.05$	Statistically insignificant	
The effect of Project Integration on Sustainability of Economic Development	0.02	$P=0.022<0.05$	Statistically significant	
The Effect of Project Integration on the Sustainability of Environment Development	0.04	$P=0.041<0.05$	Statistically significant	
Effects of Challenges of Service rendering Organization faced on Economic, Environmental and Social Development	0.17	$P=0.176>0.05$	Statistically insignificant	
Effects of enhancement of Project Integration on Social, Economic and Environmental	0.06	$P=0.06>0.05$	Statistically insignificant	
Effects of Management of Project Integration on Social, Economic and Environment Development	0.16	$P=0.16>0.05$	Statistically insignificant	

Based on the analysis of survey questionnaires, an interview and observation made in chapter four, the following major findings are summarized.

1. The study showed that horizontal and vertical integration among service rendering organization can have a positive effect on sustainability of infrastructure projects.
2. The study showed the challenges service rendering organization faced due to lack of integration, which has a negative effect on sustainability of infrastructure projects.
3. The findings indicated that there is a need to establish a legal entity that is responsible to integrate construction of infrastructure projects at a city level. The entity is also required to have full power, and which can also enforce laws pertaining to disruption of projects while integrating construction of infrastructure projects by different service rendering organizations.
4. The study showed that the right of way issue should be addressed and resolved first before the construction of infrastructure projects begins.
5. The finding indicated that in the process of integrating projects service rendering organizations, first and foremost should give due attention to finalize the planning and design of their projects.
6. The study showed that there are a lot of issues that service rendering organizations integrate to sustain infrastructure projects, such as, in planning and design of the projects, in mobilizing and pooling resources for the construction, in excavation work, handling right of way issues, cost sharing through resource sharing, etc.

5.2. Conclusions

Based on the analysis of survey questionnaires, interviews and observations made in chapter four, and having reflected on how the study results aligned with the research questions and the broader question of integration between service rendering organizations in A.A city, the following conclusions were reached.

We have seen that in Addis Ababa there are infrastructures projects if well integrated can sustain and contribute to the national development imperatives.

Yet, for this, the derive for sustainability of projects is darkened by lack of adequate integration among stake holders who are running different projects with different objectives but will have an effect of social hazard, economic crisis and environmental disruption.

There is a growing body of evidence that led to the findings and implicature about lack of cross-fertilization of ideas starting from the planning stage among authorities who are running infrastructure projects. The four service rendering organizations have brought tremendous challenges in the sustainability of projects. As the research finding endeavored, by employing both qualitative and quantitative

methods, to reveal that in today's prevailing circumstances with regard to project coordination and integration, it is quite difficult to maintain sustainability.

In the face of all these seemingly insurmountable and intricate problems with regard to creating coordinated and integrated smooth functioning of infrastructure projects the Addis Ababa City administration needs to prepare directives so that its different units when embarked on infrastructure projects work in unison and should communicate issues pertaining to the right of way and enhancing project activities.

Besides there needs for legal entity that can enforce laws to sustain projects that are vital for socio-economic development and healthy environment.

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